



## A - MILLING

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## MILLING



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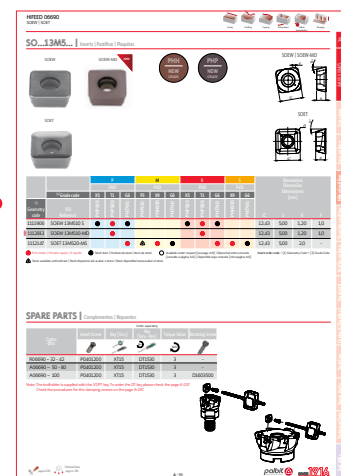
## A-8

## 4 - Select your insert.

Choose the chip-breaker for your operation:

- Chip-breaker L= Light (for light cuts when low forces/power are required)
- Chip-breaker M = Medium (first choice for mixed production)
- Chip-breaker H = Heavy (for rough operations, forging, cast skin and vibration)
- Select insert grade for optimum productivity
- The insert marked as "stock available under request" has a minimum order quantity according to the following table:

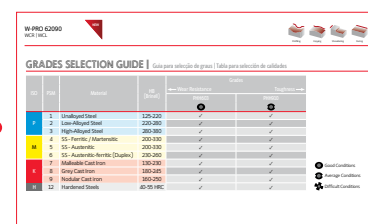
| Qty | *IC Size   |
|-----|------------|
| 300 | ≤ IC 25 mm |
| 150 | > IC 25 mm |



## 5 - Define your starting cutting parameters.

Cutting speeds and feeds for different materials are given on the insert boxes and in the tables for each solution.

The values should be optimized according to the machine and conditions.



## INSERTS CODIFICATION FOR MILLING HOLDERS

Codificação de pastilhas para fresas | Codificación de insertos para herramientas de fresado

| Code | Inserts Description | Page | Code | Inserts Description | Page | Code | Inserts description       | Page      |
|------|---------------------|------|------|---------------------|------|------|---------------------------|-----------|
| 000  | PD...W 1204         | 82   | 202  | XPET 1706           | 153  | 450  | WNHU 060410               | 196       |
| 060  | SE...T/W 1204       | 76   | 245  | RDHW 0702           | 217  | 490  | WNHU 04T3...              | 125   196 |
| 062  | SP...X 1204         | 178  | 250  | RD...T/W 1003 MO    | 217  | 495  | WNXT 0806...              | 121       |
| 063  | POKT 0403           | 89   | 251  | RD...T/W 12T3MO     | 217  | 500  | WNMW 1207                 | 113       |
| 064  | SOEW   SOET 0803... | 93   | 252  | RD...T/W 1604MO     | 217  | 505  | WDET   WDMW 1204...       | 109       |
| 065  | SPKT/W 08T308       | 117  | 253  | RD...T/W 2006MO     | 217  | 620  | WCL(R)...                 | 191   192 |
| 066  | SOEW   SOET 13M...  | 99   | 280  | SN...U 1206         | 57   | 630  | XPGT 3206...              | 194       |
| 068  | SOEW   SOET 1605... | 104  | 335  | RD...0802           | 203  | 720  | XNHW 1205...              | 229       |
| 083  | VCGX 220530         | 176  | 336  | RP...10T3           | 203  | 760  | XDGX 15M5                 | 169       |
| 099  | SE...T/W 13T3       | 79   | 337  | RP...1204           | 203  | 770  | XDGX 22M7                 | 173       |
| 163  | XNKU 06T3           | 85   | 338  | RP...1605           | 203  | 900  | LNXT 0904                 | 158       |
| 170  | AP...T 1003         | 181  | 339  | RP...2006           | 203  | 901  | LNXT 1306                 | 161       |
| 171  | ANHX 1004           | 126  | 341  | RPHT 10T3-LS(4)     | 205  | 902  | PN...X 1105               | 61        |
| 175  | ANHX 1204           | 132  | 342  | RPHT 1204-LS(4)     | 205  | 903  | LNXT 1506                 | 165       |
| 180  | AP... 1604          | 187  | 351  | RN...1204           | 211  | 908  | SN...X 1206 & ON...X 0505 | 65        |
| 181  | ANHX 1607           | 135  | 400  | XDHW 060210         | 223  | 909  | SN...X 1206               | 69        |
| 200  | XP... 0602          | 139  | 405  | XDHW 10T310         | 223  | 912  | SN...X 1606 & ON...X 0606 | 73        |
| 201  | XP.. 1003           | 147  | 410  | XDHW 040110         | 223  |      |                           |           |



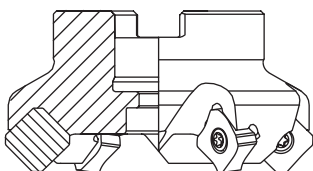
## COUPLING TYPES

Tipo de acoplamiento | Tipo de acoplamiento

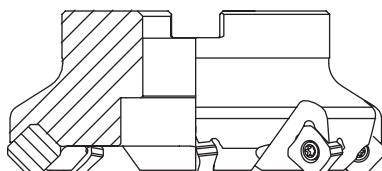
| Symbol<br>Símbolo<br>Símbolo | Coupling type<br>Tipo de acoplamiento<br>Tipo de acoplamiento           | Inserts fixation type<br>Fixação de pastilhas<br>Fijación de plaquitas                                                                                                        | Standard<br>Norma<br>Norma                       |
|------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| <b>A</b>                     | Arbor mounting<br>Montagem tipo árvore<br>Montaje tipo husillo          | Insert screw<br>Parafuso pastilha<br>Tornillo de la plaquita                                                                                                                  | ISO 6462                                         |
| <b>B</b>                     |                                                                         | Wedge<br>Cunha<br>Cuña                                                                                                                                                        | ISO 6462                                         |
| <b>C</b>                     |                                                                         | Insert screw and washer, Screw clamp or clamp<br>Parafuso para pastilha e anilha, parafuso e grampo ou grampo<br>Tornillo de la plaquita y arandela, tornillo y brida o brida | ISO 6462                                         |
| <b>D</b>                     |                                                                         | Washer<br>Anilha<br>Arandela                                                                                                                                                  | ISO 6462                                         |
| <b>E</b>                     | Cylindrical shank<br>Haste cilíndrica<br>Mango recto                    | Any type<br>Qualquer tipo<br>Cualquier tipo                                                                                                                                   | DIN 1835 - A                                     |
| <b>R</b>                     | Threaded coupling<br>Acoplamiento roscado<br>Acoplamiento tipo tornillo | Any type<br>Qualquer tipo<br>Cualquier tipo                                                                                                                                   | Palbit internal standard<br>Norma interna Palbit |
| <b>W</b>                     | Weldon shank<br>Haste weldon<br>tipo mango                              | Any type<br>Qualquer tipo<br>Cualquier tipo                                                                                                                                   | DIN 1835 - B                                     |
| <b>X</b>                     | Special coupling<br>Acoplamiento especial<br>Acoplamiento especial      | Any type<br>Qualquer tipo<br>Cualquier tipo                                                                                                                                   |                                                  |

## ISO ARBOR MOUNTING TYPES | Estilos de montagem ISO tipo árvore | Estilos de montaje ISO tipo husillo

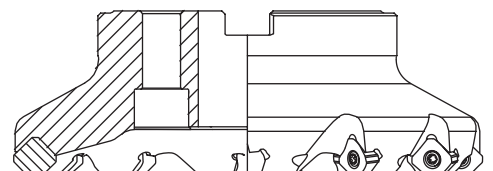
Arbor type A



Arbor type B



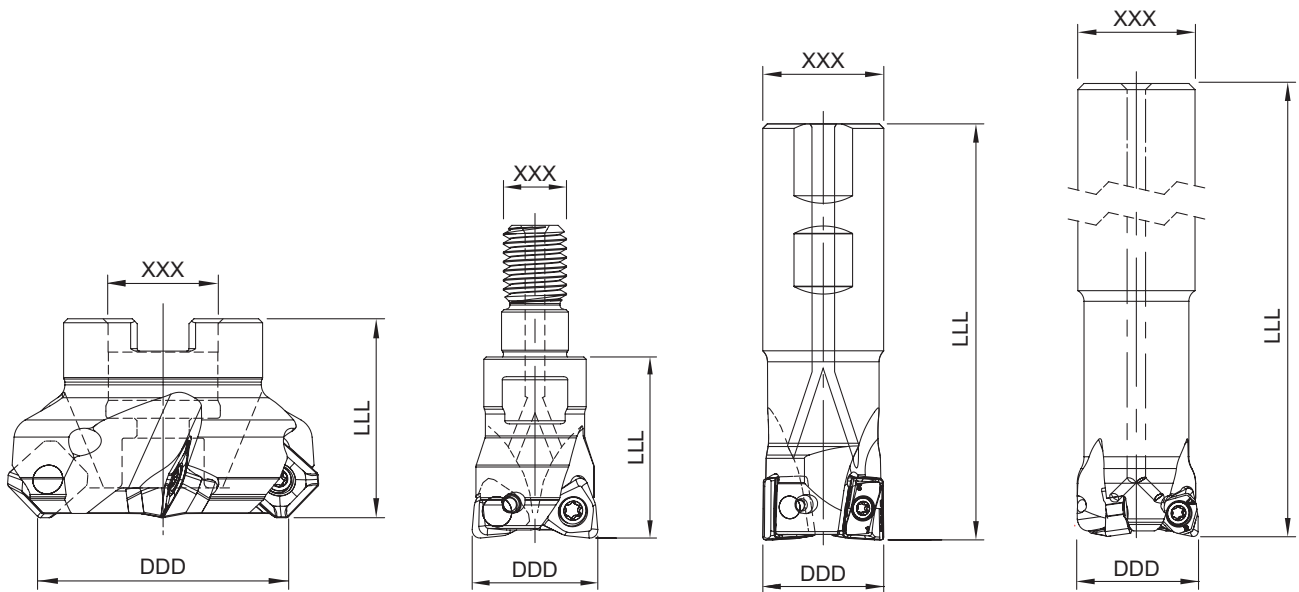
Arbor type C



NOTE: For each type of arbor mounting (see previous table of coupling type on symbols A, B, C, D), we can have a different arbor types (see images above).

# MILLING TOOLS CODIFICATION

Codificação das ferramentas de fresagem | Codificación de heramientas de fresado



**DDD Y ZZZ TT-NN-LL U XXX LLL-L-AAA ##**

Diameter  
Diâmetro  
Diámetro

Coupling Type (A-10)  
Tipo de acoplamento (A-10)  
Tipo de acoplamiento (A-10)

Insert Type (A-9)  
Pastilha aplicável (A-9)  
Inserto aplicable (A-9)

Lead angle  
Ângulo de posicionamento da pastilha  
Ángulo de posicion del inserto

Number of teeth  
Número de dentes  
Numero de dientes

Axial angle (angle of the tool constrution)  
Ângulo Axial (ângulo de construção da ferramenta)  
Ángulo Axial (ángulo de la construcción de herramienta)

Cooling system  
Refrigeração  
Refrigeración  
U - Whitout cooling system  
U - Sem refrigeração  
U - Sin refrigeración

Coupling diameter  
Diâmetro de acoplamento  
Diámetro de acoplamiento

Total length  
Comprimento total  
Longitud total

Rotation (R/L)  
Rotação (R/L)  
Rotación (R/L)  
\*In case of right rotation  
the "R" is supressed.

Depth of cut  
Profundidade de corte  
Profundidad del corte  
\*In case it is a helical cutter

Number of inserts  
Número de pastilhas  
Número de Insertos  
\*In case it is a helical cutter

# MILLING TOOLS OVERVIEW

| A                | MILLING |                                                                                                                      | LINEPRO<br>00036                                                                    | LINEPRO<br>06045                                                                    | NEW<br>LINEPRO<br>06290                                                            | P. HIFEED<br>06320                                                                  | HIFEED<br>06410                                                                     | HIFEED<br>06590                                                                     | HIFEED<br>06690                                                                     | HIFEED<br>06815                                                                       | ALUPRO<br>08390                                                                       | LINEPRO<br>09945                                                                      | NEW<br>TETRAFEED<br>16320                                                             | LINEPRO<br>17090                                                                      |  |
|------------------|---------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--|
|                  |         | Page                                                                                                                 | 82                                                                                  | 76                                                                                  | 178                                                                                | 88                                                                                  | 92                                                                                  | 116                                                                                 | 98                                                                                  | 104                                                                                   | 176                                                                                   | 78                                                                                    | 84                                                                                    | 180                                                                                   |  |
| Overview         |         | Insert                                                                                                               | PD...<br>1204...                                                                    | SE...<br>1204...                                                                    | SP...<br>1204...                                                                   | POKT<br>0403...                                                                     | SO...<br>0803...                                                                    | SP...<br>08T3...                                                                    | SO...<br>13M5...                                                                    | SO...<br>1605...                                                                      | VCGX<br>2205...                                                                       | SE...<br>13T3...                                                                      | XNKU...<br>06...                                                                      | AP...<br>1003...                                                                      |  |
|                  |         | Arbor<br>mounting                                                                                                    | Ø 66-160                                                                            | Ø 50-160                                                                            | Ø 40-160                                                                           | Ø 40-66                                                                             | -                                                                                   | -                                                                                   | Ø 50-100                                                                            | Ø 63-160                                                                              | -                                                                                     | Ø 50-250                                                                              | Ø 40-63                                                                               | Ø 40-63                                                                               |  |
| Face milling     |         | Weldon<br>Shank                                                                                                      | -                                                                                   | -                                                                                   | -                                                                                  | -                                                                                   | Ø 20-32                                                                             | Ø 20-32                                                                             | -                                                                                   | -                                                                                     | -                                                                                     | -                                                                                     | Ø 16-32                                                                               | Ø 16-25                                                                               |  |
|                  |         | Cylindrical<br>Shank                                                                                                 | -                                                                                   | -                                                                                   | -                                                                                  | Ø 20-40                                                                             | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                     | -                                                                                     | -                                                                                     | -                                                                                     | -                                                                                     |  |
| Hifeed milling   |         | Threaded<br>Coupling                                                                                                 | -                                                                                   | -                                                                                   | -                                                                                  | Ø 16-42                                                                             | Ø 20-42                                                                             | Ø 20-42                                                                             | Ø 32-42                                                                             | -                                                                                     | Ø 32                                                                                  | -                                                                                     | Ø 16-42                                                                               | Ø 16-25                                                                               |  |
|                  |         | <br>Facing                          |    |    |   |    |    |    |    |    |    |    |    |    |  |
| Shoulder milling |         | <br>Shouldering                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |   |                                                                                       |                                                                                       |   |  |
|                  |         | <br>Slanted Shoulder<br>& Chamfer |  |  |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |  |                                                                                       |                                                                                       |  |
| Profile milling  |         | <br>Ramp down                     |  |                                                                                     |                                                                                    |  |  |  |  |  |  |                                                                                       |  |  |  |
|                  |         | <br>Helical<br>Interpolation      |  |                                                                                     |                                                                                    |  |  |  |  |  |  |                                                                                       |  |  |  |
| Hardmill         |         | <br>Plunging                      |                                                                                     |                                                                                     |                                                                                    |  |  |  |  |  |                                                                                       |                                                                                       |  |                                                                                       |  |
|                  |         | <br>Side milling                  |                                                                                     |                                                                                     |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |  |
| Center & Chamfer |         | <br>Slotting                      |                                                                                     |                                                                                     |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |  |                                                                                       |                                                                                       |  |  |
|                  |         | <br>Profiling                     |                                                                                     |                                                                                     |                                                                                    |  |  |  |  |  |  |                                                                                       |  |                                                                                       |  |
| Spot face        |         | <br>Copying                       |                                                                                     |                                                                                     |                                                                                    |  |  |  |  |  |  |                                                                                       |  |                                                                                       |  |
|                  |         | <br>Plunging &<br>Recessing       |                                                                                     |                                                                                     |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |  |                                                                                       |                                                                                       |                                                                                       |  |

 Main Operation

 Other Operations



|  | PLUS<br>17190                                                                       | PLUS<br>17590                                                                       | LINEPRO<br>18090                                                                    | PLUS<br>18190                                                                       | LINEPRO<br>20090                                                                                              | LINEPRO<br>20190                                                                                              | LINEPRO<br>20290                                                                    | TOROMILL<br>24590                                                                   | TOROMILL<br>25090                                                                    | TOROMILL<br>25190                                                                     | TOROMILL<br>25290                                                                     | TOROMILL<br>25390                                                                     | PLUS<br>28088                                                                        |
|--|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|  | 126                                                                                 | 130                                                                                 | 186                                                                                 | 134                                                                                 | 138                                                                                                           | 144                                                                                                           | 152                                                                                 | 214                                                                                 | 214                                                                                  | 214                                                                                   | 216                                                                                   | 216                                                                                   | 56                                                                                   |
|  | ANHX<br>1004...                                                                     | ANHX<br>1206...                                                                     | AP...<br>1604...                                                                    | ANHX<br>1607...                                                                     | XPET<br>0602...                                                                                               | XPET<br>1003...                                                                                               | XPET<br>1706...                                                                     | RD...<br>0702...                                                                    | RD...<br>1003...                                                                     | RD...<br>12T3...                                                                      | RD...<br>1604...                                                                      | RD...<br>2006...                                                                      | SN...U<br>1206...                                                                    |
|  | Ø 40-100                                                                            | Ø 40-125                                                                            | Ø 40-125                                                                            | Ø 50-160                                                                            | -                                                                                                             | Ø 40-63                                                                                                       | Ø 40-125                                                                            | -                                                                                   | Ø 42-52                                                                              | Ø 50-80                                                                               | Ø 52-160                                                                              | Ø 80-160                                                                              | Ø 50-200                                                                             |
|  | Ø 14-40                                                                             | Ø 25-40                                                                             | Ø 25-40                                                                             | Ø 32-40                                                                             | -                                                                                                             | Ø 16-27                                                                                                       | Ø 32-40                                                                             | Ø 15                                                                                | Ø 20                                                                                 | Ø 25                                                                                  | -                                                                                     | -                                                                                     | -                                                                                    |
|  | -                                                                                   | Ø 26-33                                                                             | -                                                                                   | -                                                                                   | Ø 10-21                                                                                                       | -                                                                                                             | -                                                                                   | -                                                                                   | -                                                                                    | -                                                                                     | -                                                                                     | -                                                                                     | -                                                                                    |
|  | -                                                                                   | Ø 25-42                                                                             | -                                                                                   | Ø 32-40                                                                             | Ø 10-32                                                                                                       | Ø 16-40                                                                                                       | -                                                                                   | Ø 15-20                                                                             | Ø 20-42                                                                              | Ø 24-42                                                                               | Ø 32-35                                                                               | -                                                                                     | -                                                                                    |
|  |    |    |    |    |                              |                              |    |    |    |    |    |    |   |
|  |   |   |   |   |                             |                             |   |                                                                                     |                                                                                      |                                                                                       |                                                                                       |                                                                                       |  |
|  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                                               |                                                                                                               |                                                                                     |                                                                                     |                                                                                      |                                                                                       |                                                                                       |                                                                                       |                                                                                      |
|  |                                                                                     |                                                                                     |  |                                                                                     |                            |                            |  |  |  |  |  |  |                                                                                      |
|  |                                                                                     |                                                                                     |  |                                                                                     |                            |                            |  |  |  |  |  |  |                                                                                      |
|  |  |  |                                                                                     |  |                            |                            |  |  |  |  |  |  |                                                                                      |
|  |                                                                                     |                                                                                     |                                                                                     |                                                                                     | <br>(only with<br>XPET-HF) | <br>(only with<br>XPET-HF) |                                                                                     |                                                                                     |                                                                                      |                                                                                       |                                                                                       |                                                                                       |                                                                                      |
|  |  |  |  |  |                            |                            |  |  |  |  |  |  |                                                                                      |
|  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                            |                            |                                                                                     |  |  |  |  |  |                                                                                      |
|  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                            |                            |                                                                                     |  |  |  |  |  |                                                                                      |
|  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                                               |                                                                                                               |                                                                                     |                                                                                     |                                                                                      |                                                                                       |                                                                                       |                                                                                       |                                                                                      |

A

MILLING

Overview

Face milling

Hifed milling

Shoulder milling

Profile milling

Hardmill

Center &amp; Chamfer

Spot face

Spare Parts

Technical Data

End Mills

# MILLING TOOLS OVERVIEW

| A                | MILLING                                                                                                        |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                  |                                                                                                                | TOROMILL<br>33590                                                                   | TOROMILL<br>33690                                                                   | TOROMILL<br>33890                                                                   | TOROMILL<br>33990                                                                   | <sup>NEW</sup><br>TURBOMILL<br>34190                                                | <sup>NEW</sup><br>TURBOMILL<br>34290                                                | TOROMILL X2<br>35190                                                                | LINEPRO<br>40095                                                                      | LINEPRO<br>40595                                                                      | LINEPRO<br>41095                                                                      | PLUS<br>45095                                                                         |
| Overview         | Page                                                                                                           | 200                                                                                 | 200                                                                                 | 202                                                                                 | 202                                                                                 | 204                                                                                 | 204                                                                                 | 210                                                                                 | 222                                                                                   | 222                                                                                   | 222                                                                                   | 198                                                                                   |
|                  | Insert                                                                                                         | RDHT<br>0802...                                                                     | RPHT<br>10T3...                                                                     | RPHT<br>1605...                                                                     | RPHT<br>2006...                                                                     | RPHT<br>10T3...LS(4)                                                                | RPHT<br>1204...LS(4)                                                                | RNHX<br>1204...                                                                     | XD...<br>0602...                                                                      | XD...<br>10T3...                                                                      | XD...<br>0401...                                                                      | WNHU<br>0604...                                                                       |
| Face milling     | Arbor mouting                                                                                                  | -                                                                                   | -                                                                                   | Ø 50-125                                                                            | Ø 80-125                                                                            | Ø 42-52                                                                             | Ø 40-80                                                                             | Ø 40-80                                                                             | -                                                                                     | Ø 52-80                                                                               | -                                                                                     | -                                                                                     |
|                  | Weldon Shank                                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | Ø 32                                                                                | -                                                                                     | -                                                                                     | -                                                                                     | -                                                                                     |
| Hifeed milling   | Cylindrical Shank                                                                                              | Ø 16-25                                                                             | Ø 20-32                                                                             | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                     | -                                                                                     | -                                                                                     | -                                                                                     |
|                  | Threaded Coupling                                                                                              | Ø 16-32                                                                             | Ø 20-35                                                                             | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | Ø 32-42                                                                             | Ø 16-25                                                                               | Ø 25-42                                                                               | Ø 10-12                                                                               | Ø 25-42                                                                               |
| Shoulder milling |  Facing                       |    |    |    |    |    |    |    |    |    |    |    |
|                  |  Shouldering                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
| Profile milling  |  Slanted Shoulder & Chamfer |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                  |  Ramp down                  |  |  |  |  |  |  |  |  |  |  |                                                                                       |
| Hardmill         |  Helical Interpolation      |  |  |  |  |  |  |  |  |  |  |                                                                                       |
|                  |  Plunging                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
| Center & Chamfer |  Side milling               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                  |  Slotting                   |  |  |  |  |  |  |  |  |  |  |                                                                                       |
| Spot face        |  Profiling                  |  |  |  |  |  |  |  |  |  |  |  |
|                  |  Copying                    |  |  |  |  |  |  |  |  |  |  |  |
| Spare Parts      |  Plunging & Recessing       |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                  |                                                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
| Technical Data   |                                                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                  |                                                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
| End Mills        |                                                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                  |                                                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       |

 Main Operation

 Other Operations

|  | PLUS<br>49090                                                                      | PLUS<br>49095                                                                       | NEW<br>HEXAPLUS<br>49590                                                            | HIFEED<br>50060                                                                     | HIFEED<br>50560                                                                     | NEW<br>W-PRO<br>62090                                                               | NEW<br>BALLPRO<br>63090                                                             | HARDMILL<br>72090                                                                  | ALUPRO<br>76090                                                                       | ALUPRO<br>77090                                                                       | TGPLUS<br>90090                                                                       | TGPLUS<br>90190                                                                       |
|--|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  | 124                                                                                | 196                                                                                 | 120                                                                                 | 112                                                                                 | 108                                                                                 | 190                                                                                 | 194                                                                                 | 226                                                                                | 168                                                                                   | 172                                                                                   | 156                                                                                   | 160                                                                                   |
|  | WNHU<br>04T308-LP                                                                  | WNHU<br>04T3...                                                                     | WNXT<br>0806...                                                                     | WN...<br>1207...                                                                    | WD...<br>1204...                                                                    | WC...<br>08...                                                                      | XPXT<br>3206...                                                                     | XNHW<br>1205...                                                                    | XDGX<br>15M5...                                                                       | XDGX<br>22M7...                                                                       | LNXT<br>0904...                                                                       | LNXT<br>1306...                                                                       |
|  | -                                                                                  | -                                                                                   | Ø 40-125                                                                            | Ø 52-80                                                                             | Ø 52-80                                                                             | -                                                                                   | -                                                                                   | Ø 40-160                                                                           | Ø 40-100                                                                              | Ø 50-125                                                                              | Ø 40-63                                                                               | Ø 40-125                                                                              |
|  | -                                                                                  | -                                                                                   | Ø 32-50                                                                             | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                  | -                                                                                     | -                                                                                     | Ø 16-32                                                                               | Ø 25-40                                                                               |
|  | Ø 16-25                                                                            | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | Ø 8-20                                                                              | -                                                                                   | -                                                                                  | Ø 20-40                                                                               | Ø 32-40                                                                               | Ø 25-32                                                                               | Ø 25-40                                                                               |
|  | Ø 16-32                                                                            | Ø 16-35                                                                             | -                                                                                   | Ø 35                                                                                | -                                                                                   | -                                                                                   | Ø 32                                                                                | -                                                                                  | -                                                                                     | -                                                                                     | Ø 25-32                                                                               | -                                                                                     |
|  |   |    |    |    |    |    |                                                                                     |   |    |    |    |    |
|  |  |                                                                                     |   |                                                                                     |                                                                                     |   |                                                                                     |  |   |   |   |   |
|  |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                    |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|  |                                                                                    |                                                                                     |  |  |  |                                                                                     |                                                                                     |                                                                                    |  |  |                                                                                       |                                                                                       |
|  |                                                                                    |                                                                                     |  |  |  |                                                                                     |                                                                                     |                                                                                    |  |  |                                                                                       |                                                                                       |
|  |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                    |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|  |                                                                                    |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                    |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|  |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                    |  |  |  |  |
|  |                                                                                    |  |                                                                                     |  |  |  |  |                                                                                    |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|  |                                                                                    |  |                                                                                     |  |  |  |  |                                                                                    |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|  |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                    |  |  |                                                                                       |                                                                                       |

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center &amp; Chamfer

Spot face

Spare Parts

Technical Data

End Mills

# MILLING TOOLS OVERVIEW

| A                | MILLING                    |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |
|------------------|----------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                  |                            | PLUS<br>90260                                                                       | TGPLUS<br>90390                                                                     | PLUS<br>90845                                                                       | PLUS<br>90945                                                                         | PLUS<br>91245                                                                         |
| Overview         | Page                       | 60                                                                                  | 164                                                                                 | 64                                                                                  | 68                                                                                    | 72                                                                                    |
|                  |                            | Insert<br>PN...<br>1105...                                                          | LNXT<br>1506...                                                                     | SN... 1206...<br>ON... 0505...                                                      | SN...1206...                                                                          | SN... 1606...<br>ON... 0606...                                                        |
| Face milling     | Arbor mouting              | Ø 50-160                                                                            | Ø 50-160                                                                            | Ø 50-250                                                                            | Ø 50-250                                                                              | Ø 63-250                                                                              |
|                  |                            | Weldon Shank                                                                        | -                                                                                   | Ø 32-40                                                                             | -                                                                                     | -                                                                                     |
| Hifeed milling   | Cylindrical Shank          | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                     | -                                                                                     |
|                  |                            | Threaded Coupling                                                                   | -                                                                                   | -                                                                                   | -                                                                                     | -                                                                                     |
| Shoulder milling | Facing                     |    |    |    |    |    |
|                  |                            | Shouldering                                                                         |   |                                                                                     |                                                                                       |                                                                                       |
| Profile milling  | Slanted Shoulder & Chamfer |  |                                                                                     |  |  |  |
|                  |                            | Ramp down                                                                           |                                                                                     |                                                                                     |                                                                                       |                                                                                       |
| Hardmill         | Helical Interpolation      |  |                                                                                     |                                                                                     |                                                                                       |                                                                                       |
|                  |                            | Plunging                                                                            |                                                                                     |                                                                                     |                                                                                       |                                                                                       |
| Center & Chamfer | Side milling               |  |                                                                                     |                                                                                     |                                                                                       |                                                                                       |
|                  |                            | Slotting                                                                            |  |                                                                                     |                                                                                       |                                                                                       |
| Spare Parts      | Profiling                  |  |                                                                                     |                                                                                     |                                                                                       |                                                                                       |
|                  |                            | Copying                                                                             |                                                                                     |                                                                                     |                                                                                       |                                                                                       |
| Technical Data   | Plunging & Recessing       |  |                                                                                     |                                                                                     |                                                                                       |                                                                                       |
|                  |                            |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |

 Main Operation

 Other Operations

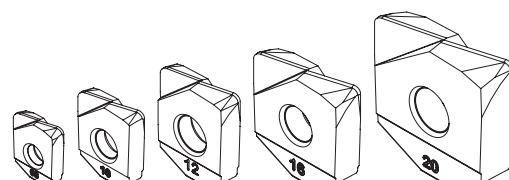
# NEW W-PRO 62090 = NEW GRADE PHH

Nova linha W-PRO 62090 - Novo grau PHH | Nueva línea W-PRO 62090 - Nueva calidad PHH

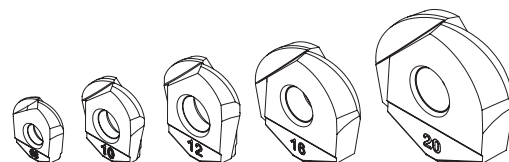
The new W-PRO is the combination of the most refined inserts and the most stable shanks. When looking for a finishing solution for Steels, Stainless Steels, Cast Irons, HRSA or Hardened Steels that can work for a long time while delivering a flawless machined surface, this is the best solution.



WCL

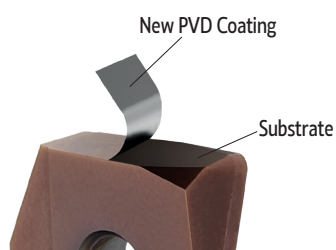


WCR



One toolholder for two types of inserts

PHH GRADE = PVD grade



This new coating has a very high thermal stability and provides long tool life. For applications in machining of hardened steels, stainless steels and titanium alloys. This new coating achieves an unmatched balance between high hardness and thermal stability. It is the perfect coating for machining hardened material.

**PHH603**

H05-H15  
P01-P05

Recommended for finishing operations in steels and hardened steels. First choice in mold and die finishing applications.

**PHH910**

P05-P10  
H15-H30

Recommended for finishing operations in steels and hardened steels in unstable conditions.



# MILLING TOOLS OVERVIEW

A

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

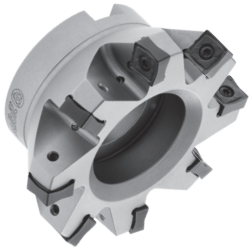
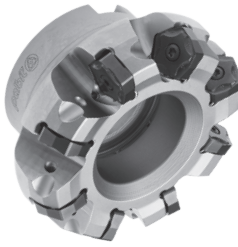
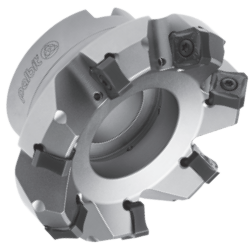
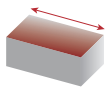
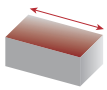
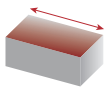
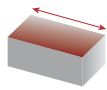
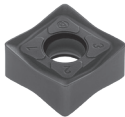
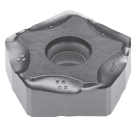
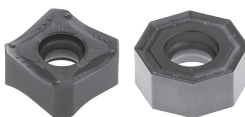
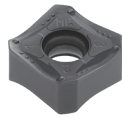
Spot face

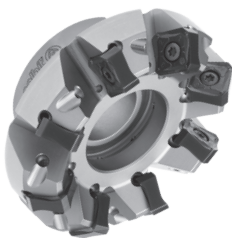
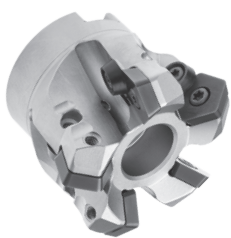
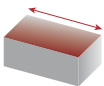
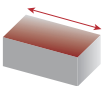
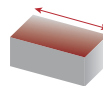
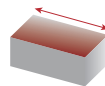
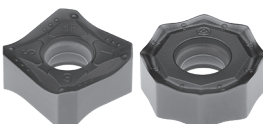
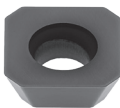
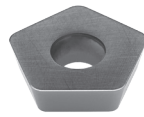
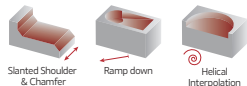
Spare Parts

Technical Data

End Mills

## FACE MILLING CUTTERS

| Program          | PLUS 28088                                                                                                                                                                                               | PLUS 90260                                                                                                                                                                   | PLUS 90845                                                                                                                                                                                    | PLUS 90945                                                                                                                                                                                                            |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | Proprietary milling line                                                                                                                                                                                 | Proprietary milling line                                                                                                                                                     | Proprietary milling line                                                                                                                                                                      | Proprietary milling line                                                                                                                                                                                              |
|                  |                                                                                                                         |                                                                                             |                                                                                                             |                                                                                                                                    |
| Material         | P M K                                                                                                                                                                                                    | P K                                                                                                                                                                          | P M K N S                                                                                                                                                                                     | P M K N S                                                                                                                                                                                                             |
| Main Operation   | <br>Facing                                                                                                              | <br>Facing                                                                                  | <br>Facing                                                                                                  | <br>Facing                                                                                                                         |
| Kr°              | 88°                                                                                                                                                                                                      | 60°                                                                                                                                                                          | 45°                                                                                                                                                                                           | 45°                                                                                                                                                                                                                   |
| Range (ØDc - mm) | 50 - 200                                                                                                                                                                                                 | 50 - 160                                                                                                                                                                     | 32 - 250                                                                                                                                                                                      | 50 - 250                                                                                                                                                                                                              |
| Insert           | SN...1206...                                                                                                                                                                                             | PN...1105...                                                                                                                                                                 | SN...1206... & ON...0505...                                                                                                                                                                   | SN...1206...                                                                                                                                                                                                          |
|                  |                                                                                                                       |                                                                                           |                                                                                                           |                                                                                                                                  |
| Couplings        | Arbor mounting                                                                                                                                                                                           | Arbor mounting                                                                                                                                                               | Arbor mounting<br>Weldon shank                                                                                                                                                                | Arbor mounting                                                                                                                                                                                                        |
| Other Operations | <br>Shouldering                                                                                                       |                                                                                                                                                                              | <br>Slanted Shoulder & Chamfer                                                                            | <br>Slanted Shoulder & Chamfer                                                                                                   |
| Page             | 56                                                                                                                                                                                                       | 60                                                                                                                                                                           | 64                                                                                                                                                                                            | 68                                                                                                                                                                                                                    |
| Features         | Indexable face mills with 8 helical cutting edges<br><br>For rough to semi-finish with high-efficiency face milling<br><br>Cutting edge angle enables performing face milling very close to the sidewall | Economical because double sided inserts applied<br><br>10 coners available improved insert design for distribution of cutting forces<br><br>Excellent solution for cast iron | New line for Heavy and Soft face milling<br><br>Two different geometries for same pocket<br><br>Insert geometries available for all applications materials<br><br>Excellent surface finishing | Economical because double sided inserts applied<br><br>Variety of insert geometries is available for all applications materials<br><br>Excellent surface finishing<br><br>Available in regular and fine pitch cutters |

| FACE MILLING CUTTERS |                                                                                                                        |                                                                                                                   |                                                                                                                     |                                                                                                                                                     |
|----------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Program              | PLUS 91245                                                                                                             | LINEPRO 06045                                                                                                     | LINEPRO 09945                                                                                                       | LINEPRO 00036                                                                                                                                       |
|                      | Proprietary milling line<br>          |                                  |                                   |                                                                  |
| Material             | P M K S                                                                                                                | P M K N                                                                                                           | P M K N                                                                                                             | P K                                                                                                                                                 |
| Main Operation       | <br>Facing                            | <br>Facing                       | <br>Facing                        | <br>Facing                                                       |
| Kr°                  | 45°                                                                                                                    | 45°                                                                                                               | 45°                                                                                                                 | 36°                                                                                                                                                 |
| Range (ØDc - mm)     | 63 - 250                                                                                                               | 50 - 160                                                                                                          | 50 - 250                                                                                                            | 66 - 160                                                                                                                                            |
| Insert               | SN...1606... & ON...0606...                                                                                            | SE...1204...                                                                                                      | SE...13T3...                                                                                                        | PD...1204...                                                                                                                                        |
|                      |                                     |                                |                                 |                                                                |
| Couplings            | Arbor mounting                                                                                                         | Arbor mounting                                                                                                    | Arbor mounting                                                                                                      | Arbor mounting                                                                                                                                      |
| Other Operations     | <br>Slanted Shoulder & Chamfer      | <br>Slanted Shoulder & Chamfer | <br>Slanted Shoulder & Chamfer  | <br>Slanted Shoulder & Chamfer Ramp down Helical Interpolation |
| Page                 | 72                                                                                                                     | 76                                                                                                                | 78                                                                                                                  | 82                                                                                                                                                  |
| Features             | Two different geometries for same pocket<br>Excellent surface finishing<br>Available in regular and fine pitch cutters | Low cutting forces<br>Good chip flow                                                                              | Low cutting forces<br>Suitable for high-speed machining<br>Excellent chip flow<br>High rigidity due to carbide shim | High rake angle and low cutting forces                                                                                                              |

# MILLING TOOLS OVERVIEW

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center &amp; Chamfer

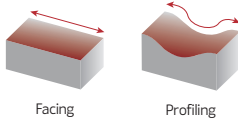
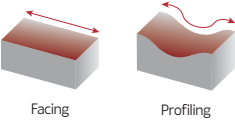
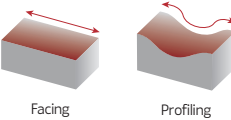
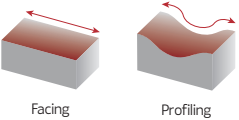
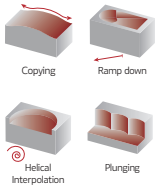
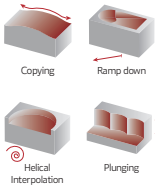
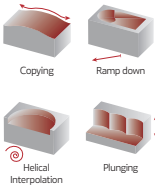
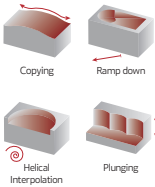
Spot face

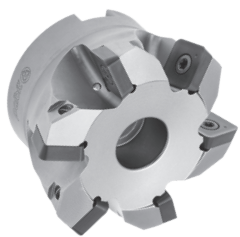
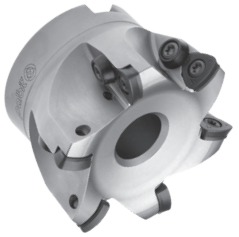
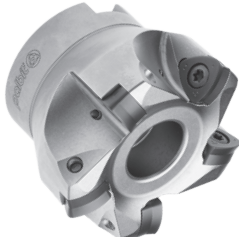
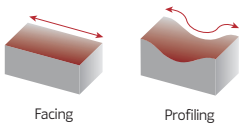
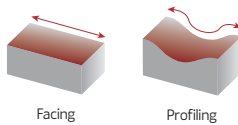
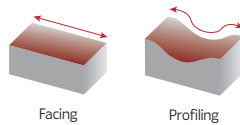
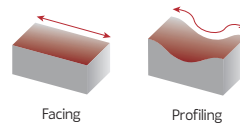
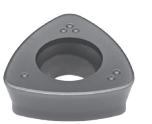
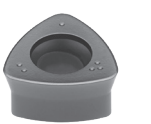
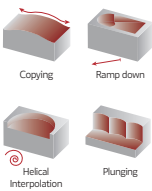
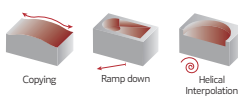
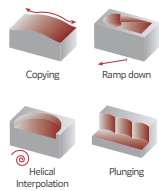
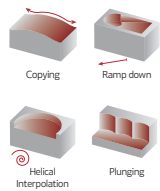
Spare Parts

Technical Data

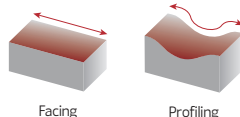
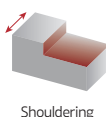
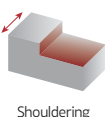
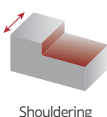
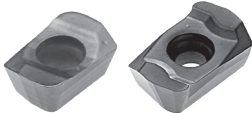
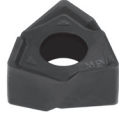
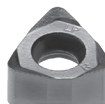
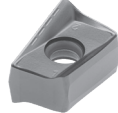
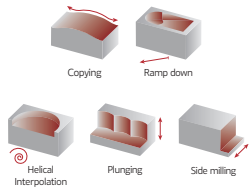
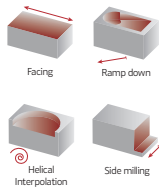
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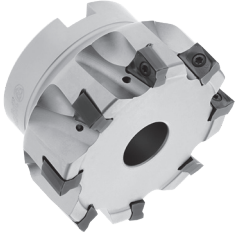
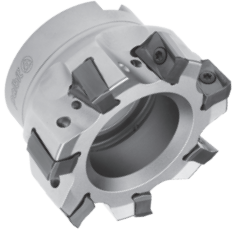
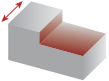
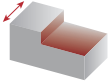
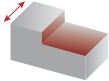
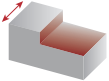
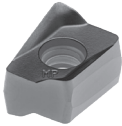
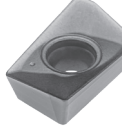
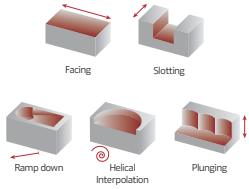
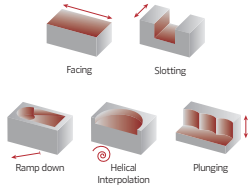
## HIFEED MILLING CUTTERS

| Program          | TETRAFEED 16320 <sup>NEW</sup>                                                                                                             | PENTA HIFEED 06320                                                                                                                         | HIFEED 06410                                                                                                                                | HIFEED 06690                                                                                                                                 |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|                  | Proprietary milling line<br>                              | Proprietary milling line<br>                              | Proprietary milling line<br>                              | Proprietary milling line<br>                              |
| Material         | P M K S                                                                                                                                    | P K                                                                                                                                        | P M K S                                                                                                                                     | P M K S                                                                                                                                      |
| Main Operation   | <br>Facing Profiling                                      | <br>Facing Profiling                                      | <br>Facing Profiling                                      | <br>Facing Profiling                                      |
| Kr°              | 20°                                                                                                                                        | 20°                                                                                                                                        | 10°                                                                                                                                         | 10°                                                                                                                                          |
| Range (ØDc - mm) | 16 - 63                                                                                                                                    | 20 - 66                                                                                                                                    | 20 - 42                                                                                                                                     | 32 - 100                                                                                                                                     |
| Insert           | XN KU 06T3...<br>                                       | POKT 0403...<br>                                        | SO...0803...<br>                                        | SO...13M5...<br>                                        |
| Couplings        | Arbor mounting<br>Weldon shank<br>Threaded coupling                                                                                        | Arbor mounting<br>Cylindrical shank<br>Threaded coupling                                                                                   | Weldon shank<br>Threaded coupling                                                                                                           | Arbor mounting<br>Threaded coupling                                                                                                          |
| Other Operations | <br>Copying Ramp down<br>Helical Interpolation Plunging | <br>Copying Ramp down<br>Helical Interpolation Plunging | <br>Copying Ramp down<br>Helical Interpolation Plunging | <br>Copying Ramp down<br>Helical Interpolation Plunging |
| Page             | 84                                                                                                                                         | 88                                                                                                                                         | 92                                                                                                                                          | 98                                                                                                                                           |
| Features         | Double-sided insert with 4 cutting edges<br>Optimized design for better chip evacuation<br>High productivity                               | High feed cutting with low cutting load<br>High productivity                                                                               | High feed cutting with low cutting load<br>High productivity                                                                                |                                                                                                                                              |

| HIFEED MILLING CUTTERS |                                                                                                                                            |                                                                                                                                |                                                                                                                                             |                                                                                                                                              |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Program                | HIFEED 06815                                                                                                                               | HIFEED 50560                                                                                                                   | HIFEED 50060                                                                                                                                | HIFEED 06590                                                                                                                                 |
|                        | Proprietary milling line<br>                              |                                               |                                                           |                                                           |
| Material               | P M K S                                                                                                                                    | P M K S                                                                                                                        | P K                                                                                                                                         | P M K                                                                                                                                        |
| Main Operation         | <br>Facing Profiling                                      | <br>Facing Profiling                          | <br>Facing Profiling                                      | <br>Facing Profiling                                      |
| Kr°                    | 15°                                                                                                                                        | -                                                                                                                              | -                                                                                                                                           | 10°                                                                                                                                          |
| Range                  | 63 - 160                                                                                                                                   | 52 - 80                                                                                                                        | 35 - 80                                                                                                                                     | 20 - 42                                                                                                                                      |
| Insert                 | SO...1605...                                                                                                                               | WD...1204...                                                                                                                   | WN...1207...                                                                                                                                | SP...08T3...                                                                                                                                 |
|                        |                                                         |                                             |                                                         |                                                         |
| Couplings              | Arbor mounting                                                                                                                             | Arbor mounting                                                                                                                 | Arbor mounting<br>Threaded coupling                                                                                                         | Weldon shank<br>Threaded coupling                                                                                                            |
| Other Operations       | <br>Copying Ramp down<br>Helical Interpolation Plunging | <br>Copying Ramp down Helical Interpolation | <br>Copying Ramp down<br>Helical Interpolation Plunging | <br>Copying Ramp down<br>Helical Interpolation Plunging |
| Page                   | 104                                                                                                                                        | 108                                                                                                                            | 112                                                                                                                                         | 116                                                                                                                                          |
| Features               | High feed cutting with low cutting load<br>High productivity                                                                               | High feed cutting with low cutting load                                                                                        | High feed cutting with low cutting load<br>Excellent in high overhang                                                                       | High feed cutting with low cutting load                                                                                                      |

# MILLING TOOLS OVERVIEW

| HIFFED MILLING CUTTERS |                                                                                                                                                                        | SHOULDER MILLING CUTTERS                                                                                                                                |                                                                                                   |                                                                                                                                                                                      |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Program                | PRO 20090   20190                                                                                                                                                      | HEXAPLUS 49590                                                                                                                                          | PLUS 49090                                                                                        | PLUS 17190                                                                                                                                                                           |
|                        | Proprietary milling line                                                                                                                                               | Proprietary milling line                                                                                                                                | Proprietary milling line                                                                          | Proprietary milling line                                                                                                                                                             |
|                        |                                                                                       |                                                                        |                 |                                                                                                   |
| Material               | P M K S                                                                                                                                                                | P K                                                                                                                                                     | P K                                                                                               | P M K N S                                                                                                                                                                            |
| Main Operation         | <br>Facing      Profiling                                                             | <br>Shouldering                                                        | <br>Shouldering | <br>Shouldering                                                                                   |
| Kr°                    | 90°                                                                                                                                                                    | 90°                                                                                                                                                     | 90°                                                                                               | 90°                                                                                                                                                                                  |
| Range (ØDc - mm)       | 10 - 63                                                                                                                                                                | 32 - 125                                                                                                                                                | 16 - 32                                                                                           | 14 - 100                                                                                                                                                                             |
|                        | XPET 0602... - HF   XPET 1003... - HF                                                                                                                                  | WNXT 0806...                                                                                                                                            | WNHU 04T308-LP                                                                                    | ANHX 1004...                                                                                                                                                                         |
| Insert                 |                                                                                     |                                                                      |               |                                                                                                 |
| Couplings              | Arbor mounting<br>Weldon shank<br>Cylindrical shank<br>Threaded coupling                                                                                               | Arbor mounting<br>Weldon shank                                                                                                                          | Cylindrical shank<br>Threaded coupling                                                            | Arbor mounting<br>Weldon shank                                                                                                                                                       |
| Other Operations       | <br>Copying      Ramp down<br>Helical Interpolation      Plunging      Side milling | <br>Facing      Ramp down<br>Helical Interpolation      Side milling | <br>Facing    | <br>Facing      Slotting      Plunging                                                          |
| Page                   | 138   144                                                                                                                                                              | 120                                                                                                                                                     | 124                                                                                               | 126                                                                                                                                                                                  |
| Features               | Chipbreaker HF for Hiffed machining                                                                                                                                    | 6 High rake cutting edges<br>Excellent surface finish<br>Strong insert seat                                                                             | Economical because double sided inserts applied                                                   | 4 corners insert with positive cutting edge<br>Variety of insert geometries is available for all applications<br>Helical cutting edge<br>Available in regular and fine pitch cutters |

| SHOULDER MILLING CUTTERS |                                                                                                                                                                                      |                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                   |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Program                  | PLUS 17590                                                                                                                                                                           | PLUS 18190                                                                                                                                                                           | LINEPRO 20090                                                                                                                                                                                                                                                                                                     | LINEPRO 20190                                                                                                                                     |
|                          | Proprietary milling line                                                                                                                                                             | Proprietary milling line                                                                                                                                                             | Proprietary milling line                                                                                                                                                                                                                                                                                          | Proprietary milling line                                                                                                                          |
|                          |                                                                                                     |                                                                                                     |                                                                                                                                                                                                                                 |                                                                |
| Material                 | P M K S                                                                                                                                                                              | P K N                                                                                                                                                                                | P M K N S H                                                                                                                                                                                                                                                                                                       | P M K N S H                                                                                                                                       |
| Main Operation           | <br>Shouldering                                                                                     | <br>Shouldering                                                                                     | <br>Shouldering                                                                                                                                                                                                                 | <br>Shouldering                                                |
| Kr°                      | 90°                                                                                                                                                                                  | 90°                                                                                                                                                                                  | 90°                                                                                                                                                                                                                                                                                                               | 90°                                                                                                                                               |
| Range (ØDc - mm)         | 25 - 125                                                                                                                                                                             | 32 - 160                                                                                                                                                                             | 10 - 32                                                                                                                                                                                                                                                                                                           | 16 - 63                                                                                                                                           |
| Insert                   | ANHX 1206...                                                                                                                                                                         | ANHX 1607...                                                                                                                                                                         | XP...0602...                                                                                                                                                                                                                                                                                                      | XP...1003...                                                                                                                                      |
|                          |                                                                                                   |                                                                                                   |                                                                                                                                                                                                                               |                                                              |
| Couplings                | Arbor mounting<br>Weldon shank<br>Cylindrical shank<br>Threaded coupling                                                                                                             | Arbor mounting<br>Weldon shank<br>Threaded coupling                                                                                                                                  | Cylindrical shank<br>Threaded coupling                                                                                                                                                                                                                                                                            | Arbor mounting<br>Weldon shank<br>Cylindrical shank<br>Threaded coupling                                                                          |
| Other Operations         | <br>Facing Slotting Plunging                                                                      | <br>Facing Slotting Plunging                                                                      | <br>Facing Slotting Plunging Ramp down Helical Interpolation                                                                                                                                                                  | <br>Facing Slotting Plunging Ramp down Helical Interpolation |
| Page                     | 130                                                                                                                                                                                  | 134                                                                                                                                                                                  | 138                                                                                                                                                                                                                                                                                                               | 144                                                                                                                                               |
| Features                 | 4 corners insert with positive cutting edge<br>Variety of insert geometries is available for all applications<br>Helical cutting edge<br>Available in regular and fine pitch cutters | 4 corners insert with positive cutting edge<br>Variety of insert geometries is available for all applications<br>Helical cutting edge<br>Available in regular and fine pitch cutters | Excellent solution for square shoulder milling<br>Offers longer tool life, better tolerances and better productivity parameters<br>Low power requirement & smooth cutting possible due to positive helical angle<br>Very flexible and suitable for most milling operations<br>High positive cutting rake geometry |                                                                                                                                                   |

# MILLING TOOLS OVERVIEW

A

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center &amp; Chamfer

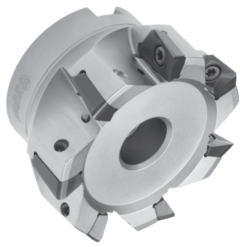
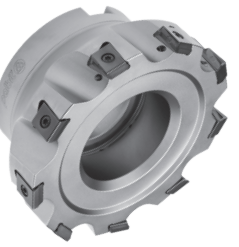
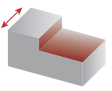
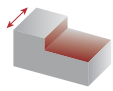
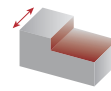
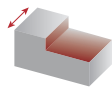
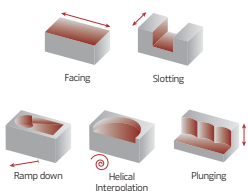
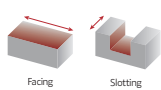
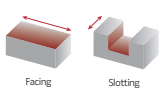
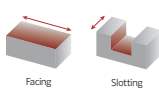
Spot face

Spare Parts

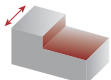
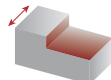
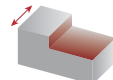
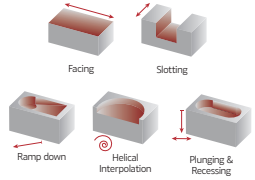
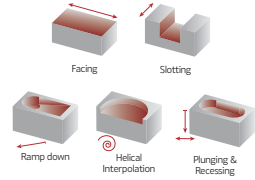
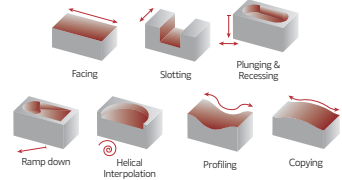
Technical Data

End Mills

## SHOULDER MILLING CUTTERS

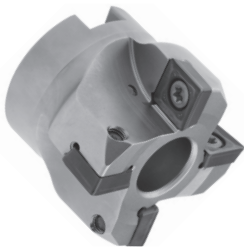
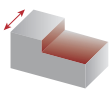
| Program          | LINEPRO 20290                                                                                                                                                                                                            | TGPLUS 90090                                                                                                                                                                                                                               | TGPLUS 90190                                                                                      | TGPLUS 90390                                                                                       |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
|                  | Proprietary milling line                                                                                                                                                                                                 | Proprietary milling line                                                                                                                                                                                                                   | Proprietary milling line                                                                          | Proprietary milling line                                                                           |
|                  |                                                                                                                                         |                                                                                                                                                           |                 |                 |
| Material         | P M K N S                                                                                                                                                                                                                | P M K                                                                                                                                                                                                                                      | P M K                                                                                             | P K                                                                                                |
| Main Operation   | <br>Shouldering                                                                                                                         | <br>Shouldering                                                                                                                                           | <br>Shouldering | <br>Shouldering |
| Kr°              | 90°                                                                                                                                                                                                                      | 90°                                                                                                                                                                                                                                        | 90°                                                                                               | 90°                                                                                                |
| Range (ØDc - mm) | 32 - 125                                                                                                                                                                                                                 | 16 - 63                                                                                                                                                                                                                                    | 25 - 125                                                                                          | 50 - 160                                                                                           |
| Insert           | XP...1706...                                                                                                                                                                                                             | LNXT 0904...                                                                                                                                                                                                                               | LNXT 1306...                                                                                      | LNXT 1506...                                                                                       |
|                  |                                                                                                                                       |                                                                                                                                                         |               |               |
| Couplings        | Arbor mounting<br>Weldon shank                                                                                                                                                                                           | Arbor mounting<br>Weldon shank<br>Cylindrical shank<br>Threaded coupling                                                                                                                                                                   | Arbor mounting<br>Cylindrical shank<br>Weldon shank                                               | Arbor mounting                                                                                     |
| Other Operations |                                                                                                                                       |                                                                                                                                                         |               |               |
| Page             | 152                                                                                                                                                                                                                      | 156                                                                                                                                                                                                                                        | 160                                                                                               | 164                                                                                                |
| Features         | Excellent solution for square shoulder milling<br><br>Offers longer tool life, better tolerances and better productivity parameters<br><br>Low power requirement & smooth cutting possible due to positive helical angle | Tangential inserts with 4 corners available<br>High rake angle insert reduces cutting force<br>Excellent insert rigidity and excellent machining stability<br>Improved pocket configuration<br>Available in regular and fine pitch cutters |                                                                                                   |                                                                                                    |

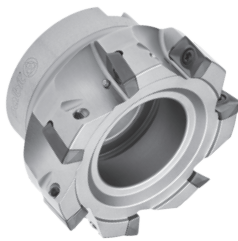
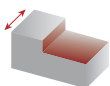
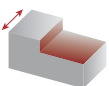
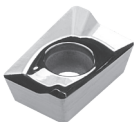


| SHOULDER MILLING CUTTERS |                                                                                                                                                                                                                                                                              |                                                                                                                   |                                                                                                        |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Program                  | ALUPRO 76090                                                                                                                                                                                                                                                                 | ALUPRO 77090                                                                                                      | ALUPRO 08390                                                                                           |
|                          | <p>Proprietary milling line</p>                                                                                                                                                             | <p>Proprietary milling line</p>  |                     |
| Material                 | N                                                                                                                                                                                                                                                                            | N                                                                                                                 | N                                                                                                      |
| Main Operation           |  <p>Shouldering</p>                                                                                                                                                                         |  <p>Shouldering</p>              |  <p>Shouldering</p> |
| Kr°                      | 90°                                                                                                                                                                                                                                                                          | 90°                                                                                                               | 90°                                                                                                    |
| Range (ØDc - mm)         | 20 - 100                                                                                                                                                                                                                                                                     | 32 - 125                                                                                                          | 32                                                                                                     |
| Insert                   | XDGX 15M5...                                                                                                                                                                                                                                                                 | XDGX 22M7...                                                                                                      | VCGX 2205...                                                                                           |
|                          |                                                                                                                                                                                           |                                |                   |
| Couplings                | Arbor mounting<br>Cylindrical shank                                                                                                                                                                                                                                          | Arbor mounting<br>Cylindrical shank                                                                               | Threaded coupling                                                                                      |
| Other Operations         |                                                                                                                                                                                           |                                |                   |
| Page                     | 168                                                                                                                                                                                                                                                                          | 172                                                                                                               | 176                                                                                                    |
| Features                 | <p>Solution for multi functional milling operations on aluminium alloys</p> <p>High speed conditions with high metal remove rate</p> <p>Stable clamping conditions (Anti-fly)</p> <p>High rake angle geometry that provides a good surface finish and low cutting forces</p> |                                                                                                                   | <p>Excellent chip flow</p>                                                                             |

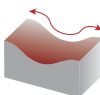
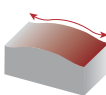
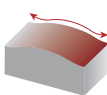
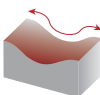
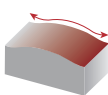
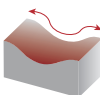
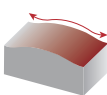
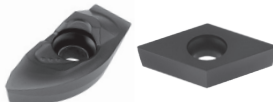
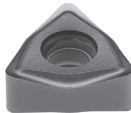
# MILLING TOOLS OVERVIEW

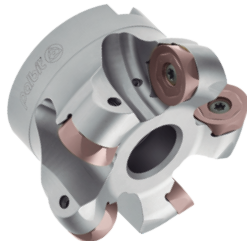
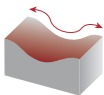
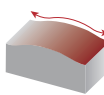
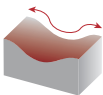
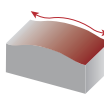
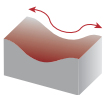
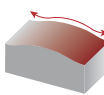
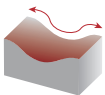
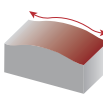
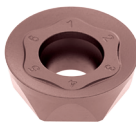
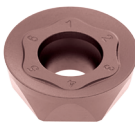
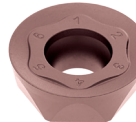
|                  |
|------------------|
| A                |
| MILLING          |
| Overview         |
| Face milling     |
| Hifeed milling   |
| Shoulder milling |
| Profile milling  |
| Hardmill         |
| Center & Chamfer |
| Spot face        |
| Spare Parts      |
| Technical Data   |
| End Mills        |

| SHOULDER MILLING CUTTERS |                                                                                                              |
|--------------------------|--------------------------------------------------------------------------------------------------------------|
| Program                  | LINEPRO 06290 <span>NEW</span>                                                                               |
|                          |                             |
| Material                 | P M K S                                                                                                      |
| Main Operation           | <br>Shouldering             |
| Kr°                      | 90°                                                                                                          |
| Range (ØDc - mm)         | 40 - 160                                                                                                     |
|                          | SP...1204...                                                                                                 |
| Insert                   |                           |
| Couplings                | Arbor mounting                                                                                               |
| Other Operations         | <br>Facing                |
| Page                     | 178                                                                                                          |
| Features                 | Positive inserts with 4 cutting edges<br>Recommended for conventional milling machines and machining centers |

| SHOULDER MILLING CUTTERS |                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Program                  | LINEPRO 17090                                                                                                                                                                                                                                                                                                                                                                                                        | LINEPRO 18090                                                                                                                                                                                                                                                                                                                                                                                                                |
|                          |                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                           |
| Material                 | P M K N                                                                                                                                                                                                                                                                                                                                                                                                              | P M K N                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Main Operation           | <br>Shouldering                                                                                                                                                                                                                                                                                                                     | <br>Shouldering                                                                                                                                                                                                                                                                                                                           |
| Kr°                      | 90°                                                                                                                                                                                                                                                                                                                                                                                                                  | 90°                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Range (ØDc - mm)         | 16 - 63                                                                                                                                                                                                                                                                                                                                                                                                              | 25 - 125                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Insert                   | AP...1003...                                                                                                                                                                                                                                                                                                                                                                                                         | AP...1604...                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                          |                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                         |
| Couplings                | Arbor mounting<br>Weldon shank<br>Threaded coupling                                                                                                                                                                                                                                                                                                                                                                  | Arbor mounting<br>Weldon shank                                                                                                                                                                                                                                                                                                                                                                                               |
| Other Operations         | <br>Facing<br><br>Slotting<br><br>Ramp down<br><br>Helical Interpolation | <br>Facing<br><br>Slotting<br><br>Ramp down<br><br>Helical Interpolation |
| Page                     | 180                                                                                                                                                                                                                                                                                                                                                                                                                  | 186                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Features                 | <p>Strong insert and low cutting force</p> <p>Helical cutting edge</p> <p>Good chip evacuation</p>                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                              |

# MILLING TOOLS OVERVIEW

| PROFILE MILLING CUTTERS |                                                                                                                                                                                                                            |                                                                                                                                                                                                                       |                                                                                                                                                                                                                         |                                                                                                                                                                                                                           |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Program                 | W-PRO 62090 <small>NEW</small>                                                                                                                                                                                             | BALLPRO 63090 <small>NEW</small>                                                                                                                                                                                      | PLUS 49095                                                                                                                                                                                                              | PLUS 45095                                                                                                                                                                                                                |
|                         | Proprietary milling line<br>                                                                                                              | Proprietary milling line<br>                                                                                                         | Proprietary milling line<br>                                                                                                          | Proprietary milling line<br>                                                                                                           |
| Material                | <div><div>P</div><div>M</div><div>K</div><div>S</div><div>H</div></div>                                                                                                                                                    | <div><div>P</div><div>K</div></div>                                                                                                                                                                                   | <div><div>P</div><div>K</div><div>H</div></div>                                                                                                                                                                         | <div><div>P</div><div>K</div><div>H</div></div>                                                                                                                                                                           |
| Main Operation          | <div><div> Profiling</div><div> Copying</div></div>      | <div><div> Profiling</div><div> Copying</div></div> | <div><div> Profiling</div><div> Copying</div></div> | <div><div> Profiling</div><div> Copying</div></div> |
| Kr°                     | 90°                                                                                                                                                                                                                        | -                                                                                                                                                                                                                     | 95°                                                                                                                                                                                                                     | 95°                                                                                                                                                                                                                       |
| Range<br>(ØDc - mm)     | 8 - 20                                                                                                                                                                                                                     | 32                                                                                                                                                                                                                    | 16 - 35                                                                                                                                                                                                                 | 25 - 42                                                                                                                                                                                                                   |
| Insert                  | WCL...   WCR...                                                                                                                                                                                                            | XPGT 3206...   DCMW 11T3...                                                                                                                                                                                           | WNHU 04T3...                                                                                                                                                                                                            | WNHU 0604...                                                                                                                                                                                                              |
|                         |                                                                                                                                         |                                                                                                                                    |                                                                                                                                     |                                                                                                                                      |
| Couplings               | Cylindrical shank<br>Threaded coupling                                                                                                                                                                                     | Threaded coupling                                                                                                                                                                                                     | Threaded coupling                                                                                                                                                                                                       | Threaded coupling                                                                                                                                                                                                         |
| Other Operations        | <div><div> Facing</div><div> Shouldering</div></div> | -                                                                                                                                                                                                                     | <div><div> Facing</div></div>                                                                                                       | <div><div> Facing</div></div>                                                                                                        |
| Page                    | 190                                                                                                                                                                                                                        | 194                                                                                                                                                                                                                   | 196                                                                                                                                                                                                                     | 198                                                                                                                                                                                                                       |
| Features                | Helical profile for smooth cutting<br>Tight Insert tolerances<br>Carbide shank to reduce vibrations                                                                                                                        | Designed for finishing and semi-finishing<br>Strong insert design<br>Stable cutting performance                                                                                                                       | Economical because double sided inserts applied<br>Designed for finishing and profile milling<br>Robust geometry                                                                                                        |                                                                                                                                                                                                                           |

| PROFILE MILLING CUTTERS |                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Program                 | TOROMILL 33590                                                                                                                                                                                                                                                                                                                                                                                           | TOROMILL 33690                                                                                                                                                                                                                                                                                                                                                                                           | TOROMILL 33790                                                                                                                                                                                                                                                                                                                                                                                                 | TOROMILL 33890                                                                                                                                                                                                                                                                                                                                                                                                   |
|                         | Proprietary milling line<br>                                                                                                                                                                                                                                                                                            | Proprietary milling line<br>                                                                                                                                                                                                                                                                                            | Proprietary milling line<br>                                                                                                                                                                                                                                                                                                 | Proprietary milling line<br>                                                                                                                                                                                                                                                                                                  |
| Material                | P M S                                                                                                                                                                                                                                                                                                                                                                                                    | P M S                                                                                                                                                                                                                                                                                                                                                                                                    | P M S                                                                                                                                                                                                                                                                                                                                                                                                          | P M S                                                                                                                                                                                                                                                                                                                                                                                                            |
| Main Operation          |  <br>Profiling Copying                                                                                                                                                                                                                 |  <br>Profiling Copying                                                                                                                                                                                                                 |  <br>Profiling Copying                                                                                                                                                                                                                     |  <br>Profiling Copying                                                                                                                                                                                                                     |
| Kr°                     | -                                                                                                                                                                                                                                                                                                                                                                                                        | -                                                                                                                                                                                                                                                                                                                                                                                                        | -                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                |
| Range (ØDc - mm)        | 16 - 32                                                                                                                                                                                                                                                                                                                                                                                                  | 20 - 52                                                                                                                                                                                                                                                                                                                                                                                                  | 40 - 80                                                                                                                                                                                                                                                                                                                                                                                                        | 50 - 125                                                                                                                                                                                                                                                                                                                                                                                                         |
| Insert                  | RDHT 0802...                                                                                                                                                                                                                                                                                                                                                                                             | RPHT 10T3...                                                                                                                                                                                                                                                                                                                                                                                             | RPHT 1204...                                                                                                                                                                                                                                                                                                                                                                                                   | RPHT 1605...                                                                                                                                                                                                                                                                                                                                                                                                     |
|                         |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                             |
| Couplings               | Cylindrical shank<br>Threaded coupling                                                                                                                                                                                                                                                                                                                                                                   | Arbor mounting<br>Cylindrical shank<br>Threaded coupling                                                                                                                                                                                                                                                                                                                                                 | Arbor mounting                                                                                                                                                                                                                                                                                                                                                                                                 | Arbor mounting                                                                                                                                                                                                                                                                                                                                                                                                   |
| Other Operations        |  <br> <br>Facing Slotting<br>Ramp down Helical Interpolation |  <br> <br>Facing Slotting<br>Ramp down Helical Interpolation |  <br> <br>Facing Slotting<br>Ramp down Helical Interpolation |  <br> <br>Facing Slotting<br>Ramp down Helical Interpolation |
| Page                    | 200                                                                                                                                                                                                                                                                                                                                                                                                      | 200                                                                                                                                                                                                                                                                                                                                                                                                      | 200                                                                                                                                                                                                                                                                                                                                                                                                            | 202                                                                                                                                                                                                                                                                                                                                                                                                              |
| Features                | <p>Excellent solution for Profile milling</p> <p>Low power requirement &amp; smooth cutting possible due to positive helical angle</p> <p>First choice for problematic materials (M and S material classes)</p> <p>High positive cutting rake geometry</p>                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                  |

# MILLING TOOLS OVERVIEW

A

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center &amp; Chamfer

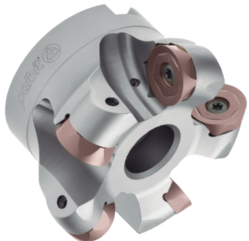
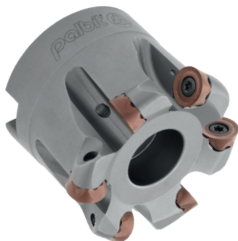
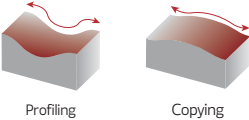
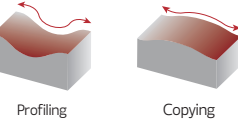
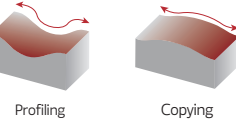
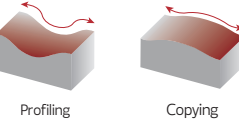
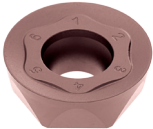
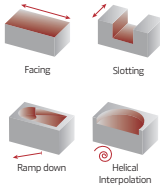
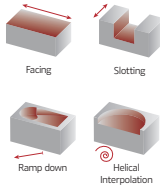
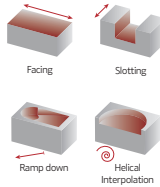
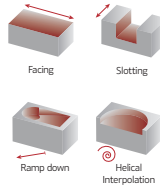
Spot face

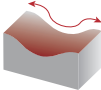
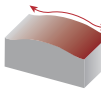
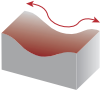
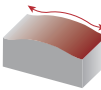
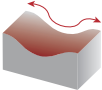
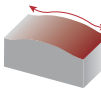
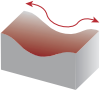
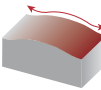
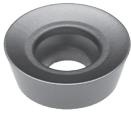
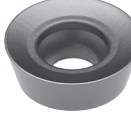
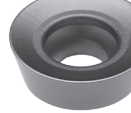
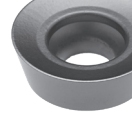
Spare Parts

Technical Data

End Mills

## PROFILE MILLING CUTTERS

| Program          | TOROMILL 33990                                                                                                                                                                                                                      | TURBOMILL 34190 <sup>NEW</sup>                                                                                                            | TURBOMILL 34290 <sup>NEW</sup>                                                                                                             | TOROMILL X2 35190                                                                                                                                   |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | Proprietary milling line                                                                                                                                                                                                            | Proprietary milling line                                                                                                                  | Proprietary milling line                                                                                                                   | Proprietary milling line                                                                                                                            |
|                  |                                                                                                                                                    |                                                          |                                                          |                                                                  |
| Material         | P M S                                                                                                                                                                                                                               | P M S                                                                                                                                     | P M S                                                                                                                                      | P M K S                                                                                                                                             |
| Main Operation   | <br>Profiling Copying                                                                                                                              | <br>Profiling Copying                                    | <br>Profiling Copying                                    | <br>Profiling Copying                                            |
| Kr°              | -                                                                                                                                                                                                                                   | -                                                                                                                                         | -                                                                                                                                          | -                                                                                                                                                   |
| Range (ØDc - mm) | 80 - 125                                                                                                                                                                                                                            | 42 - 52                                                                                                                                   | 40 - 80                                                                                                                                    | 32 - 80                                                                                                                                             |
| Insert           | RPHT 2006...<br>                                                                                                                                 | RPHT 10T3...-LS(4)<br>                                 | RPHT 1204...-LS(4)<br>                                 | RNHX 1204...<br>                                               |
| Couplings        | Arbor mounting                                                                                                                                                                                                                      | Arbor mounting                                                                                                                            | Arbor mounting                                                                                                                             | Arbor mounting<br>Weldon shank<br>Threaded coupling                                                                                                 |
| Other Operations | <br>Facing Slotting<br>Ramp down Helical Interpolation                                                                                           | <br>Facing Slotting<br>Ramp down Helical Interpolation | <br>Facing Slotting<br>Ramp down Helical Interpolation | <br>Facing Slotting<br>Ramp down Helical Interpolation         |
| Page             | 202                                                                                                                                                                                                                                 | 204                                                                                                                                       | 204                                                                                                                                        | 210                                                                                                                                                 |
| Features         | Excellent solution for Profile milling<br>Low power requirement & smooth cutting possible due to positive helical angle<br>First choice for problematic materials (M and S material classes)<br>High positive cutting rake geometry | Excellent solution for Profile milling<br>First choice for problematic materials (M and S material classes)<br>Improved insert seat       |                                                                                                                                            | Excellent solution for Profile milling<br>"First choice for problematic materials (M and S material classes)<br>High positive cutting rake geometry |

| PROFILE MILLING CUTTERS |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Program                 | TOROMILL 24590                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | TOROMILL 25090                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | TOROMILL 25190                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | TOROMILL 25290                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Material                | P K H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | P K H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | P K H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | P K H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Main Operation          |  Profiling  Copying                                                                                                                                                                                                                                                                                                           |  Profiling  Copying                                                                                                                                                                                                                                                                                                           |  Profiling  Copying                                                                                                                                                                                                                                                                                                              |  Profiling  Copying                                                                                                                                                                                                                                                                                                                 |
| Kr°                     | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Range (ØDc - mm)        | 15 - 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 20 - 52                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 24 - 80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 32 - 160                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Insert                  | RD...0702...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | RD...1003...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | RD...12T3...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | RD...1604...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Couplings               | Weldon shank<br>Threaded coupling                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Arbor mounting<br>Weldon shank<br>Threaded coupling                                                                                                                                                                                                                                                                                                                                                                                                                                             | Arbor mounting<br>Weldon shank<br>Threaded coupling                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Arbor mounting<br>Weldon shank<br>Threaded coupling                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Other Operations        |  Facing  Slotting<br> Ramp down  Helical Interpolation  Plunging |  Facing  Slotting<br> Ramp down  Helical Interpolation  Plunging |  Facing  Slotting<br> Ramp down  Helical Interpolation  Plunging |  Facing  Slotting<br> Ramp down  Helical Interpolation  Plunging |
| Page                    | 214                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 214                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 214                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 216                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Features                | <p>Offers longer tool life, better tolerances and better productivity parameters</p> <p>Low power requirement &amp; smooth cutting possible due to positive helical angle</p> <p>Very flexible and suitable for most milling operations</p> <p>High positive cutting rake geometry</p>                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



# MILLING TOOLS OVERVIEW

A

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

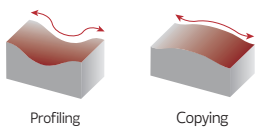
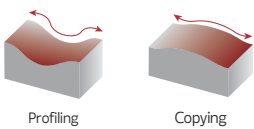
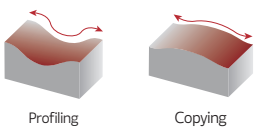
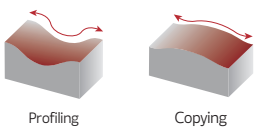
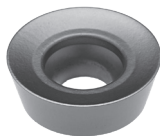
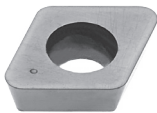
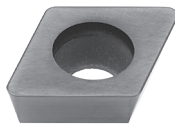
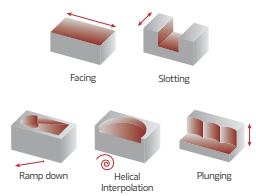
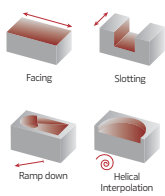
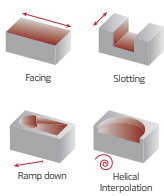
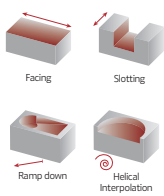
Spot face

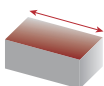
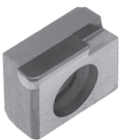
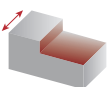
Spare Parts

Technical Data

End Mills

## PROFILE MILLING CUTTERS

| Program          | TOROMILL 25390                                                                                                                                                                                                                                                  | LINEPRO 40095                                                                                                                             | LINEPRO 40595                                                                                                                              | LINEPRO 41095                                                                                                                               |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                                                                                                                                                                                |                                                          |                                                          |                                                          |
| Material         | P K H                                                                                                                                                                                                                                                           | P K N H                                                                                                                                   | P K N H                                                                                                                                    | P K N H                                                                                                                                     |
| Main Operation   | <br>Profiling Copying                                                                                                                                                          | <br>Profiling Copying                                    | <br>Profiling Copying                                    | <br>Profiling Copying                                    |
| Kr°              | -                                                                                                                                                                                                                                                               | 95°                                                                                                                                       | 95°                                                                                                                                        | 95°                                                                                                                                         |
| Range (ØDc - mm) | 80 - 160                                                                                                                                                                                                                                                        | 16 - 25                                                                                                                                   | 25 - 80                                                                                                                                    | 10 - 12                                                                                                                                     |
| Insert           | RD...2006...                                                                                                                                                                                                                                                    | XD...0602...                                                                                                                              | XD...10T3...                                                                                                                               | XD...0401...                                                                                                                                |
|                  |                                                                                                                                                                              |                                                        |                                                        |                                                        |
| Couplings        | Arbor mounting                                                                                                                                                                                                                                                  | Threaded coupling                                                                                                                         | Arbor mounting<br>Threaded coupling                                                                                                        | Threaded coupling                                                                                                                           |
| Other Operations | <br>Facing Slotting<br>Ramp down Helical Interpolation Plunging                                                                                                              | <br>Facing Slotting<br>Ramp down Helical Interpolation | <br>Facing Slotting<br>Ramp down Helical Interpolation | <br>Facing Slotting<br>Ramp down Helical Interpolation |
| Page             | 216                                                                                                                                                                                                                                                             | 222                                                                                                                                       | 222                                                                                                                                        | 222                                                                                                                                         |
| Features         | Offers longer tool life, better tolerances and better productivity parameters<br>Low power requirement & smooth cutting possible due to positive helical angle<br>Very flexible and suitable for most milling operations<br>High positive cutting rake geometry | Designed for finishing and profile milling<br>Low power consumption                                                                       |                                                                                                                                            |                                                                                                                                             |

|                     | HARDMILL                                                                                           | CENTER & CHAMFER                                                                    | SPOT FACE                                                                             |
|---------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Program             | HARDMILL 72090                                                                                     | CENTER & CHAMFER                                                                    | SPOT FACE                                                                             |
|                     |                   |    |    |
| Material            | K N                                                                                                | P M K                                                                               | P M K                                                                                 |
|                     | <br>Facing        |                                                                                     |                                                                                       |
|                     | 90°                                                                                                |                                                                                     |                                                                                       |
| Range<br>(ØDc - mm) | 40 - 160                                                                                           | 13                                                                                  | 10 - 21                                                                               |
| Insert              | XNHW 1205...                                                                                       | SOMT SOGT 11T3...                                                                   | SPKX 05...   06...   07...   09...                                                    |
|                     |                 |  |  |
| Couplings           | Arbor mounting                                                                                     | Weldon Shank                                                                        | Weldon Shank<br>Cylindrical shank                                                     |
|                     | <br>Shouldering | Spotting<br>Chamfering<br>Engraving<br>Grooving<br>Spot Drilling                    | Spot face                                                                             |
| Page                | 226                                                                                                | 230                                                                                 | 232                                                                                   |
| Features            | Excellent solution for aluminium<br>PCD tip                                                        | Milling tool for a wide range of center & chamfer<br>operations                     | Economical solution<br>Smooth cutting                                                 |

A

MILLING

Overview

Face milling

Hifed milling

Shoulder milling

Profile milling

Hardmill

Center &amp; Chamfer

Spot face

Spare Parts

Technical Data

End Mills

# MILLING INSERTS ISO IDENTIFICATION SYSTEM

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

Technical Data

End Mills

|   |  |   |         |
|---|--|---|---------|
| H |  | M |         |
| O |  | V |         |
| P |  | W |         |
| S |  | L |         |
| T |  | A |         |
| C |  | B |         |
| D |  | K |         |
| E |  | R |         |
| F |  | X | Special |

1- Insert shape symbol

|                                                                                                                                                                  |             |             |        | <p>Triangular inserts with a facet (secondary cutting edge)</p>       |       |       |       |       |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|--------|-----------------------------------------------------------------------|-------|-------|-------|-------|-------|
| Symbol                                                                                                                                                           | m (mm)      | d (mm)      | s (mm) | Detailed dimension of M class insert<br>Insert height Tolerances (mm) |       |       |       |       |       |
| A                                                                                                                                                                | ±0.005      | ±0.025      | ±0.025 | Inscribed circle                                                      |       |       |       |       |       |
| F                                                                                                                                                                | ±0.005      | ±0.013      | ±0.025 | 6.35                                                                  | ±0.08 | -     | -     | -     | -     |
| C                                                                                                                                                                | ±0.013      | ±0.025      | ±0.025 | 9.525                                                                 | ±0.08 | ±0.08 | ±0.11 | ±0.10 | ±0.13 |
| H                                                                                                                                                                | ±0.013      | ±0.013      | ±0.025 | 12.70                                                                 | ±0.13 | ±0.13 | ±0.13 | ±0.15 | -     |
| E                                                                                                                                                                | ±0.025      | ±0.025      | ±0.025 | 15.875                                                                | ±0.15 | ±0.15 | ±0.15 | ±0.18 | -     |
| G                                                                                                                                                                | ±0.025      | ±0.025      | ±0.13  | 19.05                                                                 | ±0.15 | ±0.15 | ±0.15 | ±0.18 | -     |
| J                                                                                                                                                                | ±0.005      | ±0.05~±0.13 | ±0.025 | 25.40                                                                 | -     | ±0.18 | -     | -     | -     |
| K*                                                                                                                                                               | ±0.013      | ±0.05~±0.13 | ±0.025 | 31.75                                                                 | -     | ±0.25 | -     | -     | -     |
| L*                                                                                                                                                               | ±0.025      | ±0.05~±0.13 | ±0.025 | Inscribed circle Tolerances (mm)                                      |       |       |       |       |       |
| M*                                                                                                                                                               | ±0.08~±0.20 | ±0.05~±0.13 | ±0.13  | Inscribed circle                                                      |       |       |       |       |       |
| N*                                                                                                                                                               | ±0.08~±0.20 | ±0.05~±0.13 | ±0.025 | 6.35                                                                  | ±0.05 | -     | -     | -     | -     |
| U*                                                                                                                                                               | ±0.13~±0.38 | ±0.08~±0.25 | ±0.13  | 9.525                                                                 | ±0.05 | ±0.05 | ±0.05 | ±0.05 | ±0.05 |
| <p>*As a rule, the sides of these inserts are as sintered. Tolerance differs with insert size, for the accuracy of class M, refer to the table on the right.</p> |             |             |        | 12.70                                                                 | ±0.08 | ±0.08 | ±0.08 | ±0.08 | ±0.08 |
|                                                                                                                                                                  |             |             |        | 15.875                                                                | ±0.10 | ±0.10 | ±0.10 | ±0.10 | ±0.10 |
|                                                                                                                                                                  |             |             |        | 19.05                                                                 | -     | -     | -     | -     | ±0.10 |
|                                                                                                                                                                  |             |             |        | 25.40                                                                 | -     | ±0.13 | -     | -     | ±0.10 |
|                                                                                                                                                                  |             |             |        | 31.75                                                                 | -     | ±0.20 | -     | -     | ±0.12 |

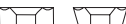
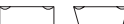
3 - Tolerances symbol

| A | B | C | D | E                     |
|---|---|---|---|-----------------------|
|   |   |   |   |                       |
| F | G | N | P | O                     |
|   |   |   |   | Other clearance angle |

2 - Normal clearance symbol

ISO | ANSI



| 4 - Insert symbol |           |                                           |                           |                                                                                     |        |           |                                           |                           |                                                                                      |        |              |            |                           |                                                                                       |  |
|-------------------|-----------|-------------------------------------------|---------------------------|-------------------------------------------------------------------------------------|--------|-----------|-------------------------------------------|---------------------------|--------------------------------------------------------------------------------------|--------|--------------|------------|---------------------------|---------------------------------------------------------------------------------------|--|
| symbol            | Type      | Hole type                                 | Chipbreaker               | Shape                                                                               | symbol | Type      | Hole type                                 | Chipbreaker               | Shape                                                                                | symbol | Type         | Hole type  | Chipbreaker               | Shape                                                                                 |  |
| W                 | with hole | Round hole / one countersink (40°~60°)    | Without chipbreaker       |  | H      | with hole | Round hole / one countersink (70°~90°)    | Chipbreaker on one side   |  | G      | with hole    | Round hole | Chipbreaker on both sides |  |  |
| T                 |           |                                           | Chipbreaker on one side   |  | C      |           | Round hole / double countersink (70°~90°) | Without chipbreaker       |   | N      | without hole | -          | Without chipbreaker       |  |  |
| Q                 |           | Round hole / double countersink (40°~60°) | Without chipbreaker       |  | J      |           |                                           | Chipbreaker on both sides |   | R      |              | -          | Chipbreaker on one side   |  |  |
| U                 |           |                                           | Chipbreaker on both sides |  | A      |           | Round hole                                | Without chipbreaker       |  | F      |              | -          | Chipbreaker on both sides |  |  |
| B                 |           | Round hole / one countersink (70°~90°)    | Without chipbreaker       |  | M      |           |                                           | Chipbreaker on one side   |  | X      | -            | -          | -                         | On request                                                                            |  |

| R's  | 35°<br>V's | 55°<br>D's | 80°<br>C's | 90°<br>S's | 60°<br>T's | 80°<br>W's | Ø CI   |       | ANSI   |
|------|------------|------------|------------|------------|------------|------------|--------|-------|--------|
|      |            |            |            |            |            |            | mm     | inch  | Symbol |
| -    | 06         | 04         | -          | 03         | 06         | 02         | 3,97   | 5/32  | 1,20   |
| -    | 08         | 05         | 04         | 04         | 08         | L3         | 4,76   | 3/16  | 1,50   |
| -    | 09         | 06         | 05         | 05         | 09         | 03         | 5,56   | 7/32  | 1,80   |
| 06** | -          | -          | -          | -          | -          | -          | 6,00   | 0,236 |        |
| 06*  | 11         | 07         | 06         | 06         | 11         | 04         | 6,35   | 1/4   | 2,00   |
| 07*  | 13         | 09         | 08         | 07         | 13         | 05         | 7,94   | 5/16  | 2,50   |
| 08*  | -          | -          | -          | -          | -          | -          | 8,00   | 0,315 |        |
| 09*  | 16         | 11         | 09         | 09         | 16         | 06         | 9,525  | 3/8   | 3,00   |
| 10** | -          | -          | -          | -          | -          | -          | 10,00  | 0,394 |        |
| 12** | -          | -          | -          | -          | -          | -          | 12,00  | 0,472 |        |
| 12*  | 22         | 15         | 12         | 12         | 22         | 08         | 12,70  | 1/2   | 4,00   |
| 15*  | 27         | 19         | 16         | 15         | 27         | 10         | 15,875 | 5/8   | 5,00   |
| 16** | -          | -          | -          | -          | -          | -          | 16,00  | 0,63  |        |
| 19*  | 33         | 23         | 19         | 19         | 33         | 13         | 19,05  | 3/4   | 6,00   |
| 20** | -          | -          | -          | -          | -          | -          | 20,00  | 0,787 |        |
| 25** | -          | -          | -          | -          | -          | -          | 25,00  | 0,984 |        |
| 25*  | 44         | 31         | 25         | 25         | 44         | 17         | 25,40  | 1,00  | 8,00   |
| 31*  | 54         | 38         | 32         | 31         | 54         | 21         | 31,75  | 1 1/4 | 10,00  |
| 32** | -          | -          | -          | -          | -          | -          | 32,00  | 1,26  |        |

5 - Insert size symbol

\* ANSI designation only  
(Radius Designation is 00)\*\* Metric designation only  
(Radius Designation is M0)

According to International Standard ISO 1832 - 2012(E)

"Indexable inserts for cutting tools - Designation"

| ISO | mm    | ANSI | inch  |
|-----|-------|------|-------|
| 01  | 1.59  | 1    | 0.062 |
| T1  | 1.98  | 1.2  | 0.078 |
| 02  | 2.38  | 1.5  | 0.094 |
| 03  | 3.18  | 2    | 0.125 |
| T3  | 3.97  | 2.5  | 0.156 |
| 04  | 4.76  | 3    | 0.188 |
| 05  | 5.56  | 3.5  | 0.219 |
| 06  | 6.35  | 4    | 0.250 |
| 07  | 7.94  | 5    | 0.312 |
| 09  | 9.52  | 6    | 0.375 |
| 12  | 12.70 | 8    | 0.500 |

6 - Insert thickness symbol

12 06 00 AN S N - MP

| 10* - Chipbreaker geometries |                          |
|------------------------------|--------------------------|
| Cutting Condition            | Main Application         |
| 1st letter                   | 2nd letter               |
| L - Light                    | P - Steel                |
| M - Medium                   | M - Stainless Steel      |
| H - Heavy                    | K - Cast Iron            |
| W - Wiper                    | N - Aluminium            |
| *only when required.         | S - HRSA Titanium Alloys |
|                              | H - Hardened Materials   |

Ex.: ANHX 160708 PNER - **MP**

| 7* - Insert corner symbol |              |      |      |
|---------------------------|--------------|------|------|
| ISO                       | mm           | inch | ANSI |
| 00                        | Sharp nose   |      | 0    |
| 01                        | 0.10         | .004 | 0.2  |
| 02                        | 0.20         | .008 | 0.5  |
| 04                        | 0.40         | .015 | 1    |
| 08                        | 0.80         | .032 | 2    |
| 12                        | 1.2          | .047 | 3    |
| 16                        | 1.6          | .062 | 4    |
| 20                        | 2.0          | .078 | 5    |
| 24                        | 2.4          | .094 | 6    |
| 28                        | 2.8          | .109 | 7    |
| 32                        | 3.2          | .125 | 8    |
| 00 (inch or M0/metric)    | Round insert |      | 0    |

\*only when required.

| 7.1* - Insert edges symbol                              |         |                                           |         |
|---------------------------------------------------------|---------|-------------------------------------------|---------|
| For inserts having secondary edges two digits are used: |         |                                           |         |
| 1st digit is secondary edge                             |         | 2nd digit is secondary edges relief angle |         |
| A                                                       | 45°     | A                                         | 3°      |
| D                                                       | 60°     | B                                         | 5°      |
| E                                                       | 75°     | C                                         | 7°      |
| F                                                       | 85°     | D                                         | 15°     |
| P                                                       | 90°     | E                                         | 20°     |
| Z                                                       | special | F                                         | 25°     |
| *only when required.                                    |         | G                                         | 30°     |
|                                                         |         | N                                         | 0°      |
|                                                         |         | P                                         | 11°     |
|                                                         |         | Z                                         | special |

| 8* - Cutting edge information |                       |        |
|-------------------------------|-----------------------|--------|
| Shape                         | Honing                | Symbol |
|                               | No honing             | F      |
|                               | With honing           | E      |
|                               | Chamfered No honing   | T      |
|                               | Chamfered with honing | S      |

\*only when required.

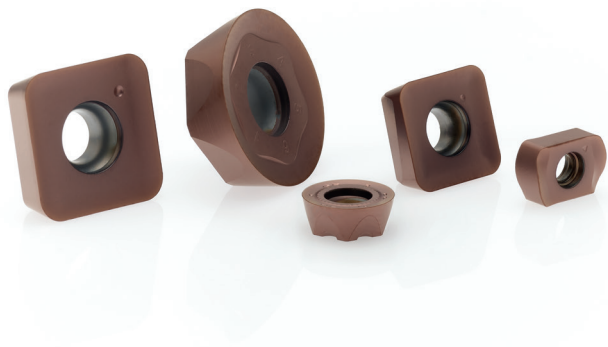
| 9 - Cutting direction |       |        |
|-----------------------|-------|--------|
| Shape                 | Hand  | Symbol |
|                       | Right | R      |
|                       | Left  | L      |
|                       | None  | N      |

# PHH = NEW MILLING GRADE | PHH - Novo grau de fresagem | PHH - Nuevo calidad de fresado

NEW

## A new step on coating innovation!

NEW



PHH  
NEW  
GRADE

### PHH603

H05-H15  
P01-P05

Recommended for finishing operations in steels and hardened steels. First choice in mold and die finishing applications.

### PHH910

P05-P10  
H15-H30

Recommended for finishing operations in steels and hardened steels in unstable conditions.

### PHH930

M20-M40  
S20-S30

Recommended for general purpose milling of stainless steels and HRSA.

### PHH530

M25-M40  
S25-S35

Extremely heat resistant grade. First choice in hot-section turbine blade milling.

### PHH808

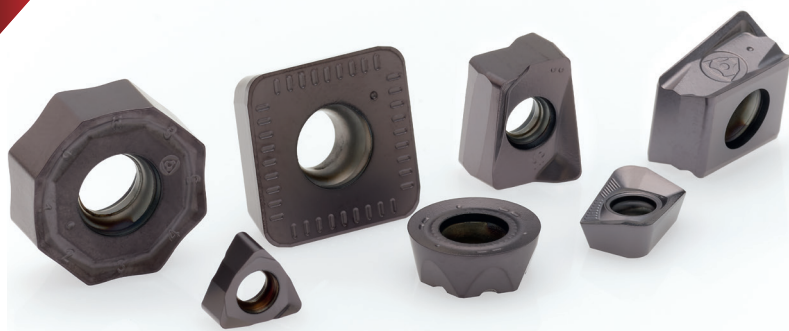
M30-M40  
S30-S40

High heat resistance grade. Economic choice in hot-section turbine blade milling.

# PHP = NEW MILLING GRADE | PHP - Novo grau de fresagem | PHP - Nuevo calidad de fresado

## A new step on coating innovation!

NEW



PHP  
NEW  
GRADE

### PHP910

P05-P10  
K05-K10

Recommended for light operations in steels.

### PHP920

P10-P35  
K10-K30

Recommended for General Steel & Cast Iron Milling.

### PHP930

P20-P40  
K20-K40

Recommended for medium to roughing operations in steels and cast irons.

### PHP530

P25-P40  
M25-M40

Extremely heat resistant grade. First choice in cold-section turbine blade milling.

### PHP808

P30-P40

High heat resistance grade. Economic choice for cold-section turbine blade milling.

| A                                                                |                             |                                                                                                                                                            |                                        | MILLING          |
|------------------------------------------------------------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------|
| PH                                                               | X                           | X                                                                                                                                                          | XX                                     | Overview         |
| PH - Palbit Hardmetal<br>PD - Palbit diamond<br>PB - Palbit PCBN | Coating<br>PCD   PCBN Grade | 1 - Steel<br>2 - Stainless steel<br>3 - Cast Iron<br>4 - Non Ferrous<br>5 - Super Alloys<br>6 - Hardened Materials<br>7 - Wearparts<br>9 - Universal Range | 01 - ISO Field (...)<br>50 - ISO Field | Face milling     |
|                                                                  |                             |                                                                                                                                                            |                                        | Hifeed milling   |
|                                                                  |                             |                                                                                                                                                            |                                        | Shoulder milling |
|                                                                  |                             |                                                                                                                                                            |                                        | Profile milling  |
|                                                                  |                             |                                                                                                                                                            |                                        | Hardmill         |
|                                                                  |                             |                                                                                                                                                            |                                        | Center & Chamfer |
|                                                                  |                             |                                                                                                                                                            |                                        | Spot face        |
|                                                                  |                             |                                                                                                                                                            |                                        | Spare Parts      |
|                                                                  |                             |                                                                                                                                                            |                                        | Technical Data   |
|                                                                  |                             |                                                                                                                                                            |                                        | End Mills        |

# MILLING INSERTS OVERVIEW

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center &amp; Chamfer

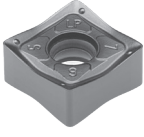
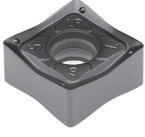
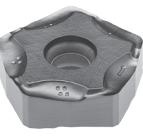
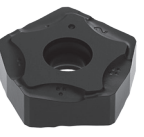
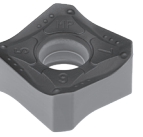
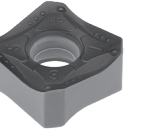
Spot face

Spare Parts

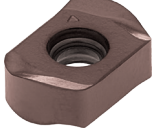
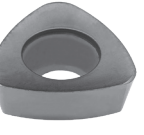
Technical Data

End Mills

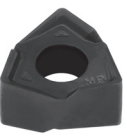
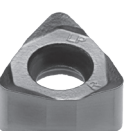
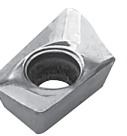
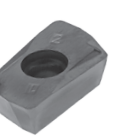
## FACE MILLING INSERTS

| Reference | SNHU                                                                              | SNKU                                                                              | PNHX                                                                              | PNKX                                                                               | SNHX                                                                                | SNKX                                                                                |
|-----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|           | Proprietary milling insert                                                        | Proprietary milling insert                                                        | Proprietary milling insert                                                        | Proprietary milling insert                                                         | Proprietary milling insert                                                          | Proprietary milling insert                                                          |
|           |  |  |  |  |  |  |
| Size      | 12                                                                                | 12                                                                                | 11                                                                                | 11                                                                                 | 12   16                                                                             | 12   16                                                                             |
| Material  | P M K                                                                             | P M K                                                                             | P K                                                                               | P K                                                                                | P M K N S                                                                           | P K                                                                                 |
| Page      | 56                                                                                | 56                                                                                | 61                                                                                | 61                                                                                 | 65   69   73                                                                        | 65   69   73                                                                        |

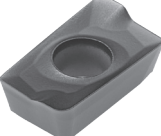
## HIFEED MILLING INSERTS

| Reference | XNKU                                                                              | POKT                                                                              | SOEW                                                                               | SOET                                                                                | WDET                                                                                |
|-----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|           | Proprietary milling insert                                                        | Proprietary milling insert                                                        | Proprietary milling insert                                                         |                                                                                     |                                                                                     |
|           |  |  |  |  |  |
| Size      | 06                                                                                | 04                                                                                | 08   13   16                                                                       | 08   13   16                                                                        | 12                                                                                  |
| Material  | P M K S                                                                           | P K                                                                               | P K                                                                                | P M S                                                                               | P M S                                                                               |
| Page      | 85                                                                                | 89                                                                                | 93   99   104                                                                      | 93   99   104                                                                       | 109                                                                                 |

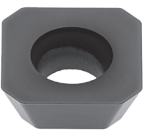
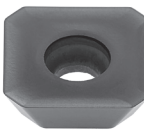
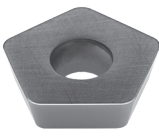
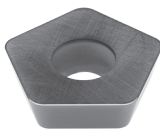
## SHOULDER MILLING INSERTS

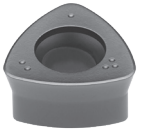
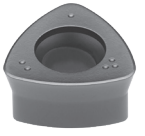
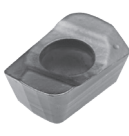
| Reference | WNXT                                                                                | WNHU                                                                                | ANHX                                                                                 | XPET                                                                                  | XPHW                                                                                  |
|-----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|           | Proprietary milling insert                                                          | Proprietary milling insert                                                          | Proprietary milling insert                                                           | Proprietary milling insert                                                            | Proprietary milling insert                                                            |
|           |  |  |  |  |  |
| Size      | 08                                                                                  | 04                                                                                  | 10   12   16                                                                         | 06   10   17                                                                          | 06   10                                                                               |
| Material  | P K                                                                                 | P K                                                                                 | P M K N S                                                                            | P M K N S                                                                             | P H                                                                                   |
| Page      | 121                                                                                 | 125                                                                                 | 126   132   135                                                                      | 139   147   153                                                                       | 139   147                                                                             |

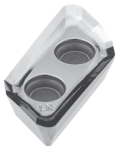
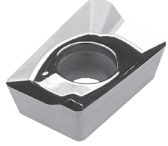
## SHOULDER MILLING INSERTS

| Reference | APKT                                                                                | APHT                                                                                |
|-----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|           |  |  |
| Size      | 10   16                                                                             | 16                                                                                  |
| Material  | P M K N                                                                             | N                                                                                   |
| Page      | 181   187                                                                           | 187                                                                                 |



| FACE MILLING INSERTS |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|----------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Reference            | ONHX                                                                              | ONKX                                                                              | SEHW                                                                              | SEHT                                                                               | PDMW                                                                                | PDHW                                                                                |
|                      | Proprietary milling insert                                                        | Proprietary milling insert                                                        |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                      |  |  |  |  |  |  |
| Size                 | 05   06                                                                           | 05   06                                                                           | 12   13                                                                           | 12   13                                                                            | 12                                                                                  | 12                                                                                  |
| Material             | P M K S                                                                           | P M K S                                                                           | P M K                                                                             | P M K N                                                                            | P                                                                                   | P K                                                                                 |
| Page                 | 65   73                                                                           | 45   73                                                                           | 76   79                                                                           | 76   79                                                                            | 82                                                                                  | 82                                                                                  |

| HIFED MILLING INSERTS |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |
|-----------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Reference             | WDMW                                                                              | WNMW                                                                              | SPKW                                                                              | SPKT                                                                               | XPET...HF                                                                           |
|                       |  |  |  |  | Proprietary milling insert                                                          |
|                       |  |  |  |  |  |
| Size                  | 12                                                                                | 12                                                                                | 08                                                                                | 08                                                                                 | 06   10                                                                             |
| Material              | P K                                                                               | P K                                                                               | P K                                                                               | P M K                                                                              | P M K S                                                                             |
| Page                  | 109                                                                               | 113                                                                               | 117                                                                               | 117                                                                                | 139   147                                                                           |

| SHOULDER MILLING INSERTS |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       |                                                                                       |
|--------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Reference                | LNXT                                                                                | XDGX                                                                                | VCGX                                                                                | SPGX NEW                                                                             | SPMX NEW                                                                              | APET                                                                                  |
|                          | Proprietary milling insert                                                          |                                                                                     |                                                                                     |                                                                                      |                                                                                       |                                                                                       |
|                          |  |  |  |  |  |  |
| Size                     | 09   13   15                                                                        | 15   22                                                                             | 22                                                                                  | 12                                                                                   | 12                                                                                    | 10                                                                                    |
| Material                 | P M K                                                                               | N                                                                                   | N                                                                                   | P M K S                                                                              | P M K S                                                                               | N                                                                                     |
| Page                     | 158   161   165                                                                     | 169   173                                                                           | 176                                                                                 | 178                                                                                  | 178                                                                                   | 181                                                                                   |

# MILLING INSERTS OVERVIEW

A

MILLING

Overview

Face milling

Hifed milling

Shoulder milling

Profile milling

Hardmill

Center &amp; Chamfer

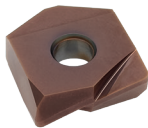
Spot face

Spare Parts

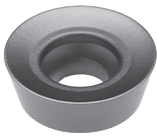
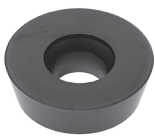
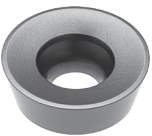
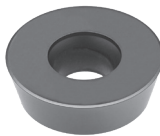
Technical Data

End Mills

## PROFILE MILLING INSERTS

| Reference | WCR <sup>NEW</sup><br>Proprietary milling insert                                  | WCL <sup>NEW</sup><br>Proprietary milling insert                                  | WNHU<br>Proprietary milling insert                                                | RDHT<br>Proprietary milling insert                                                 | RPHT<br>Proprietary milling insert                                                  | RNHX<br>Proprietary milling insert                                                  |
|-----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|           |  |  |  |  |  |  |
| Size      | 08   10   12   16   20                                                            | 08   10   12   16   20                                                            | 04   06                                                                           | 08                                                                                 | 10   12   16   20                                                                   | 12                                                                                  |
| Material  | P M K N S H                                                                       | P M K N S H                                                                       | P K H                                                                             | P M S                                                                              | P M S                                                                               | P M K S                                                                             |
| Page      | 191   192                                                                         | 191   192                                                                         | 196   198                                                                         | 203                                                                                | 203                                                                                 | 211                                                                                 |

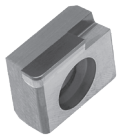
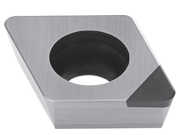
## PROFILE MILLING INSERTS

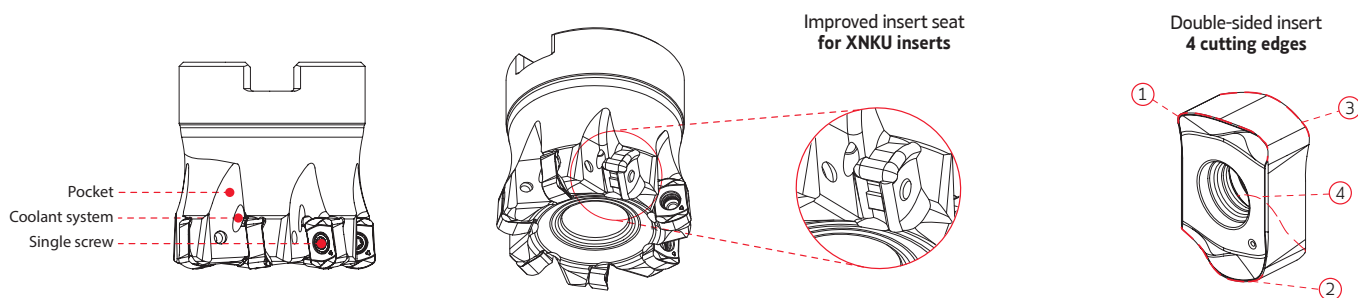
| Reference | RDHT                                                                              | RDHW                                                                              | RDMT                                                                              | RDMW                                                                               | XDHW                                                                                | XPGT <sup>NEW</sup><br>Proprietary milling insert                                   |
|-----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|           |  |  |  |  |  |  |
| Size      | 10   12   16   20                                                                 | 07   10   12   16   20                                                            | 10   12   20                                                                      | 10   12   16   20                                                                  | 04   06   10                                                                        | 32                                                                                  |
| Material  | P K                                                                               | P K H                                                                             | P                                                                                 | P K                                                                                | P K N H                                                                             | P K                                                                                 |
| Page      | 217                                                                               | 217                                                                               | 217                                                                               | 217                                                                                | 223                                                                                 | 194                                                                                 |

## HARDMILL MILLING INSERTS

## CENTER & CHAMFER INSERTS

## SPOT FACE

| Reference | XNHW                                                                                | XDHW                                                                                | SOMT                                                                                | SOGT <sup>NEW</sup>                                                                  | SPKX                                                                                  |
|-----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|           |  |  |  |  |  |
| Size      | 12                                                                                  | 04   06   10                                                                        | 11                                                                                  | 11                                                                                   | 05   06   07   09   11                                                                |
| Material  | K N                                                                                 | N H                                                                                 | P M K                                                                               | P M K                                                                                | P M K S                                                                               |
| Page      | 229                                                                                 | 223                                                                                 | 230                                                                                 | 230                                                                                  | 232                                                                                   |



## MILLING CUTTER

### Design

- Optimized design for better chip evacuation;

### Pocket

- Strong pocket design for better cutter body durability;
- Improved insert seat;

## INSERT

### Insert Width

- Large cross section;

### Cutting edge

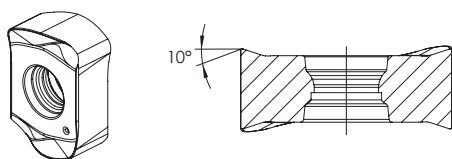
- Improved cutting edge;
- Improved wear resistance;

### Double-sided insert

- Double-sided insert with 4 cutting edges;

# XNKU 06T3

XNKU-MP

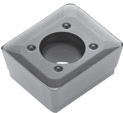
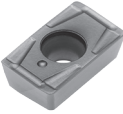
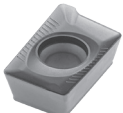
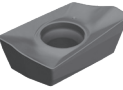


## GEOMETRY FEATURES | Características geométricas | Características geométricas

| Geometry                                | Features   Características   Características                                             |
|-----------------------------------------|------------------------------------------------------------------------------------------|
| Geometry <b>MP</b><br>General machining | Geometry with a reinforced cutting edge for general applications on different materials. |

All information: Page - 84

MILLING INSERTS OVERVIEW

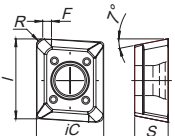
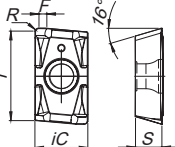
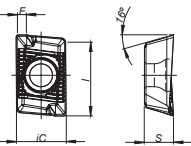
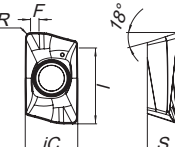
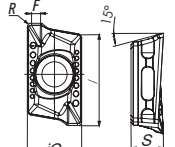
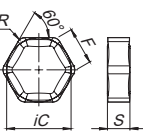
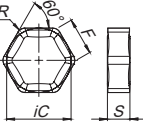
| A                |                                                                                     |                         |                 | P      |        |        |        |        |        |        | M      |        |        | K      |        |        |        |        |        |        |        | N      |     |
|------------------|-------------------------------------------------------------------------------------|-------------------------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|
|                  | Inserts<br>Pastilhas<br>Plaquitas                                                   | (1)<br>Geometry<br>code | (2) Grade code  | PVD    |        |        |        |        |        |        | PVD    |        |        | CVD    |        | PVD    |        |        |        |        |        | UNC    | UNC |
|                  |                                                                                     |                         |                 | M6     | 54     | 68     | 66     | 78     | 86     | I5     | 68     | 66     | I5     | L5     | L9     | D2     | 54     | 68     | 67     | I5     | 17     | 10     |     |
| MILLING          |                                                                                     |                         |                 | PH6103 | PH6910 | PH6920 | PH6930 | PH6125 | PH6135 | PH6740 | PH6920 | PH6930 | PH6740 | PH5705 | PH5740 | PH6705 | PH6910 | PH6920 | PH6325 | PH6740 | PH0325 | PH0910 |     |
|                  |    | 1111423                 | ACET 150612 TR  |        |        | Ⓢ      |        |        |        |        | Ⓢ      |        |        |        |        |        |        | Ⓢ      |        |        |        |        |     |
| Overview         |                                                                                     |                         |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
|                  |                                                                                     |                         |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
| Face milling     |    | 1110014                 | APFT 1604 PDFR  |        |        | ○      |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |     |
|                  |                                                                                     | 1110015                 | APFT 1604 PDSR  |        |        | Ⓢ      |        |        |        |        |        |        |        |        |        |        |        | Ⓢ      |        |        |        |        |     |
|                  |                                                                                     | 1110557                 | APFT 1604 PDTR  |        |        | ○      |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |     |
|                  |                                                                                     |                         |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
| Hifeed milling   |    | 1110006                 | ADKT 1505 PDR   |        |        | Ⓢ      | ○      |        |        |        | Ⓢ      | ○      |        |        |        |        |        | ○      | ○      |        |        |        |     |
|                  |                                                                                     | 1111218                 | ADKT 1505 PDSR  |        |        | Ⓢ      | Ⓢ      |        |        |        |        | Ⓢ      |        |        |        |        |        | Ⓢ      | Ⓢ      |        |        |        |     |
|                  |                                                                                     | 1111209                 | ADKT 1505 PDTR  |        |        | Ⓢ      | ○      |        |        |        |        | ○      |        |        |        |        |        | Ⓢ      | ○      |        |        |        |     |
|                  |                                                                                     |                         |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
| Shoulder milling |  | 1112192                 | BOMT 130408R    |        |        | ○      |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |     |
|                  |                                                                                     |                         |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
| Profile milling  |  | 1110038                 | BCKT 1304 PDR   |        |        |        |        |        | Ⓢ      |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
|                  |                                                                                     |                         |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
| Hardmill         |  | 1110922                 | HNGF 090520 - V |        |        |        |        |        |        |        |        |        |        | Ⓢ      |        |        |        | ○      | Ⓢ      |        |        |        |     |
|                  |                                                                                     |                         |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
| Center & Chamfer |  | 1110957                 | HNGF 090520 - W |        |        |        |        |        |        |        |        |        |        | Ⓢ      |        | Ⓢ      |        | ○      |        |        |        |        |     |
|                  |                                                                                     |                         |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
| face             |                                                                                     |                         |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
|                  |                                                                                     |                         |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |

Ⓢ First choice | Primeira opção | 1ª opção

Ⓢ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

| Dimensions (mm)   Dimensões (mm)   Dimensiones (mm) |      |       |      |   |      | Drawing                                                                               |
|-----------------------------------------------------|------|-------|------|---|------|---------------------------------------------------------------------------------------|
| ic                                                  | S    | I     | R    | a | F    |                                                                                       |
| 12,7                                                | 6,35 | 15,00 | 1,20 | - | 1,70 |    |
|                                                     |      |       |      |   |      |                                                                                       |
| 9,53                                                | 4,76 | 16,00 | 0,80 | - | 2,00 |    |
| 9,53                                                | 4,76 | 16,00 | 0,80 | - | 2,00 |                                                                                       |
| 9,53                                                | 4,76 | 16,00 | 0,80 | - | 2,00 |                                                                                       |
|                                                     |      |       |      |   |      |                                                                                       |
| 9,54                                                | 5,63 | 15,70 | -    | - | 1,60 |    |
| 9,54                                                | 5,63 | 15,70 | -    | - | 1,60 |                                                                                       |
| 9,54                                                | 5,63 | 15,70 | -    | - | 1,60 |                                                                                       |
|                                                     |      |       |      |   |      |                                                                                       |
| 8,13                                                | 4,85 | 11,50 | 1,20 | - | 1,40 |   |
|                                                     |      |       |      |   |      |                                                                                       |
| 8,41                                                | 4,90 | 12,80 | 0,61 | - | 1,40 |  |
|                                                     |      |       |      |   |      |                                                                                       |
| 16,20                                               | 5,56 | 9,16  | 2,00 | - | -    |  |
|                                                     |      |       |      |   |      |                                                                                       |
| 16,20                                               | 5,56 | 9,16  | 2,00 | - | -    |  |
|                                                     |      |       |      |   |      |                                                                                       |

A

MILLING

Overview

Face milling

Hifed milling

Shoulder milling

Profile milling

Hardmill

Center &amp; Chamfer

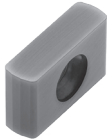
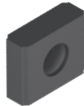
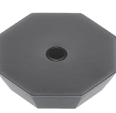
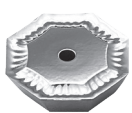
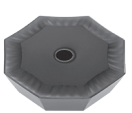
Spot face

Spare Parts

Technical Data

End Mills

# MILLING INSERTS OVERVIEW

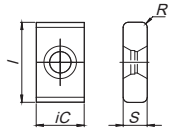
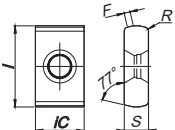
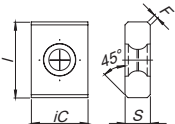
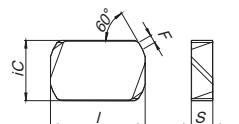
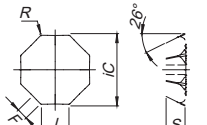
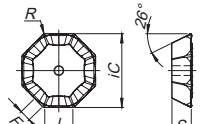
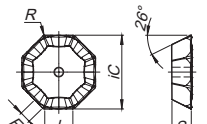
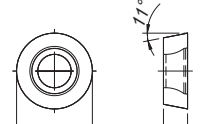
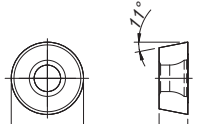
| A                |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
|------------------|-------------------------------------------------------------------------------------|-------------------------|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--|
| MILLING          |                                                                                     |                         |                                 | P      |        |        |        |        |        |        | M      |        |        | K      |        |        |        |        |        |        | N      |        |  |
|                  | Inserts<br>Pastilhas<br>Plaquetas                                                   | (1)<br>Geometry<br>code | (2) Grade code<br>ISO Reference | PVD    |        |        |        |        |        |        | PVD    |        |        | CVD    |        | PVD    |        |        |        |        | UNC    | UNC    |  |
|                  |                                                                                     |                         |                                 | 54     | 68     | G4     | 66     | 78     | 86     | I5     | 68     | 66     | I5     | L5     | L9     | D2     | 54     | 68     | 67     | I5     | 17     | 10     |  |
|                  |                                                                                     |                         |                                 | PH6910 | PH6920 | PH7920 | PH6930 | PH6125 | PH6135 | PH6740 | PH6920 | PH6930 | PH6740 | PH5705 | PH5740 | PH6705 | PH6910 | PH6920 | PH6325 | PH6740 | PH0325 | PH0910 |  |
| Overview         |    | 1111876                 | LNE 323-02                      |        |        |        |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |  |
|                  |                                                                                     | 1111877                 | LNE 323-10                      |        |        |        |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
| Face milling     |    | 1110952                 | LNE 323-02 SP                   |        |        |        |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
| Hi-feed milling  |  | 1113037                 | LNE 434 R08-SP                  |        |        | ○      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
|                  |                                                                                     | 1113038                 | LNE 434 R16-SP                  |        |        | ○      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
|                  |                                                                                     | 1111420                 | LNE 434-02                      |        | ○      |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |  |
|                  |                                                                                     | 1111894                 | LNE 434-05                      | ○      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
| Shoulder milling |  | 1111416                 | LNJN 2205 DDSR-A1               |        |        |        |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
| Profile milling  |  | 1111518                 | OFEN 070405 TN                  | ⊗      | ⊗      |        |        |        |        | ⊗      |        |        |        |        |        | ⊗      | ⊗      |        | ⊗      |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
| Hardmill         |  | 1111569                 | OFKR 070408 FN-LN               |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | ⊗      |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
| Center & Chamfer |  | 1111568                 | OFKR 070408 SN-MP               | ⊗      | ⊗      |        |        | ⊗      |        | ⊗      |        |        | ⊗      |        |        | ⊗      | ⊗      |        | ⊗      |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
| Spot face        |  | 1112133                 | RPEW 1204 M0                    |        | ○      |        |        |        |        |        |        | ○      |        |        |        |        |        | ○      |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
| Spare Parts      |  | 1121742                 | RPMT 1003 M0T                   |        | ○      |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |  |
|                  |                                                                                     | 1120448                 | RPMT 1204 M0T                   |        | ○      |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
| Technical Data   |  |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |
|                  |                                                                                     |                         |                                 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |

⊗ First choice | Primeira opção | 1ª opción

⊗ Stock item | Produto de stock | Itens de stock

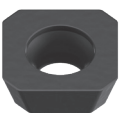
○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

| Dimensions (mm)   Dimensões (mm)   Dimensiones (mm) |      |       |      |      |      | Drawing                                                                               |
|-----------------------------------------------------|------|-------|------|------|------|---------------------------------------------------------------------------------------|
| ic                                                  | S    | I     | R    | a    | F    |                                                                                       |
| 9,53                                                | 4,76 | 15,88 | -    | -    | 0,40 |    |
| 9,53                                                | 4,76 | 15,88 | 1,27 | -    | -    |                                                                                       |
|                                                     |      |       |      |      |      |                                                                                       |
| 9,53                                                | 4,76 | 15,88 | 0,80 | -    | 1,20 |    |
|                                                     |      |       |      |      |      |                                                                                       |
|                                                     |      |       |      |      |      |                                                                                       |
| 14,25                                               | 5,85 | 18,55 | 0,80 | -    | -    |    |
| 14,25                                               | 5,85 | 18,55 | 1,60 | -    | -    |                                                                                       |
| 14,25                                               | 6,35 | 19,05 | -    | -    | 0,80 |                                                                                       |
| 14,25                                               | 6,35 | 19,05 | 1,60 | -    | -    |                                                                                       |
| 14,00                                               | 5,00 | 22,00 | -    | 2,00 | -    |   |
|                                                     |      |       |      |      |      |                                                                                       |
|                                                     |      |       |      |      |      |                                                                                       |
| 18,00                                               | 4,76 | 7,40  | 0,60 | -    | 2,20 |  |
|                                                     |      |       |      |      |      |                                                                                       |
|                                                     |      |       |      |      |      |                                                                                       |
| 18,00                                               | 4,76 | 7,40  | 0,60 | -    | 2,20 |  |
|                                                     |      |       |      |      |      |                                                                                       |
|                                                     |      |       |      |      |      |                                                                                       |
| 18,00                                               | 4,76 | 7,40  | 0,60 | -    | 1,60 |  |
|                                                     |      |       |      |      |      |                                                                                       |
|                                                     |      |       |      |      |      |                                                                                       |
| 12,00                                               | 4,76 | -     | -    | -    | -    |  |
|                                                     |      |       |      |      |      |                                                                                       |
|                                                     |      |       |      |      |      |                                                                                       |
| 10,00                                               | 3,18 | -     | -    | -    | -    |  |
| 12,00                                               | 4,76 | -     | -    | -    | -    |                                                                                       |
|                                                     |      |       |      |      |      |                                                                                       |

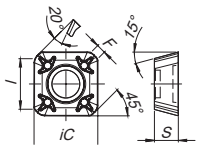
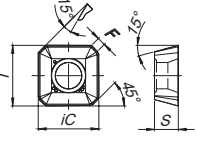
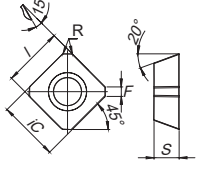
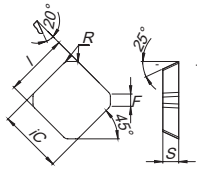
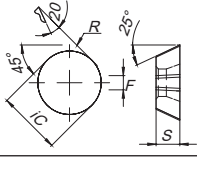
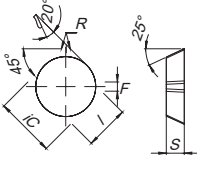
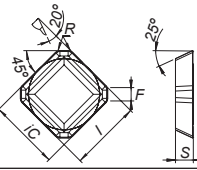
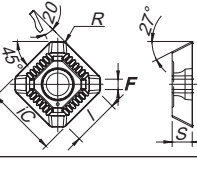


MILLING INSERTS OVERVIEW

| MILLING          |                                                                                     |                                                                                     | P                 |                  |        |        |        |        |        | M      |        |        | K      |        |        |        |        |        |        | N      |        |
|------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                  |    | (1)<br>Geometry<br>code                                                             | (2) Grade code    | PVD              |        |        |        |        |        |        | PVD    |        |        | CVD    | PVD    |        |        |        |        | UNC    | UNC    |
|                  |                                                                                     |                                                                                     |                   | M6               | 54     | 68     | 66     | 78     | 86     | I5     | 68     | 66     | I5     | L9     | D2     | 54     | 68     | 67     | I5     | 17     | 10     |
|                  |                                                                                     |                                                                                     |                   | PH6103           | PH6910 | PH6920 | PH6930 | PH6125 | PH6135 | PH6740 | PH6920 | PH6930 | PH6740 | PH5740 | PH6705 | PH6910 | PH6920 | PH6325 | PH6740 | PH0325 | PH0910 |
| Overview         |                                                                                     |                                                                                     |                   |                  | ○      |        |        |        |        |        | ○      |        |        |        |        |        | ○      |        |        |        |        |
|                  | 1110693                                                                             | SDHT 1204 AFFN                                                                      |                   | ○                |        |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     |                                                                                     |                   |                  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Face milling     |    | 1110201                                                                             | SDHT 1204 AESN-PL |                  |        | ○      |        | ○      |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     |                                                                                     |                   |                  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|                  |                                                                                     |                                                                                     |                   |                  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Hifed milling    |    | 1110818                                                                             | SDHW 09T3 AEEN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     | 1110743                                                                             | SDHW 09T3 AEFN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     | 1110781                                                                             | SDHW 1204 AEEN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     | 1110782                                                                             | SDHW 1204 AETN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     | 1112339                                                                             | SDHW 150412       |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
| Shoulder milling |  | 1110206                                                                             | SEAN 1203 AFEN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     | 1110207                                                                             | SEAN 1203 AFFN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     | 1110208                                                                             | SEAN 1203 AFSN    |                  |        | ⊗      |        |        |        |        |        |        |        |        |        |        | ⊗      |        |        |        |        |
|                  |                                                                                     | 1110209                                                                             | SEAN 1203 AFTN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     | 1110211                                                                             | SEAN 1504 AFFN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     | 1110212                                                                             | SEAN 1504 AFTN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
| Profile milling  |                                                                                     |                                                                                     |                   |                  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|                  |  | 1110224                                                                             | SEHW 1504 AFSN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     | 1110225                                                                             | SEHW 1504 AFTN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     |                                                                                     |                   |                  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Hardmill         |                                                                                     |                                                                                     |                   |                  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|                  |  | 1110226                                                                             | SEKN 1203 AFEN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     | 1110227                                                                             | SEKN 1203 AFFN    |                  |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
| 1110228          |                                                                                     | SEKN 1203 AFSN                                                                      |                   |                  | ⊗      |        |        |        |        |        |        |        |        |        |        | ⊗      |        |        |        |        |        |
| 1110230          |                                                                                     | SEKN 1203 AFTN                                                                      |                   |                  | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |
| 1110794          |                                                                                     | SEKN 1204 AFFN                                                                      |                   |                  | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |
| 1110232          |                                                                                     | SEKN 1204 AFSN                                                                      |                   |                  | ⊗      |        |        |        |        |        |        |        |        |        |        | ⊗      |        |        |        |        |        |
| 1110233          |                                                                                     | SEKN 1204 AFTN                                                                      |                   |                  | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |
| 1110235          |                                                                                     | SEKN 1504 AFEN                                                                      |                   | ⊗                | ⊗      |        |        |        | ⊗      |        |        | ⊗      |        |        | ⊗      | ⊗      |        | ⊗      |        |        |        |
| 1110238          |                                                                                     | SEKN 1504 AFTN                                                                      |                   |                  | ⊗      |        |        |        | ⊗      |        |        |        |        |        |        | ⊗      |        | ⊗      |        |        |        |
| Center & Chamfer |  | 1110239                                                                             | SEKR 1203 AFEN    |                  |        | ⊗      |        |        |        |        |        |        |        |        |        | ⊗      |        |        |        |        |        |
|                  |                                                                                     | 1110240                                                                             | SEKR 1203 AFSN    |                  |        | ⊗      |        |        |        |        |        |        |        |        |        | ⊗      |        |        |        |        |        |
|                  |                                                                                     | 1110241                                                                             | SEKR 1204 AFSN    |                  |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |
|                  |                                                                                     | 1110759                                                                             | SEKR 1504 AFSN    |                  |        | ⊗      |        |        |        | ⊗      |        |        |        |        |        | ⊗      |        | ⊗      |        |        |        |
| Spot face        |                                                                                     |                                                                                     |                   |                  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|                  | Spare Parts                                                                         |                                                                                     |                   |                  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|                  |                                                                                     |                                                                                     |                   |                  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Technical Data   |                                                                                     |  | 1111921           | SEXT 14M4 AGSN-M |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                  |                                                                                     |                                                                                     |                   |                  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|                  |                                                                                     |                                                                                     |                   |                  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |

⊗ First choice | Primeira opção | 1ª opción    ⊗ Stock item | Produto de stock | Itens de stock    ○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

| Dimensions (mm)   Dimensões (mm)   Dimensiones (mm) |      |       |      |   |      | Drawing                                                                               |
|-----------------------------------------------------|------|-------|------|---|------|---------------------------------------------------------------------------------------|
| ic                                                  | S    | I     | R    | a | F    |                                                                                       |
| 12,70                                               | 4,76 | 10,00 | -    | - | 1,80 |    |
| 12,70                                               | 4,76 | 10,00 | -    | - | 1,80 |                                                                                       |
|                                                     |      |       |      |   |      |                                                                                       |
| 12,70                                               | 4,76 | 10,00 | -    | - | 1,80 |    |
|                                                     |      |       |      |   |      |                                                                                       |
|                                                     |      |       |      |   |      |                                                                                       |
| 9,53                                                | 3,97 | 7,30  | 0,30 | - | 1,50 |    |
| 9,53                                                | 3,97 | 7,30  | 0,30 | - | 1,50 |                                                                                       |
| 12,70                                               | 4,76 | 9,00  | -    | - | 2,50 |                                                                                       |
| 12,70                                               | 4,76 | 9,00  | -    | - | 2,50 |                                                                                       |
| 15,88                                               | 4,76 | -     | 1,20 | - | -    |                                                                                       |
| 12,70                                               | 3,18 | 9,20  | 0,80 | - | 2,40 |  |
| 12,70                                               | 3,18 | 9,20  | 0,80 | - | 2,40 |                                                                                       |
| 12,70                                               | 3,18 | 9,20  | 1,20 | - | 2,40 |                                                                                       |
| 12,70                                               | 3,18 | 9,20  | 1,20 | - | 2,40 |                                                                                       |
| 15,88                                               | 4,76 | 11,60 | 1,00 | - | 2,40 |                                                                                       |
| 15,88                                               | 4,76 | 11,60 | 1,00 | - | 2,40 |                                                                                       |
| 15,88                                               | 4,76 | 11,60 | 0,20 | - | 2,80 |  |
| 15,88                                               | 4,76 | 11,60 | 0,20 | - | 2,80 |                                                                                       |
|                                                     |      |       |      |   |      |                                                                                       |
| 12,70                                               | 3,18 | 9,20  | 1,20 | - | 2,40 |  |
| 12,70                                               | 3,18 | 9,20  | 1,20 | - | 2,40 |                                                                                       |
| 12,70                                               | 3,18 | 9,20  | 1,20 | - | 2,40 |                                                                                       |
| 12,70                                               | 3,18 | 9,20  | 1,20 | - | 2,40 |                                                                                       |
| 12,70                                               | 4,76 | 9,20  | 1,20 | - | 2,40 |                                                                                       |
| 12,70                                               | 4,76 | 9,20  | 1,20 | - | 2,40 |                                                                                       |
| 12,70                                               | 4,76 | 9,20  | 1,20 | - | 2,40 |                                                                                       |
| 15,88                                               | 4,76 | 12,30 | 1,00 | - | 2,40 |                                                                                       |
| 15,88                                               | 4,76 | 12,30 | 1,00 | - | 2,40 |                                                                                       |
| 12,70                                               | 3,18 | 9,20  | 1,20 | - | 2,40 |  |
| 12,70                                               | 3,18 | 9,20  | 1,20 | - | 2,40 |                                                                                       |
| 12,70                                               | 4,76 | 9,20  | 1,20 | - | 2,40 |                                                                                       |
| 15,88                                               | 4,76 | 12,30 | 1,00 | - | 2,40 |                                                                                       |
| 14,00                                               | 4,00 | 9,20  | 1,00 | - | 2,80 |  |
|                                                     |      |       |      |   |      |                                                                                       |

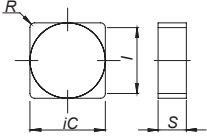
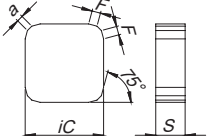
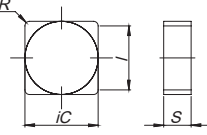
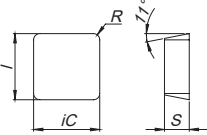
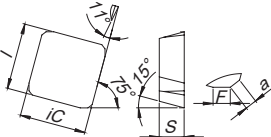
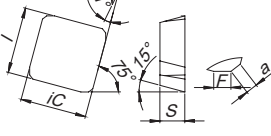
# MILLING INSERTS OVERVIEW

|                                                                                     |                         |                | P      |        |        |        |        |        |        | M      |        |        | K      |        |        |        |        |        |        | N      |     |
|-------------------------------------------------------------------------------------|-------------------------|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|
| Inserts<br>Pastilhas<br>Plaquitas                                                   | (1)<br>Geometry<br>code |                | PVD    |        |        |        |        |        |        | PVD    |        |        | CVD    | PVD    |        |        |        |        |        | UNC    | UNC |
|                                                                                     |                         | (2) Grade code | M6     | 54     | 68     | 66     | 78     | 86     | I5     | 68     | 66     | I5     | L9     | D2     | 54     | 68     | 67     | I5     | 17     | 10     |     |
|                                                                                     |                         | ISO Reference  | PH6103 | PH6910 | PH6920 | PH6930 | PH6125 | PH6135 | PH6740 | PH6920 | PH6930 | PH6740 | PH5740 | PH6705 | PH6910 | PH6920 | PH6325 | PH6740 | PH0325 | PH0910 |     |
|    | 1110266                 | SNGN 120408    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1110267                 | SNGN 120412    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1110597                 | SNGN 190412    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1110598                 | SNGN 190416    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|    | 1110271                 | SNKN 1204 ENEN |        |        | ⊗      |        |        |        |        |        |        |        |        |        | ⊗      |        |        |        |        |        |     |
|                                                                                     | 1110273                 | SNKN 1204 ENSN |        |        | ⊗      |        |        |        |        |        |        |        |        |        | ⊗      |        |        |        |        |        |     |
|                                                                                     |                         |                |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
|    | 1120541                 | SNUN 120404    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1120542                 | SNUN 120408    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1120544                 | SNUN 120412    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1121880                 | SNUN 190612T   |        |        |        | ○      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
|                                                                                     |                         |                |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
|  | 1110765                 | SPGN 090312    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1111173                 | SPGN 090316    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1110300                 | SPGN 120308    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1110301                 | SPGN 120312    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1110303                 | SPGN 120408    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1110588                 | SPGN 120412    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1110590                 | SPGN 150408    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1110304                 | SPGN 150412    |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|  | 1110326                 | SPKN 1203 EDFR |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | ⊗      |        |        |     |
|                                                                                     | 1110328                 | SPKN 1203 EDSR |        |        | ○      |        | ⊗      | ⊗      |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1110330                 | SPKN 1203 EDTR |        |        | ⊗      |        | ⊗      | ⊗      |        |        |        |        |        | ⊗      |        |        | ⊗      |        |        |        |     |
|                                                                                     | 1110331                 | SPKN 1204 EDER |        |        | ⊗      |        |        |        |        |        |        |        |        |        | ⊗      |        |        |        |        |        |     |
|                                                                                     | 1110332                 | SPKN 1204 EDSR |        |        | ⊗      |        |        | ⊗      |        |        |        |        |        |        | ⊗      |        | ⊗      |        |        |        |     |
|                                                                                     | 1110333                 | SPKN 1204 EDTR |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|  | 1110336                 | SPKN 1504 EDER |        |        | ⊗      |        | ⊗      |        |        |        |        |        |        |        | ⊗      |        |        |        |        |        |     |
|                                                                                     | 1110337                 | SPKN 1504 EDFR |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        | ⊗      |        |        |     |
|                                                                                     | 1110339                 | SPKN 1504 EDSR |        |        | ⊗      |        |        | ⊗      |        |        |        |        |        |        | ⊗      |        | ⊗      |        |        |        |     |
|                                                                                     | 1110340                 | SPKN 1504 EDTR |        |        | ⊗      |        | ⊗      | ⊗      |        |        |        |        |        |        | ⊗      |        | ⊗      |        |        |        |     |
|                                                                                     | 1110335                 | SPKN 1504 EDEL |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |
|                                                                                     | 1110338                 | SPKN 1504 EDSL |        |        | ○      |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |        |     |

Continue next page | Continua na próxima página | Sigue en la página siguiente

 First choice | Primeira opção | 1ª opción
  Stock item | Produto de stock | Itens de stock
  Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

| Dimensions (mm)   Dimensões (mm)   Dimensiones (mm) |      |       |      |      |      | Drawing                                                                               |
|-----------------------------------------------------|------|-------|------|------|------|---------------------------------------------------------------------------------------|
| ic                                                  | S    | I     | R    | a    | F    |                                                                                       |
| 12,70                                               | 4,76 | -     | 0,80 | -    | -    |    |
| 12,70                                               | 4,76 | -     | 1,20 | -    | -    |                                                                                       |
| 19,05                                               | 4,76 | -     | 1,20 | -    | -    |                                                                                       |
| 19,05                                               | 4,76 | -     | 1,60 | -    | -    |                                                                                       |
| 12,70                                               | 4,76 | -     | -    | 1,50 | 0,80 |    |
| 12,70                                               | 4,76 | -     | -    | 1,50 | 0,80 |                                                                                       |
|                                                     |      |       |      |      |      |                                                                                       |
| 12,70                                               | 4,76 | 11,10 | 0,40 | -    | -    |    |
| 12,70                                               | 4,76 | 11,10 | 0,80 | -    | -    |                                                                                       |
| 12,70                                               | 4,76 | 11,10 | 1,20 | -    | -    |                                                                                       |
| 19,05                                               | 6,35 | -     | 1,20 | -    | -    |                                                                                       |
|                                                     |      |       |      |      |      |                                                                                       |
| 9,53                                                | 3,18 | -     | 1,20 | -    | -    |  |
| 9,53                                                | 3,18 | -     | 1,60 | -    | -    |                                                                                       |
| 12,70                                               | 3,18 | -     | 0,80 | -    | -    |                                                                                       |
| 12,70                                               | 3,18 | -     | 1,20 | -    | -    |                                                                                       |
| 12,70                                               | 4,76 | -     | 0,80 | -    | -    |                                                                                       |
| 12,70                                               | 4,76 | -     | 1,20 | -    | -    |                                                                                       |
| 15,88                                               | 4,76 | -     | 0,80 | -    | -    |                                                                                       |
| 15,88                                               | 4,76 | -     | 1,20 | -    | -    |                                                                                       |
| 12,70                                               | 3,18 | 12,70 | -    | 1,00 | 1,50 |  |
| 12,70                                               | 3,18 | 12,70 | -    | 1,00 | 1,50 |                                                                                       |
| 12,70                                               | 3,18 | 12,70 | -    | 1,00 | 1,50 |                                                                                       |
| 12,70                                               | 4,76 | 12,70 | -    | 1,00 | 1,50 |                                                                                       |
| 12,70                                               | 4,76 | 12,70 | -    | 1,00 | 1,50 |                                                                                       |
| 12,70                                               | 4,76 | 12,70 | -    | 1,00 | 1,50 |                                                                                       |
| 15,88                                               | 4,76 | 15,88 | -    | 1,00 | 1,50 |  |
| 15,88                                               | 4,76 | 15,88 | -    | 1,00 | 1,50 |                                                                                       |
| 15,88                                               | 4,76 | 15,88 | -    | 1,00 | 1,50 |                                                                                       |
| 15,88                                               | 4,76 | 15,88 | -    | 1,00 | 1,50 |                                                                                       |
| 15,88                                               | 4,76 | 15,88 | -    | 1,00 | 1,50 |                                                                                       |
| 15,88                                               | 4,76 | 15,88 | -    | 1,00 | 1,50 |                                                                                       |

A

MILLING

Overview

Face milling

Hifed milling

Shoulder milling

Profile milling

Hardmill

Center &amp; Chamfer

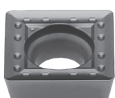
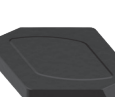
Spot face

Spare Parts

Technical Data

End Mills

MILLING INSERTS OVERVIEW

| A                |                                                                                     |                         |                   | P      |        |        |        |        |        |        | M      |        |        | K      |        |        |        |        |        |        |        | S   |     |
|------------------|-------------------------------------------------------------------------------------|-------------------------|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|-----|
|                  |    | (1)<br>Geometry<br>code | (2) Grade code    | PVD    |        |        |        |        |        |        | PVD    |        |        | CVD    |        | PVD    |        |        |        |        |        | UNC | PVD |
|                  |                                                                                     |                         |                   | M6     | 54     | 68     | 66     | 86     | I5     | 68     | 66     | I5     | L5     | L9     | D2     | 54     | 68     | 67     | I5     | 17     | I5     |     |     |
| MILLING          |                                                                                     |                         | ISO Reference     | PH6103 | PH6910 | PH6920 | PH6930 | PH6135 | PH6740 | PH6920 | PH6930 | PH6740 | PH5705 | PH5740 | PH6705 | PH6910 | PH6920 | PH6325 | PH6740 | PH0325 | PH6740 |     |     |
|                  |    | 1111976                 | SPKR 1203 EDTR    |        |        | ○      |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |     |     |
|                  |                                                                                     | 1110564                 | SPKR 1504 EDFR    |        |        | ○      |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |     |     |
| 1111449          |                                                                                     | SPKR 1504 EDSR          |                   |        | ○      |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |     |     |
| Overview         |                                                                                     |                         |                   |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |     |
| Face milling     |    | 1111107                 | SPKR 1906         |        |        | ○      |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |     |     |
|                  |                                                                                     |                         |                   |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |     |
| Hi-feed milling  |    | 1111195                 | SPKT 130510-E     |        |        | ⊗      |        |        |        |        |        |        |        |        |        |        |        | ⊗      |        |        |        |     |     |
| Shoulder milling |   | 1111153                 | SPKW 130510 F     |        | ○      | ○      |        |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |     |     |
|                  |                                                                                     | 1111355                 | SPKW 130510-E     |        |        | ⊗      |        |        |        |        |        |        |        |        |        |        |        | ⊗      |        |        |        |     |     |
|                  |                                                                                     | 1110888                 | SPKW 130510-S     |        |        | ⊗      |        |        |        |        |        |        |        |        |        |        |        | ⊗      |        |        |        |     |     |
| Profile milling  |  | 1111609                 | SPMT 120408-MP    |        |        | ⊗      |        |        | ⊗      |        |        | ⊗      |        |        |        |        |        | ⊗      |        | ⊗      | ⊗      |     |     |
| Hardmill         |  | 1120572                 | SPMW 120408       |        |        | ○      |        |        | ⊗      |        |        | ⊗      |        |        |        |        |        | ○      |        | ⊗      |        |     |     |
|                  |                                                                                     |                         |                   |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |     |
| Center & Chamfer |  | 1191186                 | SPXN 1906         |        |        | ○      |        | ○      | ○      |        |        |        |        | ○      |        |        |        | ○      |        |        |        |     |     |
| Spot face        |  | 1112384                 | SPXN 1906-W       |        |        | ○      |        |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |     |     |
|                  |                                                                                     |                         |                   |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |     |
| Spare Parts      |  | 1112134                 | SPXR 1203 EDSR-MP |        |        | ⊗      |        |        | ⊗      |        |        |        |        |        |        |        |        | ⊗      |        | ⊗      |        |     |     |
| Technical Data   |  | 1110393                 | TNHF 1204 AN-CA   |        |        |        |        |        |        |        |        |        | ⊗      | ⊗      | ⊗      | ⊗      | ○      |        |        |        |        |     |     |
|                  |                                                                                     | 1111333                 | TNHF 1204 AN-K    |        |        |        |        |        |        |        |        |        | ⊗      | ⊗      |        |        | ⊗      |        |        |        |        |     |     |
|                  |                                                                                     |                         |                   |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |     |

⊗ First choice | Primeira opção | 1ª opção

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

| Dimensions (mm)   Dimensões (mm)   Dimensiones (mm) |      |       |      |      |       | Drawing |
|-----------------------------------------------------|------|-------|------|------|-------|---------|
| ic                                                  | S    | I     | R    | a    | F     |         |
| 12,70                                               | 3,18 | 12,70 | -    | 1,00 | 1,40  |         |
| 15,88                                               | 4,76 | 15,88 | -    | 1,00 | 1,40  |         |
| 15,88                                               | 4,76 | 15,88 | -    | 1,00 | 1,40  |         |
| 19,05                                               | 6,35 | 19,05 | -    | 1,00 | 1,40  |         |
|                                                     |      |       |      |      |       |         |
| 13,00                                               | 5,56 | -     | 1,00 | -    | -     |         |
|                                                     |      |       |      |      |       |         |
| 13,00                                               | 5,56 | -     | 1,00 | -    | -     |         |
| 13,00                                               | 5,56 | -     | 1,00 | -    | -     |         |
| 13,00                                               | 5,56 | -     | 1,00 | -    | -     |         |
| 12,70                                               | 4,76 | -     | 0,8  | -    | -     |         |
|                                                     |      |       |      |      |       |         |
| 12,70                                               | 4,76 | -     | 0,8  | -    | -     |         |
|                                                     |      |       |      |      |       |         |
| 19,05                                               | 6,35 | 19,05 | -    | 1,00 | 1,40  |         |
|                                                     |      |       |      |      |       |         |
| 19,05                                               | 6,35 | -     | -    | -    | 12,00 |         |
|                                                     |      |       |      |      |       |         |
| 12,70                                               | 3,18 | 12,70 | 1,00 | 1,00 | 1,37  |         |
|                                                     |      |       |      |      |       |         |
| 12,70                                               | 4,76 | 12,00 | 2,00 | -    | 1,70  |         |
| 12,70                                               | 4,76 | 12,00 | 3,00 | -    | 1,30  |         |

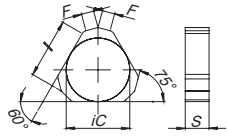
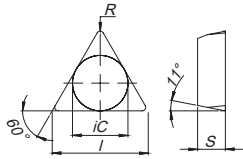
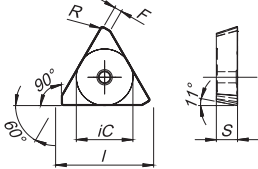
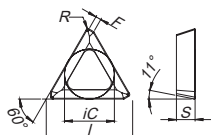
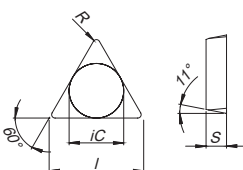
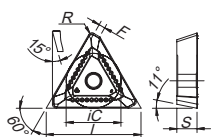
# MILLING INSERTS OVERVIEW

[illegible] First choice | Primeira opção | 1ª opción

 Stock item | Produto de stock | Itens de stock

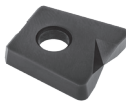
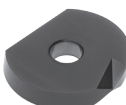
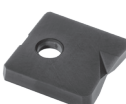
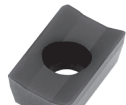
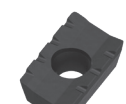
○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

| Dimensions (mm)   Dimensões (mm)   Dimensiones (mm) |      |       |      |   |      | Drawing                                                                               |
|-----------------------------------------------------|------|-------|------|---|------|---------------------------------------------------------------------------------------|
| ic                                                  | S    | I     | R    | a | F    |                                                                                       |
| 12,70                                               | 4,76 | 12,00 | -    | - | 2,50 |    |
|                                                     |      |       |      |   |      |                                                                                       |
| 6,35                                                | 3,18 | -     | 0,40 | - | -    |    |
| 6,35                                                | 3,18 | -     | 0,40 | - | -    |                                                                                       |
| 9,53                                                | 3,18 | -     | 0,40 | - | -    |                                                                                       |
| 9,53                                                | 3,18 | -     | 0,80 | - | -    |                                                                                       |
| 9,53                                                | 3,18 | 16,50 | 0,70 | - | 1,20 |   |
| 9,53                                                | 3,18 | 16,50 | 0,70 | - | 1,40 |                                                                                       |
| 9,53                                                | 3,18 | 16,50 | 0,70 | - | 1,20 |                                                                                       |
| 9,53                                                | 3,18 | 16,50 | 0,70 | - | 1,40 |                                                                                       |
| 9,53                                                | 3,18 | 16,50 | -    | - | 1,10 |                                                                                       |
| 9,53                                                | 3,18 | 16,50 | -    | - | 1,10 |                                                                                       |
| 12,70                                               | 4,76 | 22,00 | 0,50 | - | 1,70 |                                                                                       |
| 12,70                                               | 4,76 | 22,00 | 0,50 | - | 1,70 |                                                                                       |
| 12,70                                               | 4,76 | 22,00 | 0,50 | - | 1,70 |                                                                                       |
| 12,70                                               | 4,76 | 22,00 | -    | - | 1,40 |                                                                                       |
| 12,70                                               | 4,76 | 22,00 | -    | - | 1,40 |                                                                                       |
|                                                     |      |       |      |   |      |  |
| 9,53                                                | 3,18 | 16,50 | 0,60 | - | 1,20 |                                                                                       |
| 12,70                                               | 4,76 | 22,00 | 0,50 | - | 1,70 |  |
| 6,35                                                | 3,18 | 11,00 | 0,40 | - | -    |                                                                                       |
| 6,35                                                | 3,18 | 11,00 | 0,80 | - | -    |                                                                                       |
| 9,53                                                | 3,18 | 16,50 | 0,40 | - | -    |                                                                                       |
| 9,53                                                | 3,18 | 16,50 | 0,80 | - | -    |                                                                                       |
| 9,53                                                | 3,18 | 16,50 | 1,20 | - | -    |                                                                                       |
| 12,70                                               | 4,76 | 22,00 | 0,40 | - | -    |                                                                                       |
| 12,70                                               | 4,76 | 22,00 | 0,80 | - | -    |                                                                                       |
| 12,70                                               | 4,76 | 22,00 | 1,20 | - | -    |                                                                                       |
| 15,88                                               | 6,35 | 27,00 | 1,60 | - | -    |  |
| 12,70                                               | 4,76 | 22,00 | 1,00 | - | 1,70 |                                                                                       |
|                                                     |      |       |      |   |      |                                                                                       |



# MILLING INSERTS OVERVIEW

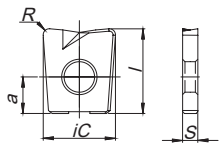
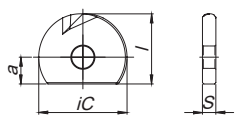
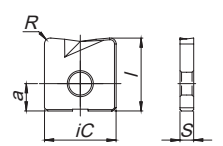
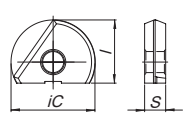
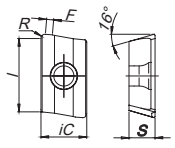
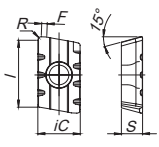
|                                                                                     |                         |                  | P      |        |        |        |        |        | M      |        |        | K      |        |        |        |        |        |        |        |        |
|-------------------------------------------------------------------------------------|-------------------------|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Inserts<br>Pastilhas<br>Plaquetas                                                   | (1)<br>Geometry<br>code |                  | PVD    |        |        |        |        |        | PVD    |        |        | CVD    |        | PVD    |        |        |        |        | UNC    |        |
|                                                                                     |                         | (2) Grade code   | M6     | 54     | 68     | 66     | 78     | 86     | I5     | 68     | 66     | I5     | L5     | L9     | D2     | 54     | 68     | 67     | I5     | 17     |
|                                                                                     |                         | ISO Reference    | PH6103 | PH6910 | PH6920 | PH6930 | PH6125 | PH6135 | PH6740 | PH6920 | PH6930 | PH6740 | PH5705 | PH5740 | PH6705 | PH6910 | PH6920 | PH6325 | PH6740 | PH0325 |
|    | 1110851                 | WPB 08           | ○      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1110852                 | WPB 10           | ○      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1110853                 | WPB 12           | ○      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1110923                 | WPB 16           | ○      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1111019                 | WPB 20           | ○      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|    | 1111554                 | WPRX-2 08        |        | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1111331                 | WPRX-2 10        |        | ⊗      | ⊗      |        |        |        |        |        |        |        |        |        | ⊗      | ⊗      |        |        |        |        |
|                                                                                     | 1111555                 | WPRX-2 12        |        | ⊗      | ⊗      |        |        |        |        |        |        |        |        |        | ⊗      | ⊗      |        |        |        |        |
|                                                                                     | 1111329                 | WPRX-2 16        |        | ⊗      | ⊗      |        |        |        |        |        |        |        |        |        | ⊗      | ⊗      |        |        |        |        |
|                                                                                     | 1111330                 | WPRX-2 20        |        | ⊗      | ⊗      |        |        |        |        |        |        |        |        |        | ⊗      | ⊗      |        |        |        |        |
|                                                                                     | 1111556                 | WPRX-2 25        |        | ⊗      | ⊗      |        |        |        |        |        |        |        |        |        | ⊗      | ⊗      |        |        |        |        |
|                                                                                     | 1111557                 | WPRX-2 32        |        | ⊗      | ⊗      |        |        |        |        |        |        |        |        |        | ⊗      | ⊗      |        |        |        |        |
|   | 1110820                 | WPV 08           | ○      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1110821                 | WPV 10           | ○      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1110822                 | WPV 12           | ○      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1110948                 | WPV 16           | ○      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1111020                 | WPV 20           | ○      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|  | 1110543                 | WPZ 08           | ⊗      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1110551                 | WPZ 10           | ⊗      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1110552                 | WPZ 12           | ⊗      | ○      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1110544                 | WPZ 16           | ⊗      | ⊗      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1110553                 | WPZ 20           | ⊗      | ⊗      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1110661                 | WPZ 25           | ⊗      | ⊗      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|                                                                                     | 1110662                 | WPZ 32           | ⊗      | ⊗      | ○      |        |        |        |        |        |        |        |        |        | ○      | ○      |        |        |        |        |
|  | 1110910                 | XPHT 1604 PDTR   |        |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                                                                                     | 1111206                 | XPHT 160420 PPTR |        |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                                                                                     | 1110926                 | XPHT 160432 PDSR |        |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|  | 1110958                 | XPHT 160412-MR   |        |        | ○      |        |        |        |        |        |        |        |        |        |        | ○      |        |        |        |        |
|                                                                                     |                         |                  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |

 First choice | Primeira opção | 1ª opção

 Stock item | Produto de stock | Itens de stock

 Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

| Dimensions (mm)   Dimensões (mm)   Dimensiones (mm) |      |       |      |       |      | Drawing                                                                               |
|-----------------------------------------------------|------|-------|------|-------|------|---------------------------------------------------------------------------------------|
| ic                                                  | S    | I     | R    | a     | F    |                                                                                       |
| 8,00                                                | 2,00 | 9,50  | 0,60 | 4,00  | -    |    |
| 10,00                                               | 2,50 | 11,50 | 0,80 | 5,00  | -    |                                                                                       |
| 12,00                                               | 2,50 | 14,00 | 1,00 | 6,00  | -    |                                                                                       |
| 16,00                                               | 3,00 | 16,00 | 1,30 | 6,00  | -    |                                                                                       |
| 20,00                                               | 3,00 | 20,00 | 1,60 | 6,00  | -    |                                                                                       |
| 8,00                                                | 2,00 | 9,50  | -    | 2,50  | -    |    |
| 10,00                                               | 2,50 | 11,50 | -    | 5,00  | -    |                                                                                       |
| 12,00                                               | 2,50 | 11,90 | -    | 6,00  | -    |                                                                                       |
| 16,00                                               | 3,00 | 13,90 | -    | 6,00  | -    |                                                                                       |
| 20,00                                               | 3,00 | 15,90 | -    | 6,00  | -    |                                                                                       |
| 25,00                                               | 4,00 | 21,30 | -    | 9,00  | -    |                                                                                       |
| 32,00                                               | 5,00 | 25,80 | -    | 10,00 | -    |   |
| 8,00                                                | 2,00 | 9,50  | 0,60 | 4,00  | -    |                                                                                       |
| 10,00                                               | 2,50 | 11,50 | 0,80 | 5,00  | -    |                                                                                       |
| 12,00                                               | 2,50 | 14,00 | 1,00 | 6,00  | -    |                                                                                       |
| 16,00                                               | 3,00 | 16,00 | 1,30 | 6,00  | -    |                                                                                       |
| 20,00                                               | 3,00 | 20,00 | 1,60 | 6,00  | -    |  |
| 8,00                                                | 2,40 | 7,00  | -    | 3,00  | -    |                                                                                       |
| 10,00                                               | 2,60 | 8,50  | -    | 3,50  | -    |                                                                                       |
| 12,00                                               | 3,00 | 10,00 | -    | 4,00  | -    |                                                                                       |
| 16,00                                               | 4,00 | 12,00 | -    | 4,00  | -    |                                                                                       |
| 20,00                                               | 5,00 | 15,00 | -    | 5,00  | -    |                                                                                       |
| 25,00                                               | 6,00 | 18,50 | -    | 6,00  | -    |  |
| 9,53                                                | 4,75 | 16,00 | 1,20 | -     | 1,70 |                                                                                       |
| 9,53                                                | 4,75 | 16,00 | 2,00 | -     | 0,70 |                                                                                       |
| 9,53                                                | 4,75 | 16,00 | 3,20 | -     | -    |                                                                                       |
| 9,53                                                | 4,75 | 16,00 | 1,20 | -     | 1,70 |  |
|                                                     |      |       |      |       |      |                                                                                       |

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

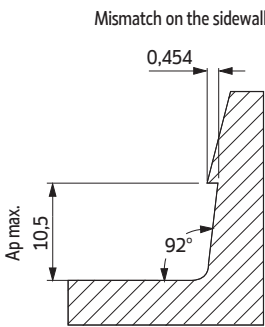
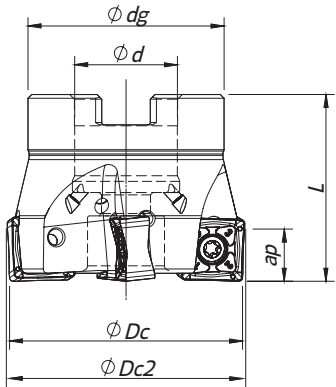
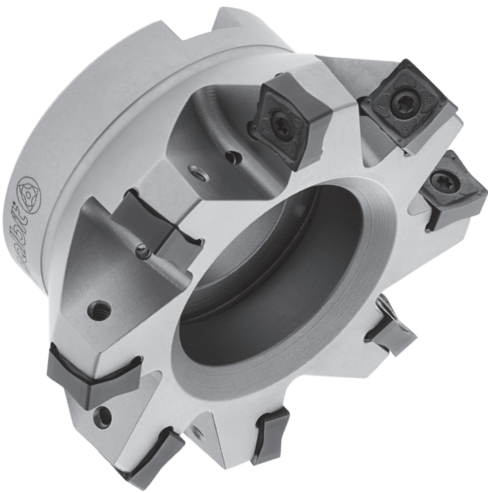
Center &amp; Chamfer

Spot face

Spare Parts

Technical Data

End Mills



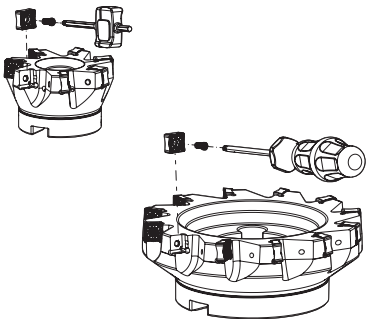
Arbor Mounting  
 $K_r=88^\circ$  |  $\gamma_p=-6^\circ$

| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |            |          |           |    | Kg  | Specifications |                   | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|------------|----------|-----------|----|-----|----------------|-------------------|-------------------------------|-------|
|                      |                                       |    | $\phi Dc$                                 | $\phi Dc2$ | $\phi d$ | $\phi dg$ | L  |     | Arbor<br>Type  | $Ap\ max$<br>(mm) |                               |       |
| 181084300            | 050A28088-05-06-022040                | 5  | 50                                        | 50,9       | 22       | 42        | 40 | 0,4 | A              | 10,5              | SN... 1206...                 |       |
| 181091600            | 063A28088-06-06-022040                | 6  | 63                                        | 63,9       | 22       | 48        | 40 | 0,5 | A              | 10,5              | SN... 1206...                 |       |
| 181091700            | 080A28088-07-06-027050                | 7  | 80                                        | 80,9       | 27       | 60        | 50 | 1,0 | A              | 10,5              | SN... 1206...                 |       |
| 181091800            | 080A28088-09-06-027050                | 9  | 80                                        | 80,9       | 27       | 60        | 50 | 0,9 | A              | 10,5              | SN... 1206...                 |       |
| 181091900            | 100A28088-08-06-032050                | 8  | 100                                       | 100,9      | 32       | 73        | 50 | 1,6 | B              | 10,5              | SN... 1206...                 |       |
| 181092000            | 100A28088-11-06-032050                | 11 | 100                                       | 100,9      | 32       | 73        | 50 | 1,5 | B              | 10,5              | SN... 1206...                 |       |
| 181092100            | 125A28088-10-06-040063                | 10 | 125                                       | 125,9      | 40       | 90        | 63 | 3,1 | B              | 10,5              | SN... 1206...                 |       |
| 181092200            | 125A28088-14-06-040063                | 14 | 125                                       | 125,9      | 40       | 90        | 63 | 3,0 | B              | 10,5              | SN... 1206...                 |       |
| 181092300            | 160A28088-12-06-U040063               | 12 | 160                                       | 160,9      | 40       | 110       | 63 | 3,7 | C              | 10,5              | SN... 1206...                 |       |
| 181092700            | 160A28088-18-06-U040063               | 18 | 160                                       | 160,9      | 40       | 110       | 63 | 3,5 | C              | 10,5              | SN... 1206...                 |       |
| 181092800            | 200A28088-14-06-U060063               | 14 | 200                                       | 200,9      | 60       | 172       | 63 | 6,3 | C              | 10,5              | SN... 1206...                 |       |
| 181092900            | 200A28088-22-06-U060063               | 22 | 200                                       | 200,9      | 60       | 172       | 63 | 6,1 | C              | 10,5              | SN... 1206...                 |       |

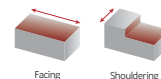
Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

SPARE PARTS | Complementos | Repuestos

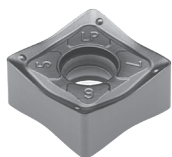
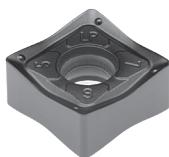
| Cutter<br>$\phi Dc$ | Order separately |            |                 |              | Order separately |                 |
|---------------------|------------------|------------|-----------------|--------------|------------------|-----------------|
|                     | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value | Screw            | DIN 6368 Wrench |
| A28088 - 50 - 80    | P0401200         | XT15       | DT1530          | 3,0          | -                | -               |
| A28088 - 100        | P0401200         | PT15       | DT1530          | 3,0          | J0164110         | SD6368-16       |
| A28088 - 125        | P0401200         | PT15       | DT1530          | 3,0          | J0204610         | SD6368-20       |
| A28088 - 160 - 200  | P0401200         | PT15       | DT1530          | 3,0          | -                | -               |



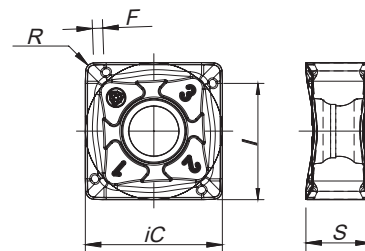
Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## SNH(K)U 1206 | Inserts | Pastilhas | Plaquetas

SNHU-LP  
(PHP grade)SNKU-LP  
(PHP grade)

SNH(K)U-LP



|                                    |                     | P                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   | M                                                                                 |                                                                                   | K                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |       |      |      |
|------------------------------------|---------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------|------|-------|------|------|
|                                    |                     | CVD                                                                               | PVD                                                                               |                                                                                   |                                                                                   |                                                                                   | PVD                                                                               |                                                                                   | CVD                                                                                 |                                                                                     |                                                                                     |                                                                                     | PVD                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                |      |       |      |      |
|                                    |                     | <sup>(2)</sup> Grade code                                                         | T9                                                                                | G4                                                                                | T1                                                                                | P3                                                                                | G6                                                                                | P3                                                                                | G6                                                                                  | L5                                                                                  | L6                                                                                  | L9                                                                                  | T9                                                                                  | G4                                                                                  | T1                                                                                  | P3                                                                                  |                                                |      |       |      |      |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference    | PHS740                                                                            | PH7920                                                                            | PHP920                                                                            | PH7930                                                                            | PH7740                                                                            | PH7930                                                                            | PH7740                                                                            | PH5705                                                                              | PH5320                                                                              | PH5740                                                                              | PHS740                                                                              | PH7920                                                                              | PHP920                                                                              | PH7930                                                                              | PH7740                                                                              | iC                                             | S    | I     | R    | F    |
| 1112020                            | SNHU 120608 ZNER-LP |                                                                                   |  |  |  |  |  |  |    |                                                                                     |  |                                                                                     |  |                                                                                     |  |  | 13,30                                          | 6,35 | 11,60 | 0,80 | 1,00 |
| 1112278                            | SNKU 120608 ZNER-LP |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 13,30                                          | 6,35 | 11,60 | 0,80 | 1,00 |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta  
(consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades          |        |        |        |           |        |        |        |
|-----|-----|-----------------------------------|-----------------|-----------------|--------|--------|--------|-----------|--------|--------|--------|
|     |     |                                   |                 | Wear Resistance |        |        |        | Toughness |        |        |        |
|     |     |                                   |                 | PH5705          | PH5320 | PHP920 | PH7920 | PH7930    | PH5740 | PHS740 | PH7740 |
| P   | 1   | Unalloyed Steel                   | 125-220         |                 |        | ✓      | ✓      | ✓         |        | ✓      | ✓      |
|     | 2   | Low-Alloyed Steel                 | 220-280         |                 |        | ✓      | ✓      | ✓         |        | ✓      | ✓      |
|     | 3   | High-Alloyed Steel                | 280-380         |                 |        | ✓      | ✓      | ✓         |        | ✓      | ✓      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                 |        |        |        | ✓         |        |        | ✓      |
|     | 5   | SS - Austenitic                   | 200-330         |                 |        |        |        | ✓         |        |        | ✓      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                 |        |        |        | ✓         |        |        | ✓      |
| K   | 7   | Malleable Cast Iron               | 130-230         | ✓               | ✓      | ✓      | ✓      | ✓         | ✓      |        | ✓      |
|     | 8   | Grey Cast Iron                    | 180-245         | ✓               | ✓      | ✓      | ✓      | ✓         | ✓      |        | ✓      |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓               | ✓      | ✓      | ✓      | ✓         | ✓      |        | ✓      |

Good Conditions  
 Average Conditions  
 Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | V <sub>c</sub> (m/min) |         |             |         |
|-----|-----|-----------------------------------|-----------------|------------------------|---------|-------------|---------|
|     |     |                                   |                 | ← Wear Resistance      |         | Toughness → |         |
|     |     |                                   |                 | PH5705                 | PH5320  | PHP920      | PH7920  |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                      | -       | 180-250     | 180-240 |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                      | -       | 160-230     | 160-220 |
|     | 3   | High-Alloyed Steel                | 280-380         | -                      | -       | 140-220     | 140-210 |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                      | -       | -           | -       |
|     | 5   | SS - Austenitic                   | 200-330         | -                      | -       | -           | -       |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                      | -       | -           | -       |
| K   | 7   | Malleable Cast Iron               | 130-230         | 160-290                | 150-280 | 160-270     | 160-260 |
|     | 8   | Grey Cast Iron                    | 180-245         | 170-320                | 160-320 | 140-250     | 140-240 |
|     | 9   | Nodular Cast iron                 | 160-250         | 140-200                | 100-190 | 120-210     | 120-200 |

(Note 1) The above table indicates the cutting conditions of 70% of the tool engagement.

(Note 2) With low workspace clamping rigidity or long overhang of the tool, adjust cutting speed and feed to 70 or 80% of the recommended conditions above.

(Note 3) Surface finishing is determined by speed/feed used.

(Note 4) PH5... and PH5... can be used wet or dry. PH7... use only air.

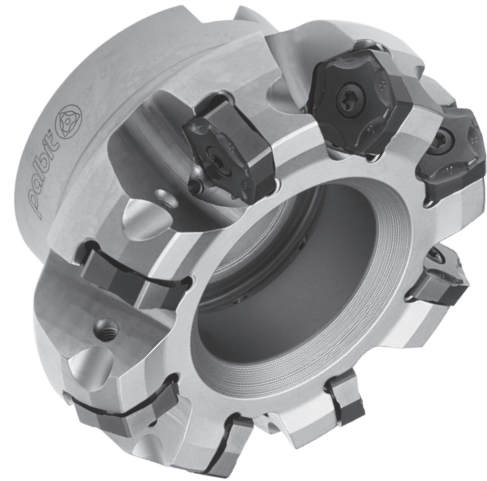
## Selection Example:

| ISO | PSM | Material            | HB<br>(brinell) | V <sub>c</sub> (m/min)          |                                 | Feed f <sub>z</sub> (mm/t)         |
|-----|-----|---------------------|-----------------|---------------------------------|---------------------------------|------------------------------------|
|     |     |                     |                 | ← Wear Resistance               | Toughness →                     |                                    |
|     |     |                     |                 | PH5705                          | PH5740                          | SNHU 1206...<br>SNKU 1206...       |
| K   | 7   | Malleable cast iron | 130-230         | 160 <b>(180)</b> 290            | 160 <b>(1900)</b> 260           | 0,10 <b>(0,25)</b> 0,35            |
|     | 8   | Grey cast iron      | 180-245         | 170 <b>(270)</b> 320            | 140 <b>(180)</b> 240            | 0,10 <b>(0,25)</b> 0,35            |
|     | 9   | Nodular cast iron   | 160-250         | <del>140</del> <b>(150)</b> 200 | <del>120</del> <b>(150)</b> 200 | <del>0,10</del> <b>(0,25)</b> 0,35 |

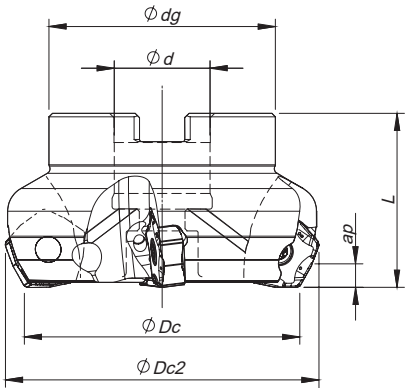
This example shows the recommended starting cutting conditions, indicated in **Bold type**.

| Vc (m/min) |         |         |         | Toughness → | Feed fz (mm/t)          |
|------------|---------|---------|---------|-------------|-------------------------|
| PH7930     | PH5740  | PHS740  | PH7740  |             | SNH(K)U 1206            |
| 160-220    | -       | 140-220 | 140-200 |             | 0,10 <b>(0,25)</b> 0,35 |
| 140-200    | -       | 120-200 | 130-180 |             | 0,10 <b>(0,25)</b> 0,35 |
| 120-190    | -       | 100-190 | 100-170 |             | 0,10 <b>(0,25)</b> 0,35 |
| 140-200    | -       | -       | 130-180 |             | 0,10 <b>(0,25)</b> 0,35 |
| 120-160    | -       | -       | 110-160 |             | 0,10 <b>(0,25)</b> 0,35 |
| 100-140    | -       | -       | 90-150  |             | 0,10 <b>(0,25)</b> 0,35 |
| 150-240    | 160-260 | -       | 140-220 |             | 0,10 <b>(0,25)</b> 0,35 |
| 140-230    | 140-240 | -       | 120-210 |             | 0,10 <b>(0,25)</b> 0,35 |
| 100-190    | 120-200 | -       | 100-190 |             | 0,10 <b>(0,25)</b> 0,35 |





Arbor Mounting  
 $K_r=60^\circ$  |  $\gamma_p -7^\circ$



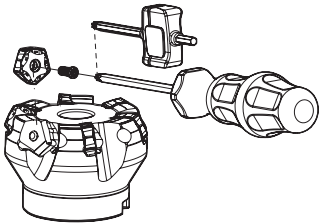
| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |            |          |           |    | Kg    | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|------------|----------|-----------|----|-------|----------------|----------------|-------------------------------|-------|
|                      |                                       |    | $\phi Dc$                                 | $\phi Dc2$ | $\phi d$ | $\phi dg$ | L  |       | Arbor<br>Type  | Ap max<br>(mm) |                               |       |
| 181050200            | 050A90260-05-07-022040                | 5  | 50                                        | 59,05      | 22       | 48        | 40 | 0,388 | A              | 5,0            | PN... 1105...                 |       |
| 181050300            | 063A90260-06-07-022040                | 6  | 63                                        | 72,05      | 22       | 52        | 40 | 0,597 | A              | 5,0            | PN... 1105...                 |       |
| 181050400            | 080A90260-08-07-027050                | 8  | 80                                        | 89,05      | 27       | 60        | 50 | 1,072 | B              | 5,0            | PN... 1105...                 |       |
| 181045900            | 100A90260-10-07-032050                | 10 | 100                                       | 109,05     | 32       | 80        | 50 | 1,745 | B              | 5,0            | PN... 1105...                 |       |
| 181050500            | 125A90260-12-07-040063                | 12 | 125                                       | 134,05     | 40       | 90        | 63 | 3,047 | B              | 5,0            | PN... 1105...                 |       |
| 181050600            | 160A90260-14-07-U040063               | 14 | 160                                       | 169,05     | 40       | 110       | 63 | 4,397 | C              | 5,0            | PN... 1105...                 |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

SPARE PARTS | Complementos | Repuestos

| Cutter<br>$\phi Dc$ | Order separately |            |                    |              | Order separately |                 |
|---------------------|------------------|------------|--------------------|--------------|------------------|-----------------|
|                     | Insert Screw     | Key (Torx) | Key<br>(Torx - Nm) | Torque Value | Screw            | DIN 6368 Wrench |
| A90260 – 50 – 63    | P0401200         | XT15       | DT1530             | 3,0          | -                | -               |
| A90260 – 80         | P0401200         | XT15       | DT1530             | 3,0          | J0123510         | SD6368-12       |
| A90260 – 100        | P0401200         | PT15       | DT1530             | 3,0          | J0164110         | SD6368-16       |
| A90260 – 125        | P0401200         | PT15       | DT1530             | 3,0          | J0204610         | SD6368-20       |
| A90260 – 160        | P0401200         | PT15       | DT1530             | 3,0          | -                | -               |



Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.

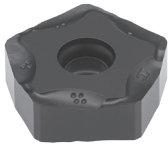


PNH(K)X 1105 | Inserts | Pastilhas | Plaquetas

PNHX-MK



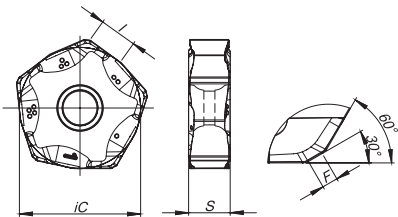
PNHX-HK



PNKX-MK



PNH(K)X-MK | HK



|                                 |                   | P                                                                                 |                                                                                   | K                                                                                 |                                                                                   |                                                                                     |                                                                                     | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |   |      |
|---------------------------------|-------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------|------|------|---|------|
|                                 |                   | PVD                                                                               |                                                                                   | CVD                                                                               |                                                                                   | PVD                                                                                 |                                                                                     |                                                |      |      |   |      |
|                                 |                   | G1                                                                                | G4                                                                                | L5                                                                                | L9                                                                                | G1                                                                                  | G4                                                                                  |                                                |      |      |   |      |
| <sup>(1)</sup><br>Geometry code | ISO<br>Reference  | PH7910                                                                            | PH7920                                                                            | PH5705                                                                            | PH5740                                                                            | PH7910                                                                              | PH7920                                                                              | iC                                             | S    | I    | R | F    |
| 1111374                         | PNHX 1105 ZNER-MK |  |  |  |  |  |  | 16,50                                          | 5,66 | 5,70 | - | 1,30 |
| 1111998                         | PNHX 1105 ZNER-HK |                                                                                   |                                                                                   |  | ○                                                                                 |                                                                                     |                                                                                     | 16,50                                          | 5,66 | 5,70 | - | 1,30 |
| 1112294                         | PNKX 1105 ZNER-MK |  |  |  | ○                                                                                 |  |  | 16,50                                          | 5,66 | 5,70 | - | 1,30 |

⊗ First choice | Primeira opção | 1ª opción    ⊗ Stock item | Produto de stock | Itens de stock    ○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)    Insert order code = (1) Geometry Code + (2) Grade Code

GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material            | HB<br>(brinell) | Grades            |        |        |             |        |
|-----|-----|---------------------|-----------------|-------------------|--------|--------|-------------|--------|
|     |     |                     |                 | ← Wear Resistance |        |        | Toughness → |        |
|     |     |                     |                 | PH5705            | PH7910 | PH7920 | PH5740      | PH7740 |
| P   | 1   | Unalloyed Steel     | 125-220         |                   | ✓      | ✓      |             | ✓      |
|     | 2   | Low-Alloyed Steel   | 220-280         |                   | ✓      | ✓      |             | ✓      |
|     | 3   | High-Alloyed Steel  | 280-380         |                   | ✓      | ✓      |             | ✓      |
| K   | 7   | Malleable Cast Iron | 130-230         | ✓                 | ✓      | ✓      | ✓           |        |
|     | 8   | Grey Cast Iron      | 180-245         | ✓                 | ✓      | ✓      | ✓           |        |
|     | 9   | Nodular Cast iron   | 160-250         | ✓                 | ✓      | ✓      | ✓           |        |

Good Conditions  
 Average Conditions  
 Difficult Conditions



## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material            | HB<br>(Brinell) | Vc (m/min)        |         |         |
|-----|-----|---------------------|-----------------|-------------------|---------|---------|
|     |     |                     |                 | ← Wear Resistance |         |         |
|     |     |                     |                 | PH5705            | PH7910  | PH7920  |
| P   | 1   | Unalloyed Steel     | 125-220         | -                 | 180-250 | 180-240 |
|     | 2   | Low-Alloyed Steel   | 220-280         | -                 | 160-230 | 160-220 |
|     | 3   | High-Alloyed Steel  | 280-380         | -                 | 140-220 | 140-210 |
| K   | 7   | Malleable Cast Iron | 130-230         | 160-290           | 180-300 | 160-260 |
|     | 8   | Grey Cast Iron      | 180-245         | 170-320           | 160-250 | 140-240 |
|     | 9   | Nodular Cast iron   | 160-250         | 140-200           | 150-200 | 120-200 |

(Note 1) Cutting conditions  $a_e/DC=70\%$ .

(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

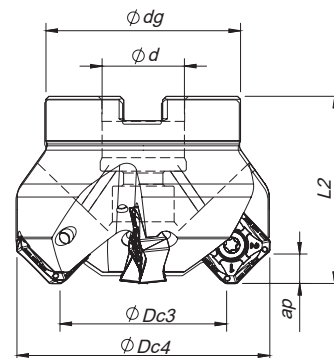
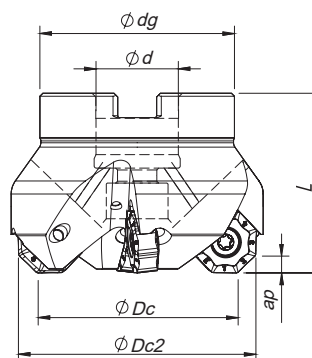
(Note 3) If chattering occurs, reduce  $a_p$  and  $V_c$  by 30% and keep the same  $f_z$  per tooth.

## CHIP-BREAKER SELECTION GUIDE || Guia para aplicações do quebra- aparas | Guía para aplicación del rompevirutas

| ISO | PSM | Material            | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|---------------------|-----------------|--------------------------|----------------------|
|     |     |                     |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel     | 125-220         | PNH(K)X 11... MK         | -                    |
|     | 2   | Low-Alloyed Steel   | 220-280         | PNH(K)X 11... MK         | -                    |
|     | 3   | High-Alloyed Steel  | 280-380         | PNH(K)X 11... MK         | -                    |
| K   | 7   | Malleable Cast Iron | 130-230         | PNH(K)X 11... MK         | PNH(K)X 11... HK     |
|     | 8   | Grey Cast Iron      | 180-245         | PNH(K)X 11... MK         | PNH(K)X 11... HK     |
|     | 9   | Nodular Cast iron   | 160-250         | PNH(K)X 11... MK         | PNH(K)X 11... HK     |

| Vc (m/min) | Toughness → | Feed fz (mm/t)  |
|------------|-------------|-----------------|
| PH5740     |             | PNH(K)X 1105... |
| -          |             | 0,15-0,30       |
| -          |             | 0,15-0,30       |
| -          |             | 0,15-0,25       |
| 160-260    |             | 0,12-0,35       |
| 140-240    |             | 0,12-0,35       |
| 120-200    |             | 0,12-0,30       |





## Arbor Mounting

 $\kappa_r = 45^\circ$  |  $\gamma_p = -6^\circ$ 

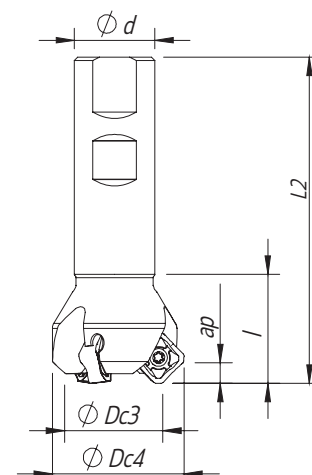
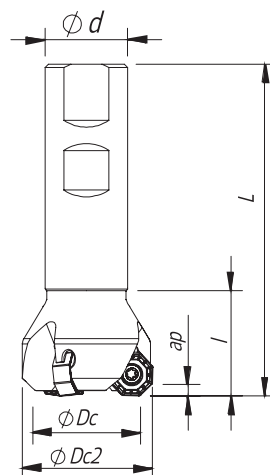
| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |            |            |            |          |           |    |      | Kg     | Specifications |           | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|------------|------------|------------|----------|-----------|----|------|--------|----------------|-----------|-------------------------------|-------|
|                      |                                       |    | $\phi Dc$                                 | $\phi Dc2$ | $\phi Dc3$ | $\phi Dc4$ | $\phi d$ | $\phi dg$ | L  | L2   |        | Arbor Type     | Ap (mm)   |                               |       |
| 181111400            | 050A90845-04-06-022040                | 4  | 50                                        | 57,6       | 47,1       | 62         | 22       | 48        | 40 | 41,5 | 0,383  | A              | 3,5   6,0 | ON...05   SN...12             |       |
| 181117400            | 050A90845-06-06-022040                | 6  | 50                                        | 57,6       | 47,1       | 62         | 22       | 48        | 40 | 41,5 | 0,374  | A              | 3,5   6,0 | ON...05   SN...12             |       |
| 181117500            | 063A90845-06-06-022040                | 6  | 63                                        | 70,6       | 60,1       | 75         | 22       | 52        | 40 | 41,5 | 0,525  | A              | 3,5   6,0 | ON...05   SN...12             |       |
| 181117600            | 063A90845-08-06-022040                | 8  | 63                                        | 70,6       | 60,1       | 75         | 22       | 52        | 40 | 41,5 | 0,517  | A              | 3,5   6,0 | ON...05   SN...12             |       |
| 181117700            | 080A90845-07-06-027050                | 7  | 80                                        | 87,6       | 77,1       | 92         | 27       | 60        | 50 | 51,5 | 0,846  | B              | 3,5   6,0 | ON...05   SN...12             |       |
| 181117800            | 080A90845-10-06-027050                | 10 | 80                                        | 87,6       | 77,1       | 92         | 27       | 60        | 50 | 51,5 | 0,842  | B              | 3,5   6,0 | ON...05   SN...12             |       |
| 181117900            | 100A90845-08-06-032050                | 8  | 100                                       | 107,6      | 97,1       | 112        | 32       | 80        | 50 | 51,5 | 1,559  | B              | 3,5   6,0 | ON...05   SN...12             |       |
| 181120900            | 100A90845-12-06-032050                | 12 | 100                                       | 107,6      | 97,1       | 112        | 32       | 80        | 50 | 51,5 | 1,540  | B              | 3,5   6,0 | ON...05   SN...12             |       |
| 181121000            | 125A90845-10-06-040063                | 10 | 125                                       | 132,6      | 122,1      | 137        | 40       | 90        | 63 | 64,5 | 2,890  | B              | 3,5   6,0 | ON...05   SN...12             |       |
| 181121100            | 160A90845-12-06-U040063               | 12 | 160                                       | 167,6      | 157,1      | 172        | 40       | 110       | 63 | 64,5 | 4,360  | C              | 3,5   6,0 | ON...05   SN...12             |       |
| 181121200            | 200A90845-14-06-U060063               | 14 | 200                                       | 207,6      | 197,1      | 212        | 60       | 172       | 63 | 64,5 | 8,890  | C              | 3,5   6,0 | ON...05   SN...12             |       |
| 181121300            | 250A90845-16-06-U060063               | 16 | 250                                       | 257,6      | 247,1      | 262        | 60       | 172       | 63 | 64,5 | 11,490 | C              | 3,5   6,0 | ON...05   SN...12             |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)



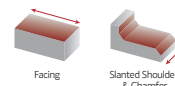
## Weldon Shank

 $\kappa_r = 45^\circ$  |  $\gamma_p = -6^\circ$ 


| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |      |      |      |    |     |       | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock                                                                                 |
|----------------------|---------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------|------|------|------|----|-----|-------|-------|----------------|-------------------------------|---------------------------------------------------------------------------------------|
|                      |                                       |                                                                                     | ØDc                                       | ØDc2 | ØDc3 | ØDc4 | Ød | L   | L2    |       | Ap (mm)        |                               |                                                                                       |
| 181118000            | 032W90845-03-06-025100                | 3                                                                                   | 32                                        | 39,6 | 29,1 | 44   | 25 | 100 | 101,5 | 0,375 | 3,5   6,0      | ON...05   SN...12             |  |
| 181118100            | 040W90845-04-06-032110                | 4                                                                                   | 40                                        | 47,6 | 37,1 | 52   | 32 | 110 | 111,5 | 0,653 | 3,5   6,0      | ON...05   SN...12             |  |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)



# ONH(K)X 05 | SNH(K)X 12 | Inserts | Pastilhas | Plaquitas

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

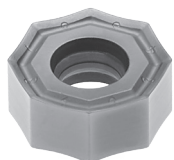
Spot face

Spare Parts

Technical Data

End Mills

ONH(K)X-LP



ONH(K)X-MK

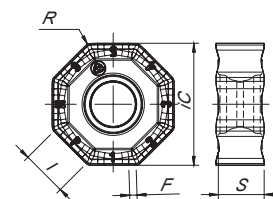


ONH(K)X-MP  
(PHS grade)

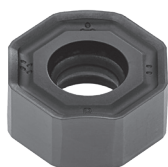


PHP  
NEW  
GRADE

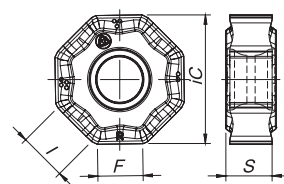
ONH(K)X-MK | LP | MP



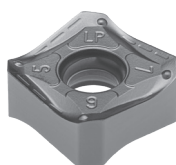
ONHX-W  
8 Cutting Edges (8R)



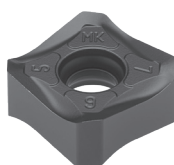
ONHX-W



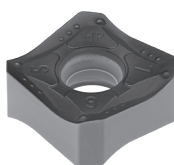
SNHX-LP



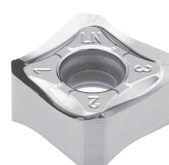
SNH(K)X-MK



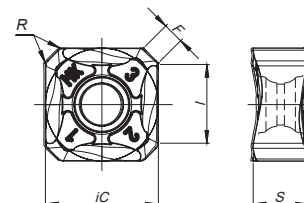
SNH(K)X-MP  
(PHS grade)



SNHX-LN



SNH(K)X- MK | LP | MP | LN



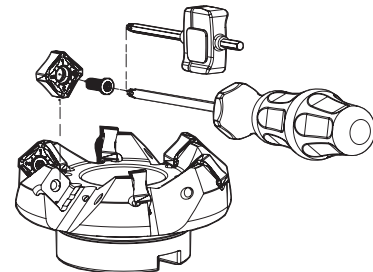
|                                    |                     | P                         |        |        |        |        |        |        |        | M      |        | K      |        |        |        |        |        |        |        | N      |        | S      |       | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |      |  |
|------------------------------------|---------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|------------------------------------------------|------|------|------|--|
|                                    |                     | CVD                       | PVD    |        |        |        |        |        | PVD    |        | CVD    |        |        | PVD    |        |        |        |        | UNC    |        | PVD    |        |       |                                                |      |      |      |  |
|                                    |                     | <sup>(2)</sup> Grade code |        |        |        |        |        |        |        | T9     | X5     | G4     | T1     | P3     | P4     | G6     | X9     | G6     | L5     | L6     | L9     | X5     | G4    |                                                |      |      |      |  |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference    | PH5740                    | PHP910 | PH7920 | PHP920 | PH7930 | PHP930 | PH7740 | PHH930 | PH7740 | PH5705 | PH5320 | PH5740 | PHP910 | PH7920 | PHP920 | PH7930 | PHP930 | PH7740 | PH0910 | PHH930 | PH7740 | iC    | S                                              | I    | R    | F    |  |
| 1112302                            | ONHX 050505 ANEN-LP |                           |        |        | Ⓢ      |        | Ⓢ      | Ⓢ      |        | Ⓢ      |        |        |        |        |        | Ⓢ      |        | Ⓢ      | Ⓢ      |        | Ⓢ      |        | 12,70 | 5,20                                           | 5,30 | 0,50 | -    |  |
| 1112304                            | ONHX 050505 ANSN-MP |                           |        |        | Ⓢ      |        | Ⓢ      |        |        |        |        |        |        |        |        | Ⓢ      |        | Ⓢ      |        |        |        |        | 12,70 | 5,20                                           | 5,30 | 0,50 | -    |  |
| 1112301                            | ONKX 050505 ANEN-LP |                           |        | Ⓢ      | Ⓢ      | Ⓢ      | Ⓢ      |        | Ⓢ      |        |        |        |        |        | Ⓢ      | Ⓢ      | Ⓢ      | Ⓢ      |        |        | Ⓢ      |        | 12,70 | 5,20                                           | 5,30 | 0,50 | -    |  |
| 1112303                            | ONKX 050505 ANSN-MP | Ⓢ                         |        | Ⓢ      | Ⓢ      | Ⓢ      | Ⓢ      |        |        |        |        |        |        |        | Ⓢ      | Ⓢ      | Ⓢ      | Ⓢ      |        |        |        |        | 12,70 | 5,20                                           | 5,30 | 0,50 | -    |  |
| 1112305                            | ONKX 050500 ANEN-MK |                           |        |        |        |        |        |        |        |        |        | Ⓢ      | Ⓢ      |        |        |        |        |        |        |        |        |        | 12,70 | 5,20                                           | 5,30 | -    | -    |  |
| 1112307                            | ONHX 050500 ANER-W  |                           |        | Ⓢ      |        |        |        |        |        |        | Ⓢ      |        |        |        | Ⓢ      |        |        |        |        |        |        |        | 12,70 | 5,20                                           | 5,30 | -    | 4,30 |  |
| 1111452                            | SNHX 1206 ANEN-LP   |                           |        |        | Ⓢ      |        | Ⓢ      |        | Ⓢ      |        |        |        |        |        |        | Ⓢ      |        | Ⓢ      |        |        | Ⓢ      |        | 12,70 | 6,35                                           | 9,30 | 0,80 | 2,00 |  |
| 1111502                            | SNHX 1206 ANSN-MP   | Ⓢ                         | Ⓢ      | Ⓢ      | Ⓢ      |        | Ⓢ      |        |        |        |        |        |        | Ⓢ      | Ⓢ      | Ⓢ      |        | Ⓢ      |        |        |        |        | 12,70 | 6,35                                           | 9,30 | 0,80 | 2,00 |  |
| 1111503                            | SNHX 1206 ANEN-MK   |                           |        |        |        |        |        |        |        |        | Ⓢ      |        | Ⓢ      | Ⓢ      | Ⓢ      | Ⓢ      |        |        |        |        |        |        | 12,70 | 6,35                                           | 9,30 | 0,80 | 2,00 |  |
| 1111504                            | SNHX 1206 ANFN-LN   |                           |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | Ⓢ      |        |        | 12,70 | 6,35                                           | 9,30 | 0,80 | 2,00 |  |
| 1112293                            | SNKX 1206 ANSN-MP   | Ⓢ                         |        | Ⓢ      | Ⓢ      |        |        | Ⓢ      |        |        |        |        |        |        | Ⓢ      | Ⓢ      |        |        | Ⓢ      |        |        |        | 12,70 | 6,35                                           | 9,30 | 0,80 | 2,00 |  |
| 1112249                            | SNKX 1206 ANEN-MK   |                           |        |        |        |        |        |        |        |        | Ⓢ      | Ⓢ      | Ⓢ      |        |        |        |        |        |        |        |        |        | 12,70 | 6,35                                           | 9,30 | 0,80 | 2,00 |  |

First choice | Primeira opção | 1ª opción 
 Stock item | Produto de stock | Itens de stock 
 Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9) 
 Insert order code = (1) Geometry Code + (2) Grade Code

## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc      | Insert Screw | Order separately |                    |              | Order separately |                 |
|--------------------|--------------|------------------|--------------------|--------------|------------------|-----------------|
|                    |              | Key (Torx)       | Key<br>(Torx - Nm) | Torque Value | Screw            | DIN 6368 Wrench |
| A90845 - 50 - 63   | P0401200     | XT15             | DT1530             | 3,0          | -                | -               |
| A90845 - 80        | P0401200     | XT15             | DT1530             | 3,0          | J0123510         | SD6368-12       |
| A90845 - 100       | P0401200     | PT15             | DT1530             | 3,0          | J0164110         | SD6368-16       |
| A90845 - 125       | P0401200     | PT15             | DT1530             | 3,0          | J0204610         | SD6368-20       |
| A90845 - 160 - 250 | P0401200     | PT15             | DT1530             | 3,0          | -                | -               |
| W90845 - 32 - 40   | P0401200     | XT15             | DT1530             | 3,0          | -                | -               |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|-----|-----|-----------------------------------|-----------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|     |     |                                   |                 | ← Wear Resistance                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       |                                                                                       |                                                                                       | Toughness →                                                                           |                                                                                       |                                                                                       |                                                                                       |
|     |     |                                   |                 | PH0910                                                                              | PH5705                                                                              | PH5320                                                                              | PHP910                                                                              | PHP920                                                                               | PH7920                                                                                | PHP930                                                                                | PHH930                                                                                | PH7930                                                                                | PH5740                                                                                | PHS740                                                                                | PH7740                                                                                |
| P   | 1   | Unalloyed Steel                   | 125-220         |  |  |  |  |  |  |  |  |  |  |  |  |
|     | 2   | Low-Alloyed Steel                 | 220-280         |  |  |  |  |  |  |  |  |  |  |  |  |
|     | 3   | High-Alloyed Steel                | 280-380         |  |  |  |  |  |  |  |  |  |  |  |  |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |  |  |  |  |  |  |  |  |  |  |  |  |
|     | 5   | SS - Austenitic                   | 200-330         |  |  |  |  |  |  |  |  |  |  |  |  |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |  |  |  |  |  |  |  |  |  |  |  |  |
| K   | 7   | Malleable Cast Iron               | 130-230         |  |  |  |  |  |  |  |  |  |  |  |  |
|     | 8   | Grey Cast Iron                    | 180-245         |  |  |  |  |  |  |  |  |  |  |  |  |
|     | 9   | Nodular Cast iron                 | 160-250         |  |  |  |  |  |  |  |  |  |  |  |  |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          |  |  |  |  |  |  |  |  |  |  |  |  |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |  |  |  |  |  |  |  |  |  |  |  |  |



Good Conditions



Average Conditions



Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |         |             |         |         |         |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|---------|-------------|---------|---------|---------|
|     |     |                                   |                 | ← Wear Resistance |         |         | Toughness → |         |         |         |
|     |     |                                   |                 | PH0910            | PH5705  | PH5320  | PHP910      | PHP920  | PH7920  | PHP930  |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                 | -       | -       | 180-250     | 180-250 | 180-240 | 160-220 |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                 | -       | -       | 160-240     | 160-230 | 160-220 | 140-200 |
|     | 3   | High-Alloyed Steel                | 280-380         | -                 | -       | -       | 140-230     | 140-220 | 140-210 | 120-190 |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | -       | -           | -       | 140-220 | 140-200 |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | -       | -           | -       | 130-180 | 120-160 |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | -       | -           | -       | 120-160 | 100-140 |
| K   | 7   | Malleable Cast Iron               | 130-230         | -                 | 160-290 | 150-280 | 180-300     | 160-270 | 160-260 | 150-240 |
|     | 8   | Grey Cast Iron                    | 180-245         | -                 | 170-320 | 160-320 | 160-250     | 140-250 | 140-240 | 140-230 |
|     | 9   | Nodular Cast iron                 | 160-250         | -                 | 140-200 | 100-190 | 150-210     | 120-210 | 120-200 | 100-190 |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | 100-2000          | -       | -       | -           | -       | -       | -       |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       | -       | -           | -       | -       | 30-100  |

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |         |             |         | Feed fz (mm/t) |               |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|---------|-------------|---------|----------------|---------------|
|     |     |                                   |                 | ← Wear Resistance |         |         | Toughness → |         |                |               |
|     |     |                                   |                 | PHH930            | PH7930  | PH5740  | PHS740      | PH7740  | SNH(K)X 12...  | ONH(K)X 05... |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                 | 160-220 | -       | 140-220     | 140-200 | 0,10-0,35      | 0,10-0,35     |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                 | 140-200 | -       | 120-200     | 130-180 | 0,10-0,35      | 0,10-0,35     |
|     | 3   | High-Alloyed Steel                | 280-380         | -                 | 120-190 | -       | 100-190     | 100-170 | 0,10-0,30      | 0,10-0,30     |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | 140-210           | 140-200 | -       | -           | 130-180 | 0,10-0,30      | 0,10-0,30     |
|     | 5   | SS - Austenitic                   | 200-330         | 120-170           | 120-160 | -       | -           | 110-160 | 0,10-0,30      | 0,10-0,30     |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | 100-150           | 100-140 | -       | -           | 90-150  | 0,10-0,25      | 0,10-0,25     |
| K   | 7   | Malleable Cast Iron               | 130-230         | -                 | 150-240 | 160-260 | -           | 140-220 | 0,10-0,35      | 0,10-0,35     |
|     | 8   | Grey Cast Iron                    | 180-245         | -                 | 140-230 | 140-240 | -           | 120-210 | 0,10-0,35      | 0,10-0,35     |
|     | 9   | Nodular Cast iron                 | 160-250         | -                 | 100-190 | 120-200 | -           | 100-190 | 0,10-0,30      | 0,10-0,30     |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | -                 | -       | -       | -           | -       | 0,10-0,35      | -             |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | 30-110            | 30-100  | -       | -           | 30-100  | 0,07-0,20      | 0,07-0,18     |

(Note 1) Cutting conditions  $a_p/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) PH5... and PHS... can be used wet or dry. PH7... use only air.

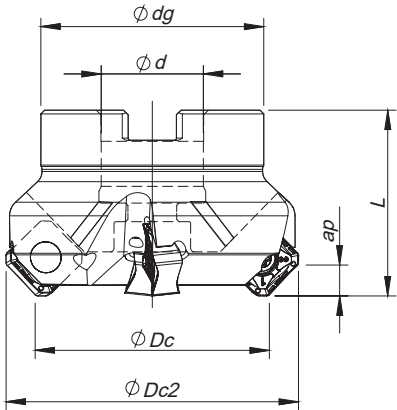
## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra- aparas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | LP                       | MP                   |
|     | 2   | Low-Alloyed Steel                 | 220-280         | LP                       | MP                   |
|     | 3   | High-Alloyed Steel                | 280-380         | MP                       | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | LP                       | MP                   |
|     | 5   | SS - Austenitic                   | 200-330         | LP                       | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | LP                       | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230         | MK                       | -                    |
|     | 8   | Grey Cast Iron                    | 180-245         | MK                       | -                    |
|     | 9   | Nodular Cast iron                 | 160-250         | MK                       | -                    |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | LN                       | -                    |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | LP                       | -                    |





Arbor Mounting  
 $K_r=45^\circ$  |  $\gamma_p=-6^\circ$



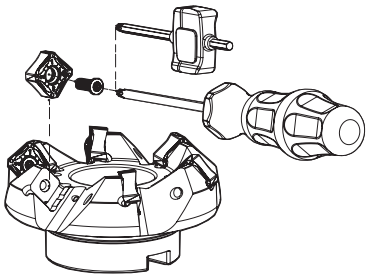
| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |            |          |           |    | Kg     | Specifications |                   | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|------------|----------|-----------|----|--------|----------------|-------------------|-------------------------------|-------|
|                      |                                       |    | $\phi Dc$                                 | $\phi Dc2$ | $\phi d$ | $\phi dg$ | L  |        | Arbor<br>Type  | $A_p$ max<br>(mm) |                               |       |
| 181048200            | 050A90945-04-06-022040                | 4  | 50                                        | 63         | 22       | 48        | 40 | 0,424  | A              | 6,0               | SN... 1206                    |       |
| 181067000            | 050A90945-06-06-022040                | 6  | 50                                        | 63         | 22       | 48        | 40 | 0,415  | A              | 6,0               | SN... 1206                    |       |
| 181048300            | 063A90945-06-06-022040                | 6  | 63                                        | 76         | 22       | 52        | 40 | 0,575  | A              | 6,0               | SN... 1206                    |       |
| 181067100            | 063A90945-08-06-022040                | 8  | 63                                        | 76         | 22       | 52        | 40 | 0,577  | A              | 6,0               | SN... 1206                    |       |
| 181048400            | 080A90945-07-06-027050                | 7  | 80                                        | 93         | 27       | 60        | 50 | 0,966  | B              | 6,0               | SN... 1206                    |       |
| 181067200            | 080A90945-10-06-027050                | 10 | 80                                        | 93         | 27       | 60        | 50 | 0,950  | B              | 6,0               | SN... 1206                    |       |
| 181048500            | 100A90945-08-06-032050                | 8  | 100                                       | 113        | 32       | 80        | 50 | 1,667  | B              | 6,0               | SN... 1206                    |       |
| 181067300            | 100A90945-12-06-032050                | 12 | 100                                       | 113        | 32       | 80        | 50 | 1,650  | B              | 6,0               | SN... 1206                    |       |
| 181048600            | 125A90945-10-06-040063                | 10 | 125                                       | 138        | 40       | 90        | 63 | 2,890  | B              | 6,0               | SN... 1206                    |       |
| 181048700            | 160A90945-12-06-U040063               | 12 | 160                                       | 173        | 40       | 110       | 63 | 4,360  | C              | 6,0               | SN... 1206                    |       |
| 181052800            | 200A90945-14-06-U060063               | 14 | 200                                       | 213        | 60       | 172       | 63 | 8,890  | C              | 6,0               | SN... 1206                    |       |
| 181064700            | 250A90945-16-06-U060063               | 16 | 250                                       | 263        | 60       | 172       | 63 | 11,490 | C              | 6,0               | SN... 1206                    |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

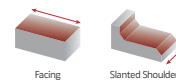
SPARE PARTS | Complementos | Repuestos

| Cutter<br>$\phi Dc$ | Order separately |            |                 |              | Order separately |                 |
|---------------------|------------------|------------|-----------------|--------------|------------------|-----------------|
|                     | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value | Screw            | DIN 6368 Wrench |
| A90945 - 50 - 63    | P0401200         | XT15       | DT1530          | 3,0          | -                | -               |
| A90945 - 80         | P0401200         | XT15       | DT1530          | 3,0          | J0123510         | SD6368-12       |
| A90945 - 100        | P0401200         | PT15       | DT1530          | 3,0          | J0164110         | SD6368-16       |
| A90945 - 125        | P0401200         | PT15       | DT1530          | 3,0          | J0204610         | SD6368-20       |
| A90945 - 160 - 250  | P0401200         | PT15       | DT1530          | 3,0          | -                | -               |



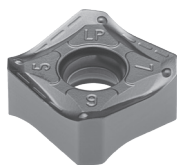
Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



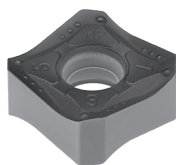


## SNH(K)X 1206 | Inserts | Pastilhas | Plaquetas

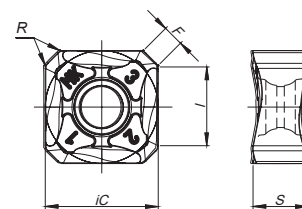
SNHX-LP



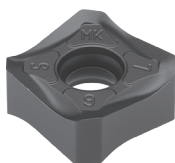
SNH(K)X-MP



SNH(K)X-MK | LP | MP | LN



SNH(K)X-MK



SNHX-LN

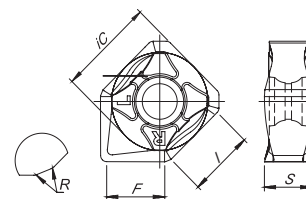


SNHX-W

4 Cutting edges (2R + 2L)



SNHX-W



|                                    |                   | P                         |        |        |        |        |        | M      | K      |        |        |        |        |        | N      | S      | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |        |       |      |      |      |      |
|------------------------------------|-------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|--------|-------|------|------|------|------|
|                                    |                   | CVD                       | PVD    |        |        |        |        | PVD    | CVD    |        |        | PVD    |        |        | UNC    | PVD    |                                                |        |       |      |      |      |      |
|                                    |                   | <sup>(2)</sup> Grade code | T9     | X5     | G4     | T1     | P4     | G6     | X9     | L5     | L6     | L9     | X5     | G4     | T1     | P4     |                                                |        |       |      |      | G6   | 10   |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference  | PH5740                    | PH6910 | PH7920 | PH9920 | PH9930 | PH7740 | PHH930 | PH5705 | PH5320 | PH5740 | PH6910 | PH7920 | PH9920 | PH9930 | PH7740 | PH0910                                         | PHH930 | iC    | S    | I    | R    | F    |
| 1112293                            | SNKX 1206 ANSN-MP | Ⓐ                         |        | Ⓐ      | Ⓜ      |        | Ⓐ      |        |        |        |        |        | Ⓐ      | Ⓜ      |        | Ⓐ      |                                                |        | 12,70 | 6,35 | 9,30 | 0,80 | 2,00 |
| 1112249                            | SNKX 1206 ANEN-MK |                           |        |        |        |        |        |        | Ⓜ      | Ⓜ      | Ⓐ      |        |        |        |        |        |                                                |        | 12,70 | 6,35 | 9,30 | 0,80 | 2,00 |
| 1111452                            | SNHX 1206 ANEN-LP |                           |        |        | Ⓜ      | Ⓐ      |        | Ⓜ      |        |        |        |        |        | Ⓜ      | Ⓐ      |        |                                                | Ⓜ      | 12,70 | 6,35 | 9,30 | 0,80 | 2,00 |
| 1111502                            | SNHX 1206 ANSN-MP | Ⓐ                         | Ⓐ      | Ⓐ      | Ⓜ      | Ⓐ      |        |        |        |        |        | Ⓐ      | Ⓐ      | Ⓜ      | Ⓐ      |        |                                                |        | 12,70 | 6,35 | 9,30 | 0,80 | 2,00 |
| 1111503                            | SNHX 1206 ANEN-MK |                           | Ⓐ      | Ⓐ      | Ⓜ      |        |        |        | Ⓜ      |        | Ⓐ      | Ⓐ      | Ⓐ      | Ⓐ      |        |        |                                                |        | 12,70 | 6,35 | 9,30 | 0,80 | 2,00 |
| 1111504                            | SNHX 1206 ANFN-LN |                           |        |        |        |        |        |        |        |        |        |        |        |        |        |        | Ⓜ                                              |        | 12,70 | 6,35 | 9,30 | 0,80 | 2,00 |
| 1111899                            | SNHX 1206 ANFN-W* |                           | Ⓐ      |        | Ⓜ      |        |        |        |        |        |        | Ⓐ      |        | Ⓜ      |        |        |                                                |        | 12,70 | 6,30 | 9,30 | 0,40 | 7,60 |

Ⓐ First choice | Primeira opção | 1ª opción

Ⓜ Stock item | Produto de stock | Ítems de stock

○ Available under request (see page A-9) | Disponível sobre consulta  
(consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

\* Wiper insert with 2 rights and 2 left-hand cutting edges.



## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |         |         |         |         |         |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|---------|---------|---------|---------|---------|
|     |     |                                   |                 | ← Wear Resistance |         |         |         |         |         |         |
|     |     |                                   |                 | PH0910            | PH5705  | PH5320  | PHP910  | PHP920  | PH7920  | PHP930  |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                 | -       | -       | 180-250 | 180-250 | 180-240 | 160-220 |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                 | -       | -       | 160-240 | 160-230 | 160-220 | 140-200 |
|     | 3   | High-Alloyed Steel                | 280-380         | -                 | -       | -       | 140-230 | 140-220 | 140-210 | 120-190 |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | -       | -       | -       | 140-220 | 140-200 |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | -       | -       | -       | 130-180 | 120-160 |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | -       | -       | -       | 120-160 | 100-140 |
| K   | 7   | Malleable Cast Iron               | 130-230         | -                 | 160-290 | 150-280 | 180-300 | 160-270 | 160-260 | 150-240 |
|     | 8   | Grey Cast Iron                    | 180-245         | -                 | 170-320 | 160-320 | 160-250 | 140-250 | 140-240 | 140-230 |
|     | 9   | Nodular Cast iron                 | 160-250         | -                 | 140-200 | 100-190 | 150-210 | 120-210 | 120-200 | 100-190 |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | 100-2000          | -       | -       | -       | -       | -       | -       |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       | -       | -       | -       | -       | 30-100  |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) PH5... and PH5... can be used wet or dry. PH7... use only air.

## GRADES SELECTION GUIDE || Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades            |        |        |        |        |        |        |             |        |        |        |
|-----|-----|-----------------------------------|-----------------|-------------------|--------|--------|--------|--------|--------|--------|-------------|--------|--------|--------|
|     |     |                                   |                 | ← Wear Resistance |        |        |        |        |        |        | Toughness → |        |        |        |
|     |     |                                   |                 | PH0910            | PH5705 | PH5320 | PHP910 | PHP920 | PH7920 | PHP930 | PHH930      | PH7930 | PH5740 | PH7740 |
| P   | 1   | Unalloyed Steel                   | 125-220         | ●                 | ●      | ●      | ●      | ●      | ●      | ●      | ●           | ●      | ●      | ●      |
|     | 2   | Low-Alloyed Steel                 | 220-280         | ●                 | ●      | ●      | ●      | ●      | ●      | ●      | ●           | ●      | ●      | ●      |
|     | 3   | High-Alloyed Steel                | 280-380         | ●                 | ●      | ●      | ●      | ●      | ●      | ●      | ●           | ●      | ●      | ●      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | ●                 | ●      | ●      | ●      | ●      | ●      | ●      | ●           | ●      | ●      | ●      |
|     | 5   | SS - Austenitic                   | 200-330         | ●                 | ●      | ●      | ●      | ●      | ●      | ●      | ●           | ●      | ●      | ●      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | ●                 | ●      | ●      | ●      | ●      | ●      | ●      | ●           | ●      | ●      | ●      |
| K   | 7   | Malleable Cast Iron               | 130-230         | ●                 | ●      | ●      | ●      | ●      | ●      | ●      | ●           | ●      | ●      | ●      |
|     | 8   | Grey Cast Iron                    | 180-245         | ●                 | ●      | ●      | ●      | ●      | ●      | ●      | ●           | ●      | ●      | ●      |
|     | 9   | Nodular Cast iron                 | 160-250         | ●                 | ●      | ●      | ●      | ●      | ●      | ●      | ●           | ●      | ●      | ●      |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | ●                 | ●      | ●      | ●      | ●      | ●      | ●      | ●           | ●      | ●      | ●      |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | ●                 | ●      | ●      | ●      | ●      | ●      | ●      | ●           | ●      | ●      | ●      |

● Good Conditions

● Average Conditions

● Difficult Conditions

## CHIP-BREAKER SELECTION GUIDE || Guia para aplicações do quebra- aparas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | SNHX 12... LP            | SNH(K)X 12... MP     |
|     | 2   | Low-Alloyed Steel                 | 220-280         | SNHX 12... LP            | SNH(K)X 12... MP     |
|     | 3   | High-Alloyed Steel                | 280-380         | SNH(K)X 12... MP         | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | SNHX 12... LP            | -                    |
|     | 5   | SS - Austenitic                   | 200-330         | SNHX 12... LP            | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | SNHX 12... LP            | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230         | SNH(K)X 12... MK         | -                    |
|     | 8   | Grey Cast Iron                    | 180-245         | SNH(K)X 12... MK         | -                    |
|     | 9   | Nodular Cast iron                 | 160-250         | SNH(K)X 12... MK         | -                    |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | SNHX 12... LN            | -                    |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | SNHX 12... LP            | -                    |

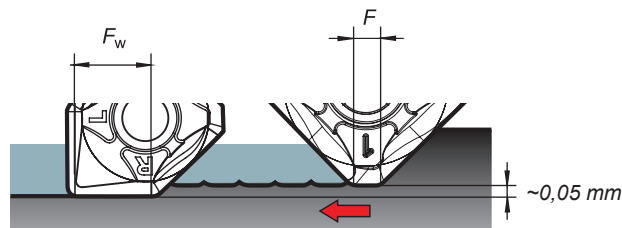


| Vc (m/min)  |         |         |         |         | Feed fz (mm/t) |                  |                  |               |              |
|-------------|---------|---------|---------|---------|----------------|------------------|------------------|---------------|--------------|
| Toughness → |         |         |         |         |                |                  |                  |               |              |
| PHH930      | PH7930  | PH5740  | PHS740  | PH7740  | SNHX 12... LP  | SNH(K)X 12... MP | SNH(K)X 12... MK | SNHX 12... LN | SNHX 12... W |
| -           | 160-220 | -       | 140-220 | 140-200 | 0,10-0,35      | 0,10-0,35        | -                | -             | 0,10-0,35    |
| -           | 140-200 | -       | 120-200 | 130-180 | 0,10-0,35      | 0,10-0,35        | -                | -             | 0,10-0,35    |
| -           | 120-190 | -       | 100-190 | 100-170 | 0,10-0,30      | 0,10-0,30        | -                | -             | 0,10-0,30    |
| 140-210     | 140-200 | -       | -       | 130-180 | 0,10-0,30      | -                | -                | -             | -            |
| 120-170     | 120-160 | -       | -       | 110-160 | 0,10-0,30      | -                | -                | -             | -            |
| 100-150     | 100-140 | -       | -       | 90-150  | 0,10-0,25      | -                | -                | -             | -            |
| -           | 150-240 | 160-260 | -       | 140-220 | 0,10-0,35      | -                | 0,10-0,35        | -             | 0,10-0,40    |
| -           | 140-230 | 140-240 | -       | 120-210 | 0,10-0,35      | -                | 0,10-0,35        | -             | 0,10-0,40    |
| -           | 100-190 | 120-200 | -       | 100-190 | 0,10-0,30      | -                | 0,10-0,30        | -             | 0,10-0,40    |
| -           | -       | -       | -       | -       | -              | -                | -                | 0,10-0,35     | -            |
| 30-110      | 30-100  | -       | -       | 30-100  | 0,07-0,20      | -                | -                | -             | -            |

## WIPER INSERTS

Recommended Cutting Conditions:

- $f_z$  should be equal to  $0,8 \times F_w / Z$
- Axial depth of cut is 0,5 to 0,8mm.



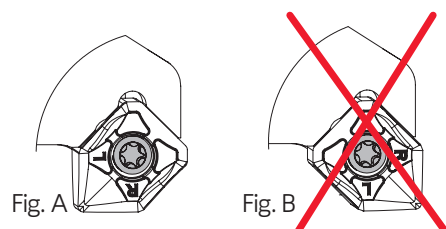
Example:

- The width of the parallel land ( $F$ ) of the insert is 2mm.
- To obtain a good surface finishing, the feed per revolution should be a maximum of 80% of 2mm = 1,6mm.
- The wiper insert will have a parallel land ( $F_w$ ) with a width of 7,6mm.
- Result: Feed per revolution ( $f_r$ ) could be increased from 1,6mm to 6,1mm (80% of 7,6mm).

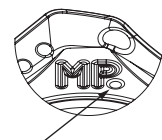
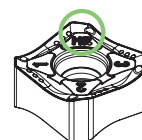
Note: Other limitations, such as machine power, must be taken into consideration.

How to use a wiper insert:

- Since wiper is one corner use to standard cutters, please attach the insert with the parallel land down to the workspace cutting surface.

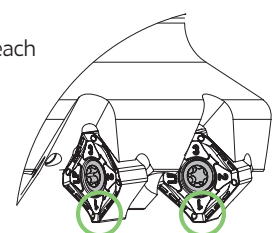


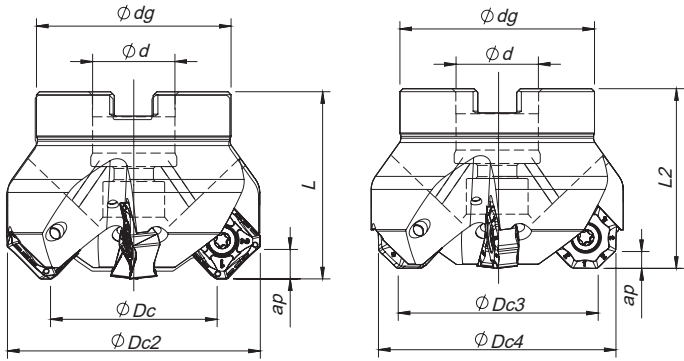
When using wiper insert, install the insert as shown on Fig. A if the insert is installed as shown on Fig. B breakage of the insert is inevitable and normal surface finish can not be obtained.



This point shows the SNKX insert difference to SNHX

Put the same side of insert in each pocket for best radial and axial runout when using SNKX.





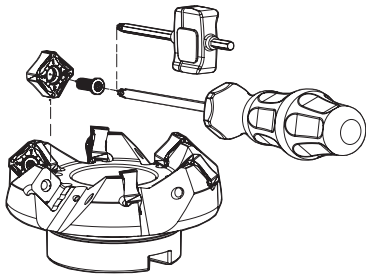
Arbor Mounting  
 $K_r=45^\circ$  |  $\gamma_p=-6^\circ$

| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |            |            |            |          |           |    |    | Kg    | Specifications |           | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|------------|------------|------------|----------|-----------|----|----|-------|----------------|-----------|-------------------------------|-------|
|                      |                                       |    | $\phi Dc$                                 | $\phi Dc2$ | $\phi Dc3$ | $\phi Dc4$ | $\phi d$ | $\phi dg$ | L  | L2 |       | Arbor Type     | Ap (mm)   |                               |       |
| 181088900            | 063A91245-05-06-022050                | 5  | 63                                        | 80,1       | 66,6       | 76,0       | 22       | 52        | 50 | 48 | 0,81  | A              | 3,8   8,5 | ON...06   SN...16             |       |
| 181089000            | 080A91245-06-06-027050                | 6  | 80                                        | 97,1       | 83,6       | 93,0       | 27       | 60        | 50 | 48 | 1,06  | B              | 3,8   8,5 | ON...06   SN...16             |       |
| 181089100            | 080A91245-08-06-027050                | 8  | 80                                        | 97,1       | 83,6       | 93,0       | 27       | 60        | 50 | 48 | 1,09  | B              | 3,8   8,5 | ON...06   SN...16             |       |
| 181089200            | 100A91245-07-06-032063                | 7  | 100                                       | 117,1      | 103,6      | 113,0      | 32       | 80        | 63 | 61 | 2,24  | B              | 3,8   8,5 | ON...06   SN...16             |       |
| 181089300            | 100A91245-10-06-032063                | 10 | 100                                       | 117,1      | 103,6      | 113,0      | 32       | 80        | 63 | 61 | 2,28  | B              | 3,8   8,5 | ON...06   SN...16             |       |
| 181089400            | 125A91245-08-06-040063                | 8  | 125                                       | 142,1      | 128,6      | 138,0      | 40       | 90        | 63 | 61 | 3,04  | B              | 3,8   8,5 | ON...06   SN...16             |       |
| 181089500            | 160A91245-10-06-U040063               | 10 | 160                                       | 177,1      | 163,6      | 173,0      | 40       | 110       | 63 | 61 | 4,40  | C              | 3,8   8,5 | ON...06   SN...16             |       |
| 181089600            | 200A91245-12-06-U060063               | 12 | 200                                       | 217,1      | 203,6      | 213,0      | 60       | 172       | 63 | 61 | 9,12  | C              | 3,8   8,5 | ON...06   SN...16             |       |
| 181089700            | 250A91245-14-06-U060063               | 14 | 250                                       | 267,1      | 253,6      | 263,0      | 60       | 172       | 63 | 61 | 11,93 | C              | 3,8   8,5 | ON...06   SN...16             |       |

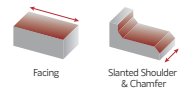
Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

SPARE PARTS | Complementos | Repuestos

| Cutter<br>$\phi Dc$ | Order separately |            |                 |              | Order separately |                 |
|---------------------|------------------|------------|-----------------|--------------|------------------|-----------------|
|                     | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value | Screw            | DIN 6368 Wrench |
| A91245 - 63         | P0451400         | XT20       | DT2050          | 5,0          | -                | -               |
| A91245 - 80         | P0451400         | XT20       | DT2050          | 5,0          | J0123510         | SD6368-12       |
| A91245 -100         | P0451400         | PT20       | DT2050          | 5,0          | J0164110         | SD6368-16       |
| A91245 -125         | P0451400         | PT20       | DT2050          | 5,0          | J0204610         | SD6368-20       |
| A91245 - 160-250    | P0451400         | PT20       | DT2050          | 5,0          | -                | -               |



Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



# ONH(K)X 0606 | SNH(K)X 1606 | Inserts | Pastilhas | Plaquitas

A

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

Technical Data

End Mills

ONH(K)X-LP



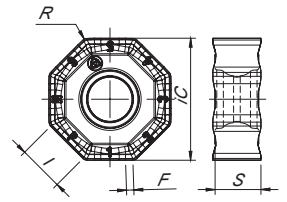
ONH(K)X-MP  
(PHP grade)



ONH(K)X-MK



ONH(K)X-LP | MP | MK

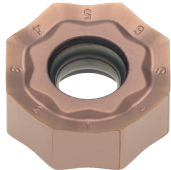


ONHX-W  
(8 Cutting edges (4R + 4L))

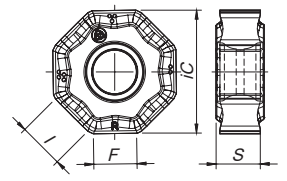


ONHX-LS  
(PHH grade)

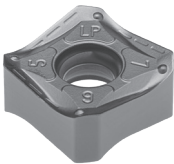
NEW



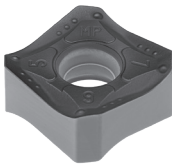
ONHX-W



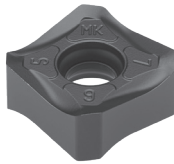
SNHX-LP



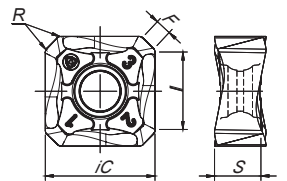
SNH(K)X-MP  
(PHS grade)



SNH(K)X-MK



SNH(K)X-MK | LP | MP



|     |                  | P                 |     |  |  |  |  | M      |        |       | K      |       |        |        |        |        | S      |        |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |       |        |       |        |        |        |        |       |      |       |      |      |
|-----|------------------|-------------------|-----|--|--|--|--|--------|--------|-------|--------|-------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|-------|--------|-------|--------|--------|--------|--------|-------|------|-------|------|------|
|     |                  | CVD               | PVD |  |  |  |  | PVD    |        |       | CVD    |       |        | PVD    |        |        | PVD    |        |        |                                                |       |        |       |        |        |        |        |       |      |       |      |      |
|     |                  | (2) Grade code    |     |  |  |  |  | T9     | G4     | T1    | P3     | P4    | G6     | P3     | X9     | G6     | L5     | L6     | L9     |                                                |       |        |       |        | G4     | T1     | P3     | P4    | G6   | P3    | X9   | G6   |
| (1) | Geometry<br>code | ISO<br>Reference  |     |  |  |  |  | PH5740 | PH7920 | PH920 | PH7930 | PH930 | PH7740 | PH7930 | PHH930 | PH7740 | PH5705 | PH5320 | PH5740 | PH7920                                         | PH920 | PH7930 | PH930 | PH7740 | PH7930 | PHH930 | PH7740 | iC    | S    | I     | R    | F    |
| NEW | 1111954          | ONHX 0606 ANEN-LP |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 6,20  | 0,80 | 1,00 |
|     | 1112696          | ONHX 0606 ANEN-LS |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 6,20  | 0,80 | 1,00 |
|     | 1111955          | ONHX 0606 ANEN-MP |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 6,20  | 0,80 | 1,00 |
|     | 1111956          | ONHX 0606 ANEN-MK |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 6,20  | 0,80 | 1,00 |
|     | 1112053          | ONHX 0606 ANEN-W* |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 6,20  | -    | 6,00 |
|     | 1112284          | ONKX 0606 ANEN-LP |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 6,20  | 0,80 | 1,00 |
|     | 1112287          | ONKX 0606 ANEN-MP |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 6,20  | 0,80 | 1,00 |
|     | 1112291          | ONKX 0606 ANEN-MK |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 6,20  | 0,80 | 1,00 |
|     | 1111951          | SNHX 1606 ANER-LP |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 12,50 | 0,80 | 2,20 |
|     | 1111952          | SNHX 1606 ANER-MP |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 12,50 | 0,80 | 2,20 |
|     | 1111953          | SNHX 1606 ANER-MK |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 12,50 | 0,80 | 2,20 |
|     | 1112281          | SNKX 1606 ANER-MP |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 12,50 | 0,80 | 2,20 |
|     | 1112282          | SNKX 1606 ANER-MK |     |  |  |  |  |        |        |       |        |       |        |        |        |        |        |        |        |                                                |       |        |       |        |        |        |        | 16,50 | 6,35 | 12,50 | 0,80 | 2,20 |

First choice | Primeira opção | 1ª opción Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

\* Wiper insert with 4 rights and 4 left-hand cutting edges.

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades                                                                                      |                                                                                             |                                                                                             |                                                                                             |                                                                                              |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                               |
|-----|-----|-----------------------------------|-----------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
|     |     |                                   |                 | ← Wear Resistance                                                                           |                                                                                             |                                                                                             |                                                                                             |                                                                                              |                                                                                               | Toughness →                                                                                   |                                                                                               |                                                                                               |                                                                                               |
|     |     |                                   |                 | PH5705<br> | PH5320<br> | PHP920<br> | PH7920<br> | PHP930<br> | PHH930<br> | PH7930<br> | PH5740<br> | PHS740<br> | PH7740<br> |
| P   | 1   | Unalloyed Steel                   | 125-220         |                                                                                             |                                                                                             | ✓                                                                                           | ✓                                                                                           | ✓                                                                                            |                                                                                               | ✓                                                                                             |                                                                                               | ✓                                                                                             | ✓                                                                                             |
|     | 2   | Low-Alloyed Steel                 | 220-280         |                                                                                             |                                                                                             | ✓                                                                                           | ✓                                                                                           | ✓                                                                                            |                                                                                               | ✓                                                                                             |                                                                                               | ✓                                                                                             | ✓                                                                                             |
|     | 3   | High-Alloyed Steel                | 280-380         |                                                                                             |                                                                                             | ✓                                                                                           | ✓                                                                                           | ✓                                                                                            |                                                                                               | ✓                                                                                             |                                                                                               | ✓                                                                                             | ✓                                                                                             |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                                                                                             |                                                                                             |                                                                                             |                                                                                             |                                                                                              | ✓                                                                                             | ✓                                                                                             |                                                                                               |                                                                                               | ✓                                                                                             |
|     | 5   | SS - Austenitic                   | 200-330         |                                                                                             |                                                                                             |                                                                                             |                                                                                             |                                                                                              | ✓                                                                                             | ✓                                                                                             |                                                                                               |                                                                                               | ✓                                                                                             |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                                                                                             |                                                                                             |                                                                                             |                                                                                             |                                                                                              | ✓                                                                                             | ✓                                                                                             |                                                                                               |                                                                                               | ✓                                                                                             |
| K   | 7   | Malleable Cast Iron               | 130-230         | ✓                                                                                           | ✓                                                                                           | ✓                                                                                           | ✓                                                                                           | ✓                                                                                            |                                                                                               | ✓                                                                                             | ✓                                                                                             |                                                                                               | ✓                                                                                             |
|     | 8   | Grey Cast Iron                    | 180-245         | ✓                                                                                           | ✓                                                                                           | ✓                                                                                           | ✓                                                                                           | ✓                                                                                            |                                                                                               | ✓                                                                                             | ✓                                                                                             |                                                                                               | ✓                                                                                             |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓                                                                                           | ✓                                                                                           | ✓                                                                                           | ✓                                                                                           | ✓                                                                                            |                                                                                               | ✓                                                                                             | ✓                                                                                             |                                                                                               | ✓                                                                                             |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                                                                                             |                                                                                             |                                                                                             |                                                                                             |                                                                                              | ✓                                                                                             | ✓                                                                                             |                                                                                               |                                                                                               | ✓                                                                                             |

● Good Conditions

● Average Conditions

● Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |         |             |         |         |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|---------|-------------|---------|---------|
|     |     |                                   |                 | ← Wear Resistance |         |         | Toughness → |         |         |
|     |     |                                   |                 | PH5705            | PH5320  | PHP920  | PH7920      | PHP930  | PHH930  |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                 | -       | 180-250 | 180-240     | 160-230 | -       |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                 | -       | 160-230 | 160-220     | 140-210 | -       |
|     | 3   | High-Alloyed Steel                | 280-380         | -                 | -       | 140-220 | 140-210     | 120-200 | -       |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | -       | -           | -       | 140-210 |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | -       | -           | -       | 120-170 |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | -       | -           | -       | 100-150 |
| K   | 7   | Malleable Cast Iron               | 130-230         | 160-290           | 150-280 | 160-270 | 160-260     | 150-250 | -       |
|     | 8   | Grey Cast Iron                    | 180-245         | 170-320           | 160-320 | 140-250 | 140-240     | 140-230 | -       |
|     | 9   | Nodular Cast iron                 | 160-250         | 140-200           | 100-190 | 120-210 | 120-200     | 100-200 | -       |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       | -       | -           | -       | 30-110  |

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |             |         | Feed fz (mm/t)         |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|-------------|---------|------------------------|
|     |     |                                   |                 | ← Wear Resistance |         | Toughness → |         |                        |
|     |     |                                   |                 | PH7930            | PH5740  | PHS740      | PH7740  | SNH(K)X/ONH(K)X        |
| P   | 1   | Unalloyed Steel                   | 125-220         | 160-220           | -       | 140-220     | 140-200 | 0,15 <b>(0,25)</b> 0,4 |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 140-200           | -       | 120-200     | 130-180 | 0,15 <b>(0,25)</b> 0,4 |
|     | 3   | High-Alloyed Steel                | 280-380         | 120-190           | -       | 100-190     | 100-170 | 0,15 <b>(0,25)</b> 0,4 |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | 140-200           | -       | -           | 130-180 | 0,1 <b>(0,20)</b> 0,3  |
|     | 5   | SS - Austenitic                   | 200-330         | 120-160           | -       | -           | 110-160 | 0,1 <b>(0,20)</b> 0,3  |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | 100-140           | -       | -           | 90-150  | 0,1 <b>(0,20)</b> 0,3  |
| K   | 7   | Malleable Cast Iron               | 130-230         | 150-240           | 160-260 | -           | 140-220 | 0,15 <b>(0,25)</b> 0,4 |
|     | 8   | Grey Cast Iron                    | 180-245         | 140-230           | 140-240 | -           | 120-210 | 0,14 <b>(0,25)</b> 0,4 |
|     | 9   | Nodular Cast iron                 | 160-250         | 100-190           | 120-200 | -           | 100-190 | 0,14 <b>(0,25)</b> 0,4 |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | 30-100            |         | -           | 30-100  | 0,1 <b>(0,15)</b> 0,17 |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) PH5... and PH5... can be used wet or dry. PH7... use only air.



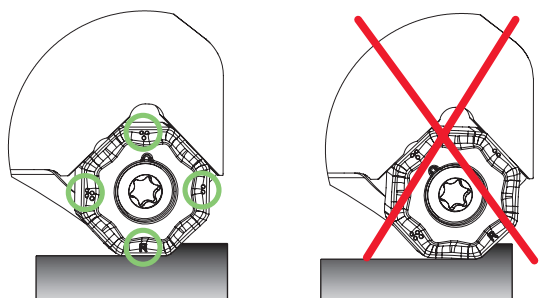
# CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra- aparas | Guía para aplicación del rompevirutas

## Selection Example:

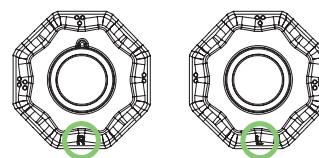
| ISO | PSM | Material            | HB (Brinell) | Vc (m/min)               |                          | Feed fz (mm/t)              |
|-----|-----|---------------------|--------------|--------------------------|--------------------------|-----------------------------|
|     |     |                     |              | ← Wear Resistance        | Toughness →              |                             |
|     |     |                     |              | PH5705                   | PH5740                   | SNHX/ONHX                   |
| K   | 7   | Malleable cast iron | 130-230      | 170 <b>(190)</b> 305     | 150 <b>(170)</b> 260     | 0,15 <b>(0,25)</b> 0,40     |
|     | 8   | Grey cast iron      | 180-245      | 180 <b>(240)</b> 350     | 155 <b>(190)</b> 290     | 0,14 <b>(0,25)</b> 0,40     |
|     | 9   | Nodular cast iron   | 160-250      | <del>130 (160) 210</del> | <del>115 (140) 180</del> | <del>0,14 (0,25) 0,40</del> |

This example shows the recommended starting cutting conditions, indicated in **Bold type**.

| ISO | PSM | Material                          | HB (Brinell) | Chip-Breaker Application |             |
|-----|-----|-----------------------------------|--------------|--------------------------|-------------|
|     |     |                                   |              | 1 <sup>st</sup> choice   | Alternative |
| P   | 1   | Unalloyed Steel                   | 125-220      | LP                       | MP          |
|     | 2   | Low-Alloyed Steel                 | 220-280      | LP                       | MP          |
|     | 3   | High-Alloyed Steel                | 280-380      | MP                       | -           |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      | LS                       | LP          |
|     | 5   | SS - Austenitic                   | 200-330      | LS                       | LP          |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      | LS                       | LP          |
| K   | 7   | Malleable Cast Iron               | 130-230      | MK                       | -           |
|     | 8   | Grey Cast Iron                    | 180-245      | MK                       | -           |
|     | 9   | Nodular Cast iron                 | 160-250      | MK                       | LP          |
| S   | 11  | Heat Resistant Super Alloys       | 200-320      | LS                       | LP          |



The points and letter (R or L) on the insert indicates the side that should be parallel to the workspace material.

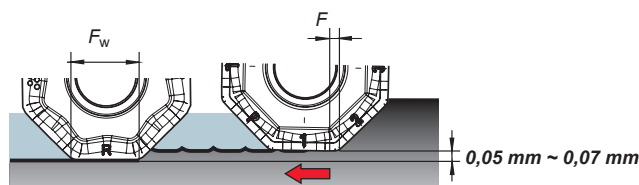


Wiper insert with 4 Right and 4 Left-hand cutting edges. The side work of the insert it's indicated by the letter R (Right) & L (Left).

## WIPER INSERTS

Recommended Cutting Conditions:

- $f_z$  should be equal to  $0,8 \times F_w / Z$
- Axial depth of cut is 0,5 to 0,8mm.



Example:

- The width of the parallel land (F) of the insert is 1mm.
- To obtain a good surface finishing, the feed per revolution should be a maximum of 80% of 1mm = 0,8mm.
- The wiper insert will have a parallel land ( $F_w$ ) with a width of 6,0mm.
- Result: Feed per revolution ( $f_n$ ) could be increased from 0,8mm to 4,8mm (80% of 6,0mm).

Note: Other limitations, such as machine power, must be taken into consideration.

How to use a wiper insert:

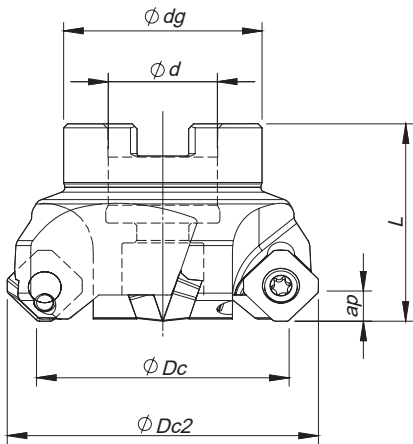
- Since wiper is one corner use to standard cutters, please attach the insert with the parallel land down to the workspace cutting surface.
- The points and the letter (R or L) on the insert indicates the side that should be parallel to the workspace material.
- The side work of the insert it's indicated by the letter (R - Right & L - Left).



LINEPRO 06045



Arbor Mounting  
 $K_r=45^\circ$  |  $\gamma_p=+19^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |            |          |           |    | Kg    | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|------------|----------|-----------|----|-------|----------------|----------------|-------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi Dc2$ | $\phi d$ | $\phi dg$ | L  |       | Arbor<br>Type  | Ap max<br>(mm) |                               |       |
| 181163200            | 050A06045-04-19-022040                | 4 | 50                                        | 62         | 22       | 42        | 40 | 0,350 | A              | 6,0            | SE...T/W 1204                 |       |
| 181148800            | 063A06045-05-19-022050                | 5 | 63                                        | 75         | 22       | 42        | 50 | 0,800 | A              | 6,0            | SE...T/W 1204                 |       |
| 181148900            | 080A06045-06-19-027050                | 6 | 80                                        | 92         | 27       | 50        | 50 | 1,150 | A              | 6,0            | SE...T/W 1204                 |       |
| 181149000            | 100A06045-06-19-032050                | 6 | 100                                       | 112        | 32       | 64        | 50 | 1,700 | A              | 6,0            | SE...T/W 1204                 |       |
| 181163300            | 125A06045-07-19-040063                | 7 | 125                                       | 132        | 40       | 85        | 63 | 2,750 | B              | 6,0            | SE...T/W 1204                 |       |
| 181040300            | 160A06045-08-19-U040063               | 8 | 160                                       | 172        | 40       | 100       | 63 | 4,600 | C              | 6,0            | SE...T/W 1204                 |       |

Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

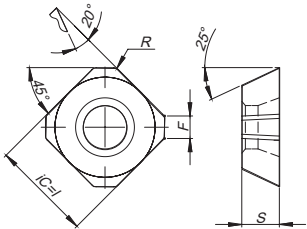
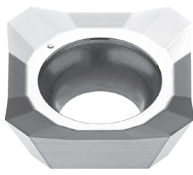
SEH... 1204 || Inserts | Pastilhas | Plaquitass

SEHW

SEHT

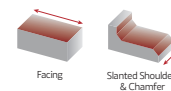
SEHT-LN

SEHW | SEHT | SEHT-LN



|         |                   | P      |        | M      | K      |        | N      | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |       |      |
|---------|-------------------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|-------|------|
|         |                   | PVD    |        |        | PVD    |        | UNC    |                                                |      |       |      |
|         | (2) Grade code    | 68     | I5     | I5     | 68     | I5     | 10     |                                                |      |       |      |
| (1)     | ISO<br>Reference  | PH6920 | PH6740 | PH6740 | PH6920 | PH6740 | PH0910 | iC                                             | S    | I     | F    |
| 1110216 | SEHT 1204 AFEN    |        |        |        |        |        |        | 12,70                                          | 4,76 | 12,70 | 2,80 |
| 1110218 | SEHT 1204 AFTN    |        |        |        |        |        |        | 12,70                                          | 4,76 | 12,70 | 2,80 |
| 1112283 | SEHT 1204 AFFN-LN |        |        |        |        |        |        | 12,70                                          | 4,76 | 12,70 | 2,00 |
| 1110219 | SEHW 1204 AFEN    |        |        |        |        |        |        | 12,70                                          | 4,76 | 12,70 | 2,80 |
| 1110222 | SEHW 1204 AFTN    |        |        |        |        |        |        | 12,70                                          | 4,76 | 12,70 | 2,80 |

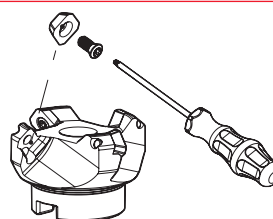
First choice | Primeira opção | 1ª opción      Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)      Insert order code = (1) Geometry Code + (2) Grade Code



## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc     | Insert Screw | Key (Torx) | Order separately   |              |
|-------------------|--------------|------------|--------------------|--------------|
|                   |              |            | Key<br>(Torx - Nm) | Torque Value |
| A06045 - 50 - 160 | P0501100     | PT20       | DT2050             | 5,0          |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades          |        |           |
|-----|-----|-----------------------------------|-----------------|-----------------|--------|-----------|
|     |     |                                   |                 | Wear Resistance |        | Toughness |
|     |     |                                   |                 | PH0910          | PH6920 | PH6740    |
| P   | 1   | Unalloyed steel                   | 125-220         | ●               | ✓      | ✓         |
|     | 2   | Low-alloyed steel                 | 220-280         |                 | ✓      | ✓         |
|     | 3   | High-alloy steel                  | 280-380         |                 | ✓      | ✓         |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                 |        | ✓         |
|     | 5   | SS - Austenitic                   | 200-330         |                 |        | ✓         |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                 |        | ✓         |
| K   | 7   | Malleable cast iron               | 130-230         |                 | ✓      | ✓         |
|     | 8   | Grey cast iron                    | 180-245         |                 | ✓      | ✓         |
|     | 9   | Nodular cast iron                 | 160-250         |                 | ✓      | ✓         |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | ✓               |        |           |

● Good Conditions  
● Average Conditions  
● Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)      |         |           | Feed fz (mm/t) |              |              |
|-----|-----|-----------------------------------|-----------------|-----------------|---------|-----------|----------------|--------------|--------------|
|     |     |                                   |                 | Wear Resistance |         | Toughness |                |              |              |
|     |     |                                   |                 | PH0910          | PH6920  | PH6740    | SEHT 1204...   | SEHT 1204 LN | SEHW 1204... |
| P   | 1   | Unalloyed Steel                   | 125-220         | -               | 150-230 | 130-160   | 0,10-0,20      | -            | 0,10-0,20    |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -               | 140-220 | 120-150   | 0,10-0,20      | -            | 0,10-0,20    |
|     | 3   | High-Alloyed Steel                | 280-380         | -               | 130-180 | 100-130   | 0,10-0,20      | -            | 0,10-0,20    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -               | -       | 100-120   | 0,10-0,15      | -            | 0,10-0,20    |
|     | 5   | SS - Austenitic                   | 200-330         | -               | -       | 80-110    | 0,10-0,15      | -            | 0,10-0,20    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -               | -       | 70-100    | 0,10-0,15      | -            | 0,10-0,20    |
| K   | 7   | Malleable Cast Iron               | 130-230         | -               | -       | 130-250   | 0,10-0,25      | -            | 0,10-0,25    |
|     | 8   | Grey Cast Iron                    | 180-245         | -               | -       | 110-220   | 0,10-0,25      | -            | 0,10-0,25    |
|     | 9   | Nodular Cast iron                 | 160-250         | -               | -       | 80-170    | 0,10-0,25      | -            | 0,10-0,25    |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | 350-1400        | -       | -         | -              | 0,10-0,25    | -            |

(Note 1) Cutting conditions ae/DC=70%

(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

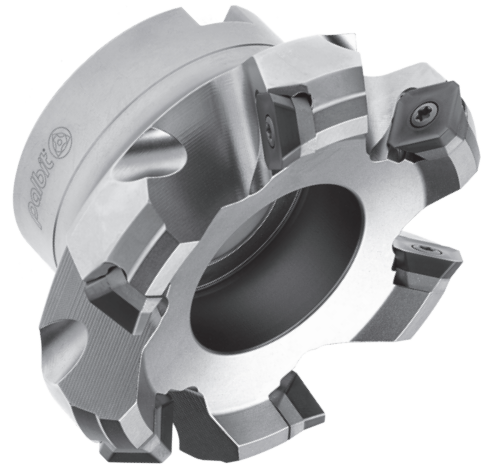
(Note 3) If chattering occurs, reduce ap and Vc by 30% and keep the same fz per tooth.

## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra- aparas | Guía para aplicación del rompevirutas

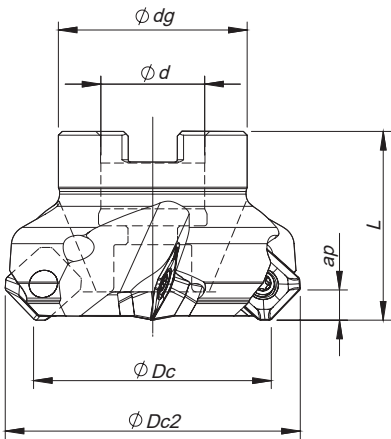
| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | SEHT 12... AFEN          | SEHW 12... AFEN      |
|     | 2   | Low-Alloyed Steel                 | 220-280         | SEHT 12... AFTN          | SEHW 12... AFTN      |
|     | 3   | High-Alloyed Steel                | 280-380         | SEHT 12... AFTN          | SEHW 12... AFTN      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | SEHT 12... AFEN          | SEHW 12... AFEN      |
|     | 5   | SS - Austenitic                   | 200-330         | SEHT 12... AFEN          | SEHW 12... AFEN      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | SEHW 12... AFEN          | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230         | SEHT 12... AFEN          | SEHW 12... AFEN      |
|     | 8   | Grey Cast Iron                    | 180-245         | SEHT 12... AFEN          | SEHW 12... AFEN      |
|     | 9   | Nodular Cast iron                 | 160-250         | SEHW 12... AFEN          | SEHW 12... AFTN      |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | SEHT 12... AFFN-LN       | -                    |







Arbor Mounting  
 $K_r=45^\circ$  |  $\gamma_p=+20^\circ \sim +21^\circ$

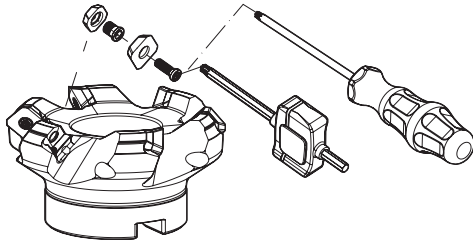


| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |            |          |           |    | Kg    | Specifications |                   | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|------------|----------|-----------|----|-------|----------------|-------------------|-------------------------------|-------|
|                      |                                       |    | $\phi Dc$                                 | $\phi Dc2$ | $\phi d$ | $\phi dg$ | L  |       | Arbor<br>Type  | $A_p$ max<br>(mm) |                               |       |
| 181034700            | 050A09945-04-20-U022040               | 4  | 50                                        | 63         | 22       | 40        | 40 | 0,36  | A              | 6,0               | SE...13T3                     |       |
| 181024200            | 063A09945-05-21-U022040               | 5  | 63                                        | 76         | 22       | 48        | 40 | 0,59  | A              | 6,0               | SE...13T3                     |       |
| 181024300            | 080A09945-06-21-U027050               | 6  | 80                                        | 93         | 27       | 60        | 50 | 1,02  | B              | 6,0               | SE...13T3                     |       |
| 181024400            | 100A09945-07-21-U032050               | 7  | 100                                       | 113        | 32       | 70        | 50 | 1,52  | B              | 6,0               | SE...13T3                     |       |
| 181024500            | 125A09945-08-21-U040063               | 8  | 125                                       | 138        | 40       | 90        | 63 | 3,16  | B              | 6,0               | SE...13T3                     |       |
| 181024600            | 160A09945-10-21-U040063               | 10 | 160                                       | 173        | 40       | 110       | 63 | 4,61  | C              | 6,0               | SE...13T3                     |       |
| 181051400            | 250A09945-24-21-U060063L              | 24 | 250                                       | 263        | 60       | 172       | 63 | 13,89 | C              | 6,0               | SE...13T3                     |       |
| 181024800            | 250A09945-24-21-U060063               | 24 | 250                                       | 263        | 60       | 172       | 63 | 13,89 | C              | 6,0               | SE...13T3                     |       |

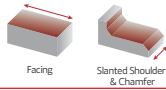
Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

SPARE PARTS | Complementos | Repuestos

| Cutter<br>$\phi Dc$ | Order separately |            |                 |              | Order separately |            |
|---------------------|------------------|------------|-----------------|--------------|------------------|------------|
|                     | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value | Shim             | Shim Screw |
| A09945 - 50 - 80    |                  |            |                 | 3,0          |                  |            |
| A09945 - 100-250    |                  |            |                 | 3,0          |                  |            |



Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



SE... 13T3 | Inserts | Pastilhas | Plaquetas

SEHT



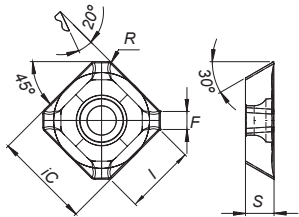
SEHW



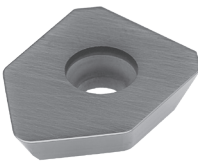
SEHT-LN



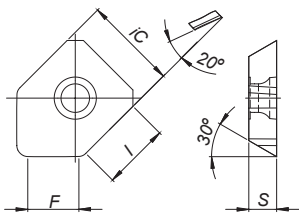
SEHT | SEHW | SEHT-LN



SEHT-W



SEHT-W



|                         |                   | P      |        | M      | K      |        | N      | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |     |
|-------------------------|-------------------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|------|-----|
|                         |                   | PVD    |        | PVD    |        |        | UNC    |                                                |      |      |     |
|                         |                   | 68     | I5     | I5     | 68     | I5     | 10     |                                                |      |      |     |
| (1)<br>Geometry<br>code | ISO<br>Reference  | PH6920 | PH6740 | PH6740 | PH6920 | PH6740 | PH0910 | iC                                             | S    | I    | F   |
| 1110559                 | SEHT 13T3 AGSN    | Ⓢ      | Ⓢ      | Ⓢ      | Ⓢ      | Ⓢ      |        | 13,35                                          | 3,97 | 10,0 | 2,0 |
| 1111586                 | SEHT 13T3 AGFN-LN |        |        |        |        |        | Ⓢ      | 13,35                                          | 3,97 | 10,0 | 2,3 |
| 1110627                 | SEHT 13T3 AGSN-W  | Ⓢ      |        |        | Ⓢ      |        |        | 13,35                                          | 3,97 | 10,0 | 8,2 |
| 1111146                 | SEHW 13T3 AGFN    | Ⓢ      |        |        | Ⓢ      |        |        | 13,35                                          | 3,97 | 10,0 | 2,0 |

Ⓢ First choice | Primeira opção | 1ª opción    Ⓢ Stock item | Produto de stock | Ítems de stock    ○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)    Insert order code = (1) Geometry Code + (2) Grade Code

GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | Material                          | HB<br>(Brinell) | Grades          |        |           |
|-----|-----------------------------------|-----------------|-----------------|--------|-----------|
|     |                                   |                 | Wear Resistance |        | Toughness |
|     |                                   |                 | PH0910          | PH6920 | PH6740    |
| P   | Unalloyed steel                   | 125-220         | ●               | ✓      | ✓         |
|     | Low-alloyed steel                 | 220-280         |                 | ✓      | ✓         |
|     | High-alloy steel                  | 280-380         |                 | ✓      | ✓         |
| M   | SS - Ferritic / Martensitic       | 200-330         |                 |        | ✓         |
|     | SS - Austenitic                   | 200-330         |                 |        | ✓         |
|     | SS - Austenitic-ferritic (Duplex) | 230-260         |                 |        | ✓         |
| K   | Malleable cast iron               | 130-230         |                 | ✓      | ✓         |
|     | Grey cast iron                    | 180-245         |                 | ✓      | ✓         |
|     | Nodular cast iron                 | 160-250         |                 | ✓      | ✓         |
| N   | Aluminium and Non Ferrous         | 30-130          | ✓               |        |           |

● Good Conditions  
● Average Conditions  
● Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |             | Feed fz (mm/t)    |                   |                      |                     |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|-------------|-------------------|-------------------|----------------------|---------------------|
|     |     |                                   |                 | ← Wear Resistance |         | Toughness → |                   |                   |                      |                     |
|     |     |                                   |                 | PH0910            | PH6920  | PH6740      | SEHT 13T3<br>AGSN | SEHW 13T3<br>AGFN | SEHT 13T3<br>AGFN-LN | SEHT 13T3<br>AGSN-W |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                 | 180-340 | 180-240     | 0,10-0,25         | -                 | -                    | 0,10-0,30           |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                 | 180-340 | 160-220     | 0,10-0,20         | -                 | -                    | 0,10-0,30           |
|     | 3   | High-Alloyed Steel                | 280-380         | -                 | 180-330 | 140-210     | 0,10-0,20         | -                 | -                    | 0,10-0,30           |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | 140-220     | 0,10-0,20         | -                 | -                    | -                   |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | 130-180     | 0,10-0,20         | -                 | -                    | -                   |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | 120-160     | 0,10-0,20         | -                 | -                    | -                   |
| K   | 7   | Malleable Cast Iron               | 130-230         | -                 | -       | 160-260     | 0,10-0,25         | 0,10-0,25         | -                    | 0,10-0,30           |
|     | 8   | Grey Cast Iron                    | 180-245         | -                 | -       | 140-240     | 0,10-0,25         | 0,10-0,25         | -                    | 0,10-0,30           |
|     | 9   | Nodular Cast iron                 | 160-250         | -                 | -       | 120-200     | 0,10-0,20         | 0,10-0,20         | -                    | 0,10-0,30           |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | 350-1400          | -       | -           | 0,10-0,20         | -                 | 0,10-0,20            | -                   |

(Note 1) Cutting conditions ae/DC=70%

(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 3) If chattering occurs, reduce ap and Vc by 30% and keep the same fz per tooth.

## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra-aparas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | SEHT... AGSN             | -                    |
|     | 2   | Low-Alloyed Steel                 | 220-280         | SEHT... AGSN             | -                    |
|     | 3   | High-Alloyed Steel                | 280-380         | SEHT... AGSN             | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | SEHT... AGSN             | SEHW... AGFN         |
|     | 5   | SS - Austenitic                   | 200-330         | SEHT... AGSN             | SEHW... AGFN         |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | SEHT... AGSN             | SEHW... AGFN         |
| K   | 7   | Malleable Cast Iron               | 130-230         | SEHW... AGFN             | -                    |
|     | 8   | Grey Cast Iron                    | 180-245         | SEHW... AGFN             | -                    |
|     | 9   | Nodular Cast iron                 | 160-250         | SEHW... AGFN             | -                    |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | SEHT... AGFN-LN          | -                    |

## WIPER INSERTS

### Rec. Cutting Conditions

- $F_w$  at least 40% larger than  $f_n$  ( $f_n = f_z \times Z$ );
- Axial depth of cut is 0,5 - 0,8 mm;

### Example:

- The width of parallel land ( $F$ ) of the SEHT insert is 2,0 mm.
- With a cutter of 10 inserts and using a feed per tooth ( $f_z$ ) of 0,3 mm, the feed per revolution ( $f_n$ ) will be 3 mm, i.e. 66% bigger than the parallel land.
- To obtain a good surface finishing, the feed per revolution should be a maximum 80% of 2,0 mm = 1,6 mm.
- The wiper insert will have a parallel land ( $F_w$ ) with a width of approximately 8,2 mm.
- Result: Feed per revolution ( $f_n$ ) could be increased from 1,6 mm to 60% of 6,0 mm = 4,9 mm.

Note: Other limitations, such as machine power, must be taken into consideration.

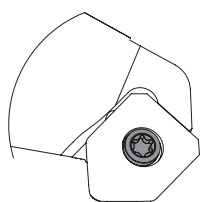


Fig. A

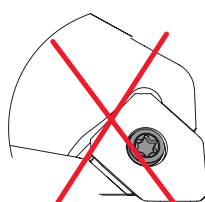
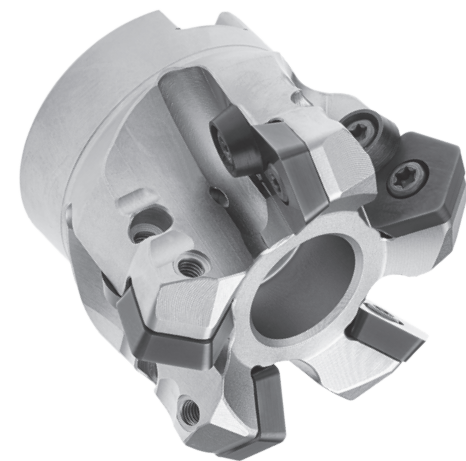


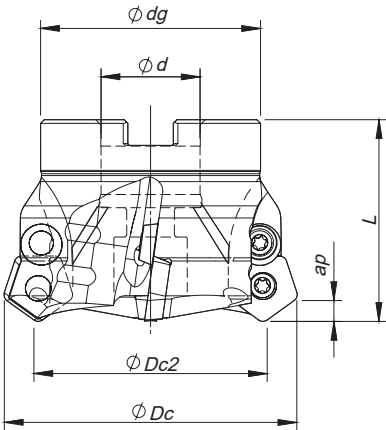
Fig. B

When using wiper insert, install the insert as shown on Fig. A.  
If the insert is installed as shown on Fig. B breakage of the insert is inevitable and normal surface finish can not be obtained.





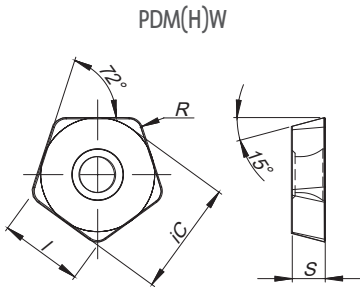
Arbor Mounting  
 $K_r=36^\circ$  |  $\gamma_p=+9^\circ$  |  $R_p=7,0$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |        |         |    | Kg    | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|--------|---------|----|-------|----------------|----------------|-------------------------------|-------|
|                      |                                       |   | \phi Dc                                   | \phi Dc2 | \phi d | \phi dg | L  |       | Arbor<br>Type  | Ap max<br>(mm) |                               |       |
| 181009800            | 066C00036-05-09-027055                | 5 | 66                                        | 47,5     | 27     | 48      | 55 | 0,520 | A              | 5,5            | PD...1204                     |       |
| 181010400            | 080C00036-06-09-027055                | 6 | 80                                        | 61,5     | 27     | 60      | 55 | 0,940 | A              | 5,5            | PD...1204                     |       |
| 181018100            | 100C00036-07-09-U032055               | 7 | 100                                       | 81,5     | 32     | 70      | 55 | 1,400 | B              | 5,5            | PD...1204                     |       |
| 181001100            | 125C00036-08-09-U040055               | 8 | 125                                       | 106,5    | 40     | 90      | 55 | 2,420 | B              | 5,5            | PD...1204                     |       |
| 181002700            | 160C00036-09-09-U040055               | 9 | 160                                       | 141,5    | 40     | 120     | 55 | 4,590 | B              | 5,5            | PD...1204                     |       |

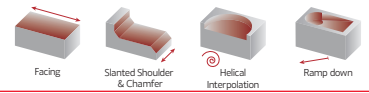
Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

PD... 1204... || Inserts | Pastilhas | Plaquitass



|                              |                           | P      |        |        | K      | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |     |
|------------------------------|---------------------------|--------|--------|--------|--------|------------------------------------------------|------|------|-----|
|                              |                           | PVD    |        |        | PVD    |                                                |      |      |     |
|                              | <sup>(2)</sup> Grade code | 68     | 78     | 86     | 68     |                                                |      |      |     |
| <sup>(1)</sup> Geometry code | ISO Reference             | PH6920 | PH6125 | PH6135 | PH6920 | iC                                             | S    | I    | R   |
| 1110555                      | PDMW 120420 T             |        |        |        |        | 16,52                                          | 4,76 | 12,0 | 2,0 |
| 1110554                      | PDHW 120420 T             |        |        |        |        | 16,52                                          | 4,76 | 12,0 | 2,0 |

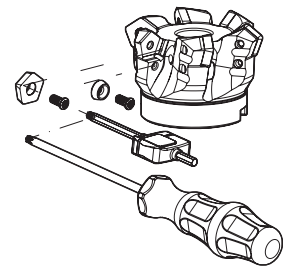
First choice | Primeira opção | 1ª opción      Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)      Insert order code = (1) Geometry Code + (2) Grade Code



## SPARE PARTS | Complementos | Repuestos

| ScrewCutter<br>ØDc | Order separately |            |                    |              | Order separately |              |
|--------------------|------------------|------------|--------------------|--------------|------------------|--------------|
|                    | Insert Screw     | Key (Torx) | Key<br>(Torx - Nm) | Torque Value | Washer           | Washer Screw |
| C00036 - 66-80     | P0451001         | XT20       | DT2050             | 5,0          | HC01200          | P0451001     |
| C00036 - 100-160   | P0451001         | PT20       | DT2050             | 5,0          | HC01200          | P0451001     |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material            | HB<br>(Brinell) | Vc (m/min)        |         |             | Feed fz (mm/t) |
|-----|-----|---------------------|-----------------|-------------------|---------|-------------|----------------|
|     |     |                     |                 | ← Wear Resistance |         | Toughness → |                |
|     |     |                     |                 | PH6920            | PH6125  | PH6135      | PDHW / PDMW    |
| P   | 1   | Unalloyed Steel     | 125-220         | 150-230           | 160-190 | 150-180     | 0,25-0,50      |
|     | 2   | Low-Alloyed Steel   | 220-280         | 140-220           | 140-180 | 140-170     | 0,25-0,50      |
|     | 3   | High-Alloyed Steel  | 280-380         | 130-180           | 130-160 | 120-150     | 0,25-0,40      |
| K   | 7   | Malleable Cast Iron | 130-230         | 150-280           | -       | -           | 0,25-0,60      |
|     | 8   | Grey Cast Iron      | 180-245         | 130-230           | -       | -           | 0,25-0,60      |
|     | 9   | Nodular Cast iron   | 160-250         | 80-190            | -       | -           | 0,25-0,60      |

(Note 1) Cutting conditions ae/DC=70%

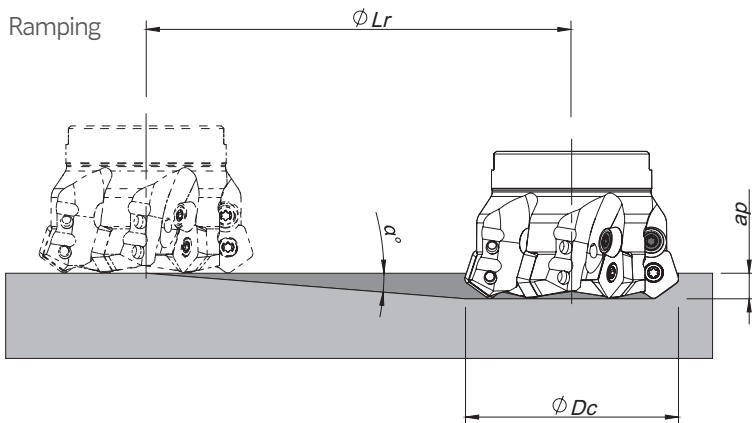
(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 3) If chattering occurs, reduce ap and Vc by 30% and keep the same fz per tooth.

## RAMPING AND HELICAL INTERPOLATION

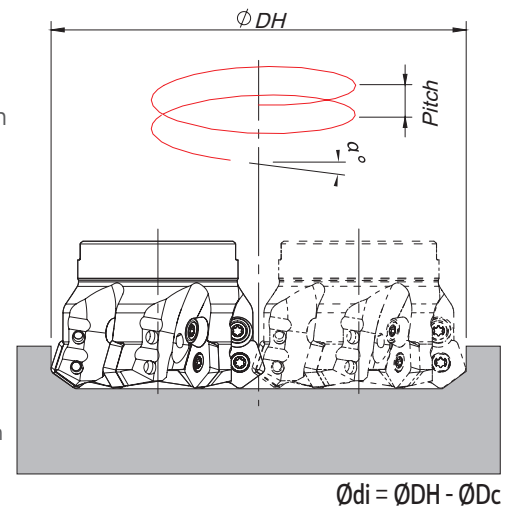
Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular

Ramping



Helical Interpolation

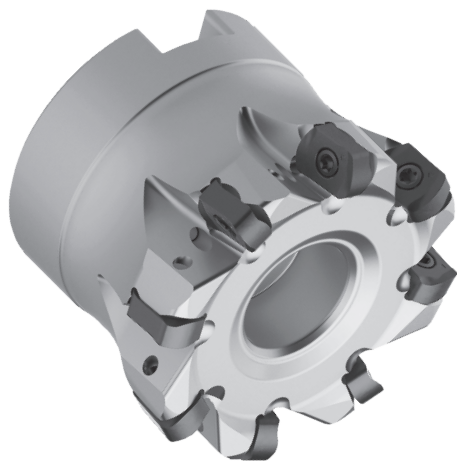
Blind hole  
Flat bottom



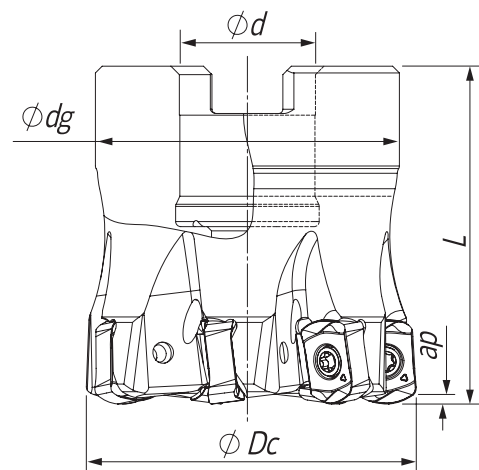
$$\text{Ødi} = \text{ØDH} - \text{ØDc}$$

| ØDc | Ramping     |        |        | Helical Interpolation |            |                |
|-----|-------------|--------|--------|-----------------------|------------|----------------|
|     | Max Ramp α° | Max ap | Min Lr | ØDHmin                | ØDHmax     | Max Pitch/Rev. |
| 66  | 8           | 5,5    | 39,1   | 113,3<br>-            | -<br>130,4 | 20,9<br>28,4   |
| 80  | 6           | 5,5    | 52,3   | 141,3<br>-            | -<br>158,4 | 20,2<br>25,9   |
| 100 | 4,3         | 5,5    | 73,1   | 181,3<br>-            | -<br>198,4 | 19,2<br>23,2   |
| 125 | 3,2         | 5,5    | 98,4   | 231,3<br>-            | -<br>248,4 | 18,7<br>21,7   |
| 160 | 2,4         | 5,5    | 131,2  | 301,3<br>-            | -<br>318,4 | 18,6<br>20,8   |

Note: During helical interpolation do not exceed max Pitch.



**Arbor Mounting**  
 $K_r=20^\circ$  |  $\gamma_p=-7^\circ$  |  $R_p=1,8$



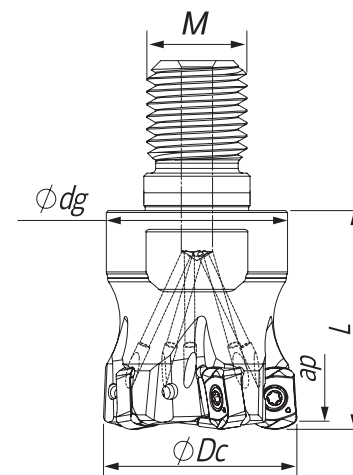
| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg   | Specifications |            | Insert      | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|----|-----|----|------|----------------|------------|-------------|-------|
|                      |                                       |    | ØDc                                       | Ød | Ødg | L  |      | Ap max (mm)    | Arbor Type |             |       |
| 181152300            | 040A16320-07-07-016040                | 7  | 40                                        | 16 | 36  | 40 | 0,20 | 1,00           | A          | XN KU 06... |       |
| 181157500            | 050A16320-06-07-022040                | 6  | 50                                        | 22 | 42  | 40 | 0,25 | 1,00           | A          | XN KU 06... |       |
| 181152400            | 050A16320-08-07-022040                | 8  | 50                                        | 22 | 42  | 40 | 0,29 | 1,00           | A          | XN KU 06... |       |
| 181152500            | 052A16320-08-07-022040                | 8  | 52                                        | 22 | 40  | 40 | 0,39 | 1,00           | A          | XN KU 06... |       |
| 181152600            | 063A16320-09-07-022040                | 9  | 63                                        | 22 | 48  | 40 | 0,50 | 1,00           | A          | XN KU 06... |       |
| NEW 181177800        | 080A16320-10-07-027050                | 10 | 80                                        | 27 | 60  | 50 | 0,95 | 1,00           | A          | XN KU 06... |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)



**Threaded Coupling**  
 $K_r=20^\circ$  |  $\gamma_p=-7^\circ$  |  $R_p=1,8$

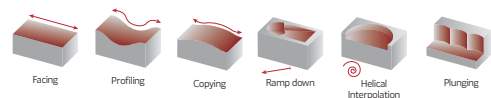


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |     |     |    | Kg   | Specifications |             | Insert | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----|-----|----|------|----------------|-------------|--------|-------|
|                      |                                       |   | ØDc                                       | ØM  | Ødg | L  |      | Ap max (mm)    | Arbor Type  |        |       |
| 181151300            | 016R16320-02-07-M08025                | 2 | 16                                        | M08 | 13  | 25 | 0,02 | 1,00           | XN KU 06... |        |       |
| 181151400            | 020R16320-03-07-M10028                | 3 | 20                                        | M10 | 18  | 28 | 0,05 | 1,00           | XN KU 06... |        |       |
| 181151500            | 025R16320-04-07-M12035                | 4 | 25                                        | M12 | 18  | 35 | 0,07 | 1,00           | XN KU 06... |        |       |
| 181148000            | 032R16320-05-07-M16035                | 5 | 32                                        | M16 | 29  | 35 | 0,16 | 1,00           | XN KU 06... |        |       |
| NEW 181178600        | 035R16320-05-07-M16035                | 5 | 35                                        | M16 | 29  | 35 | 0,16 | 1,00           | XN KU 06... |        |       |
| 181151600            | 035R16320-06-07-M16035                | 6 | 35                                        | M16 | 29  | 35 | 0,17 | 1,00           | XN KU 06... |        |       |
| 181151700            | 040R16320-05-07-M16045                | 5 | 40                                        | M16 | 29  | 45 | 0,24 | 1,00           | XN KU 06... |        |       |
| NEW 181178500        | 040R16320-06-07-M16035                | 6 | 40                                        | M16 | 29  | 35 | 0,23 | 1,00           | XN KU 06... |        |       |
| 181151800            | 042R16320-07-07-M16035                | 7 | 42                                        | M16 | 29  | 35 | 0,24 | 1,00           | XN KU 06... |        |       |

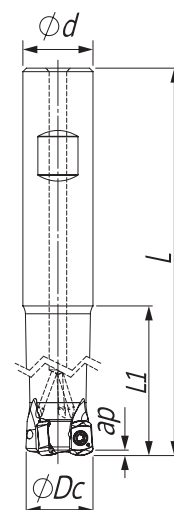
Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)





## Weldon Shank

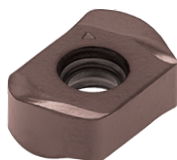
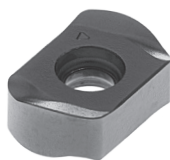
 $K_r=20^\circ$  |  $\gamma_p=-7^\circ$  |  $R_p=1,8$ 

| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |     | Kg   | Specifications | Insert     | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|-----|------|----------------|------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1  |      | Ap max (mm)    |            |       |
| 181161000            | 016W16320-02-07-016150                | 2 | 16                                        | 16 | 150 | 50  | 0,19 | 1,00           | XNKU 06... |       |
| 181151900            | 020W16320-03-07-020160                | 3 | 20                                        | 20 | 160 | 90  | 0,29 | 1,00           | XNKU 06... |       |
| 181152000            | 025W16320-04-07-025180                | 4 | 25                                        | 25 | 180 | 100 | 0,40 | 1,00           | XNKU 06... |       |
| 181152100            | 032W16320-05-07-032200                | 5 | 32                                        | 32 | 200 | 120 | 1,10 | 1,00           | XNKU 06... |       |

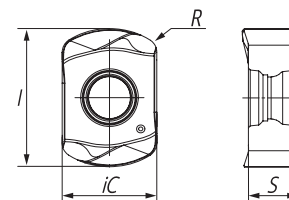
Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

## XNKU 06T3... || Inserts | Pastilhas | Plaquetas

XNKU-MP  
(PHP grade)XNKU-MP  
(PHH grade)XNKU-MP  
(PHS grade)

XNKU-MP



|                      |                  | P      |        |        |        | M      |        | K      |        | S      |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |       |      |
|----------------------|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|-------|------|
|                      |                  | CVD    | PVD    |        |        | CVD    | PVD    | CVD    | PVD    | CVD    | PVD    |                                                |      |       |      |
|                      |                  | T9     | X5     | T1     | P4     | T9     | X9     | T9     | T1     | T9     | X9     |                                                |      |       |      |
| (1)<br>Geometry code | ISO<br>Reference | PHS740 | PHP910 | PHP920 | PHP930 | PHS740 | PHH930 | PHS740 | PHP920 | PHS740 | PHH930 | iC                                             | S    | I     | R    |
| NEW 1112802          | XNKU 06T310-MP   |        |        |        |        |        |        |        |        |        |        | 6,85                                           | 3,60 | 10,00 | 1,00 |

First choice | Primeira opção | 1ª opción

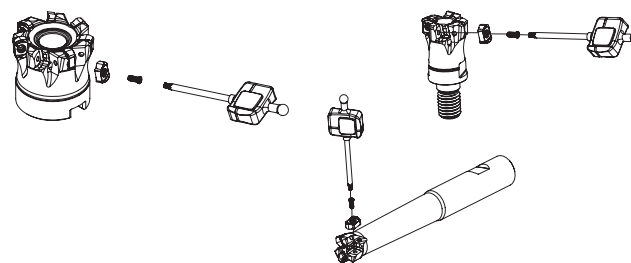
Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

## SPARE PARTS Complementos | Repuestos

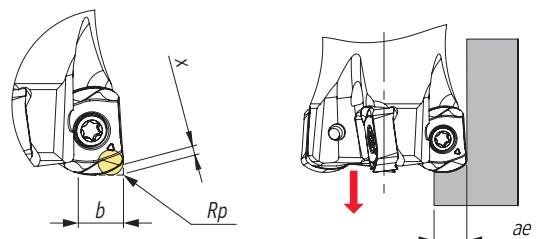
| Cutter<br>ØDc  | Order separately |            |                 |              |
|----------------|------------------|------------|-----------------|--------------|
|                | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value |
| A16320 - 40-80 | P0250704         | XT08       | DT0812          | 1,20         |
| R16320 - 20-42 | P0250704         | XT08       | DT0812          | 1,20         |
| W16320 - 20-32 | P0250704         | XT08       | DT0812          | 1,20         |





## PROGRAMMING DATA | Dados para programação | Datos para la programación

| Insert         | Programming Data |     |     |                |
|----------------|------------------|-----|-----|----------------|
|                | Rp               | X   | b   | a <sub>e</sub> |
| XNKU 06T310-MP | 1,8              | 0,4 | 3,6 | 3,4            |



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades            |        |        |             |        |
|-----|-----|-----------------------------------|-----------------|-------------------|--------|--------|-------------|--------|
|     |     |                                   |                 | ← Wear Resistance |        |        | Toughness → |        |
|     |     |                                   |                 | PHP910            | PHP920 | PHP930 | PHH930      | PHS740 |
| P   | 1   | Unalloyed Steel                   | 125-220         | ✓                 | ✓      | ✓      |             | ✓      |
|     | 2   | Low-Alloyed Steel                 | 220-280         | ✓                 | ✓      | ✓      |             | ✓      |
|     | 3   | High-Alloyed Steel                | 280-380         | ✓                 | ✓      | ✓      |             | ✓      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                   |        |        | ✓           | ✓      |
|     | 5   | SS - Austenitic                   | 200-330         |                   |        |        | ✓           | ✓      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                   |        |        | ✓           | ✓      |
| K   | 7   | Malleable Cast Iron               | 130-230         | ✓                 | ✓      |        |             | ✓      |
|     | 8   | Grey Cast Iron                    | 180-245         | ✓                 | ✓      |        |             | ✓      |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓                 | ✓      |        |             | ✓      |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                   |        |        | ✓           | ✓      |



## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |         |             |         | Feed fz (mm/t) |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|---------|-------------|---------|----------------|
|     |     |                                   |                 | ← Wear Resistance |         |         | Toughness → |         |                |
|     |     |                                   |                 | PHP910            | PHP920  | PHP930  | PHH930      | PHS740  | XNKU 06...MP   |
| P   | 1   | Unalloyed Steel                   | 125-220         | 180-250           | 180-250 | 160-230 | -           | 160-230 | 0,50-1,50      |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 160-240           | 170-210 | 150-190 | -           | 150-190 | 0,50-1,50      |
|     | 3   | High-Alloyed Steel                | 280-380         | 140-230           | 160-200 | 140-180 | -           | 140-180 | 0,50-1,50      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | -       | 130-170     | 120-180 | 0,50-1,40      |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | -       | 100-160     | 100-150 | 0,50-1,40      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | -       | 80-140      | 70-130  | 0,50-1,40      |
| K   | 7   | Malleable Cast Iron               | 130-230         | 180-300           | 180-320 | -       | -           | 160-300 | 0,50-1,50      |
|     | 8   | Grey Cast Iron                    | 180-245         | 160-250           | 170-280 | -       | -           | 150-260 | 0,50-1,50      |
|     | 9   | Nodular Cast iron                 | 160-250         | 150-210           | 100-240 | -       | -           | 80-220  | 0,50-1,50      |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       | -       | 30-75       | 30-70   | 0,50-1,30      |

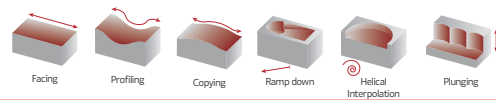
(Note 1) Cutting conditions a<sub>e</sub>/Dc=70%.

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

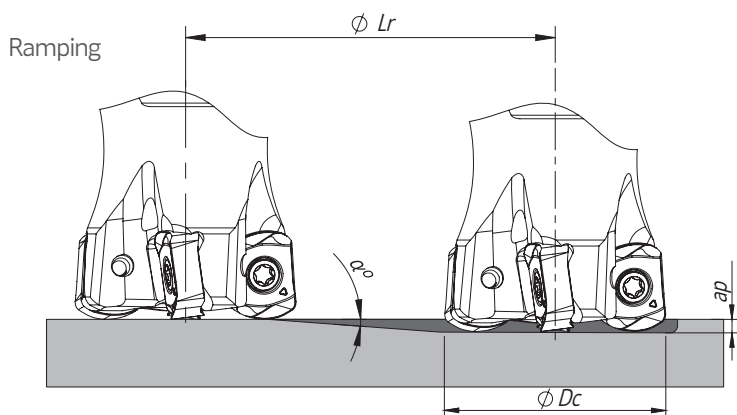
(Note 3) When using ØDc=16mm apply 70% or less feed (fz) from the table.





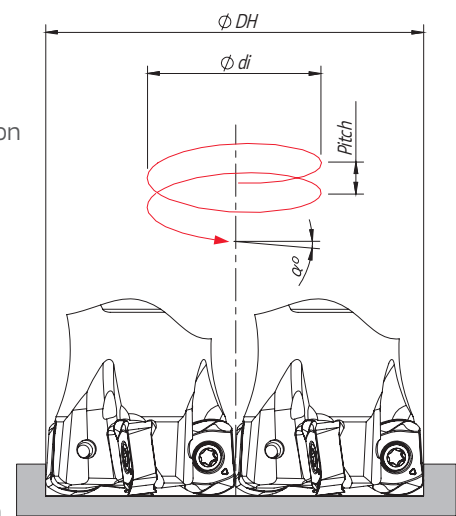
## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular



Helical Interpolation

Blind hole  
Flat bottom



$$\phi di = \phi DH - \phi Dc$$

| $\phi Dc$ | Ramping                 |           |          | Helical Interpolation |                 |                |
|-----------|-------------------------|-----------|----------|-----------------------|-----------------|----------------|
|           | Max Ramp $\alpha^\circ$ | Max $a_p$ | Min $Lr$ | $\phi DH_{min}$       | $\phi DH_{max}$ | Max Pitch/Rev. |
| 16        | 0,5                     | 1         | 114,6    | 24,8<br>-             | -<br>30,0       | 0,2<br>0,3     |
| 20        | 0,5                     | 1         | 114,6    | 32,8<br>-             | -<br>38,0       | 0,3<br>0,4     |
| 25        | 0,8                     | 1         | 71,6     | 42,8<br>-             | -<br>48,0       | 0,7<br>1,0     |
| 32        | 0,8                     | 1         | 71,6     | 56,8<br>-             | -<br>62,0       | 1,0<br>1,3     |
| 35        | 0,5                     | 1         | 114,6    | 62,8<br>-             | -<br>68,0       | 0,7<br>0,9     |
| 40        | 0,4                     | 1         | 143,2    | 72,8<br>-             | -<br>78,0       | 0,7<br>0,8     |
| 42        | 0,4                     | 1         | 143,2    | 76,8<br>-             | -<br>82,0       | 0,7<br>0,8     |
| 50        | 0,3                     | 1         | 191,0    | 92,8<br>-             | -<br>98,0       | 0,7<br>0,7     |
| 52        | 0,3                     | 1         | 191,0    | 96,8<br>-             | -<br>102,0      | 0,7<br>0,8     |
| 63        | 0,25                    | 1         | 229,2    | 118,8<br>-            | -<br>124,0      | 0,7<br>0,8     |
| 80        | 0,15                    | 1         | 382,0    | 152,8<br>-            | -<br>158,0      | 0,5<br>0,6     |

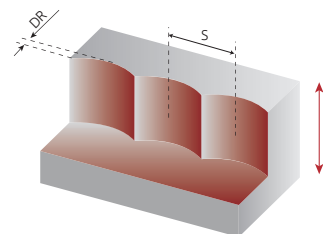
Note: During helical interpolation do not exceed max Pitch.

(\*) Down cutting is recommended, tool pass rotation should be counter-clockwise.

(\*) In case of ramping and helical interpolation, apply 70% or less feed ( $f_z$ ) from recommended cutting conditions table.

## PLUNGING | Mergulho | Plunge

| L≤3Dc                 | L>3Dc       | S max.                                    |
|-----------------------|-------------|-------------------------------------------|
| f <sub>z</sub> (mm/t) |             |                                           |
| 0,08-0,15             | 0,05 - 0,10 | S <sub>max</sub> = √DC·Dr-Dr <sup>2</sup> |



| S max and DR corresponding cutting diameter Dc (mm) |                    |     |     |     |     |      |      |      |      |      |      |
|-----------------------------------------------------|--------------------|-----|-----|-----|-----|------|------|------|------|------|------|
| DR (mm)                                             | Dc (mm) XNKU 06... |     |     |     |     |      |      |      |      |      |      |
|                                                     | 16                 | 20  | 25  | 32  | 35  | 40   | 42   | 50   | 52   | 60   | 80   |
| 1                                                   | 3,9                | 4,4 | 4,9 | 5,6 | 5,8 | 6,2  | 6,4  | 7,0  | 7,1  | 7,9  | 8,9  |
| 2                                                   | 5,3                | 6,0 | 6,8 | 7,7 | 8,1 | 8,7  | 8,9  | 9,8  | 10,0 | 11,0 | 12,5 |
| 3                                                   | 6,2                | 7,1 | 8,1 | 9,3 | 9,8 | 10,5 | 10,8 | 11,9 | 12,1 | 13,4 | 15,2 |

Note: Recommended for  $L \leq 4 Dc$  for extra long tool this step and side cut must be reduced.

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

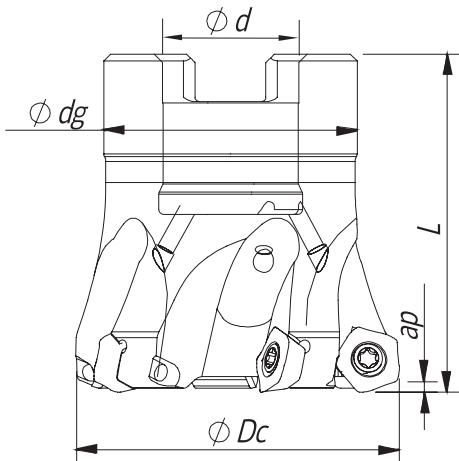
Spare Parts

Technical Data

End Mills



Arbor Mounting  
 $K_r=20^\circ$  |  $\gamma_p=14^\circ$  |  $R_p=2,5$



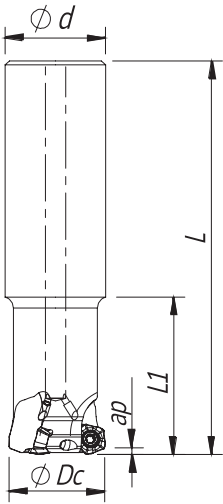
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg   | Specifications |            | Insert       | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|------|----------------|------------|--------------|-------|
|                      |                                       |   | ØDc                                       | Ød | Ødg | L  |      | Ap max (mm)    | Arbor Type |              |       |
| 181129300            | 040A06320-05-14-016040                | 5 | 40                                        | 16 | 30  | 40 | 0,15 | 1,0            | A          | POKT 0403... |       |
| 181129400            | 050A06320-06-14-022045                | 6 | 50                                        | 22 | 40  | 45 | 0,19 | 1,0            | A          | POKT 0403... |       |
| 181129500            | 052A06320-06-14-022045                | 6 | 52                                        | 22 | 40  | 45 | 0,29 | 1,0            | A          | POKT 0403... |       |
| 181129600            | 063A06320-07-14-027050                | 7 | 63                                        | 27 | 48  | 50 | 0,50 | 1,0            | A          | POKT 0403... |       |
| 181131300            | 066A06320-07-14-027050                | 7 | 66                                        | 27 | 48  | 50 | 0,55 | 1,0            | A          | POKT 0403... |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)



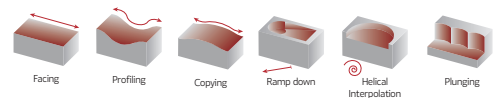
Cylindrical Shank  
 $K_r=20^\circ$  |  $\gamma_p=14^\circ$  |  $R_p=2,5$



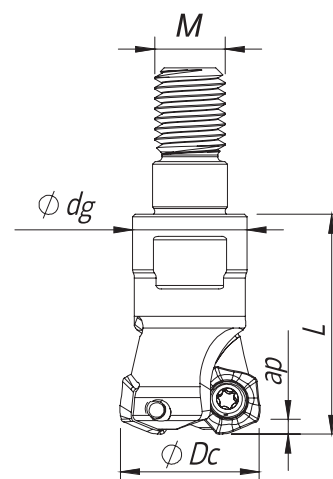
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg   | Specifications |            | Insert       | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|------|----------------|------------|--------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1 |      | Ap max (mm)    | Arbor Type |              |       |
| 181147200            | 020E06320-02-14-020130                | 2 | 20                                        | 20 | 130 | 40 | 0,38 | 1,0            | A          | POKT 0403... |       |
| 181131000            | 025E06320-03-14-025150                | 3 | 25                                        | 25 | 150 | 40 | 0,41 | 1,0            | A          | POKT 0403... |       |
| 181131100            | 032E06320-05-14-032180                | 5 | 32                                        | 32 | 180 | 50 | 0,56 | 1,0            | A          | POKT 0403... |       |
| 181131200            | 040E06320-05-14-032180                | 5 | 40                                        | 32 | 180 | 50 | 0,70 | 1,0            | A          | POKT 0403... |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)



**Threaded Coupling**  
 $K_r=20^\circ$  |  $\gamma_p=14^\circ$  |  $R_p=2,5$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |     |     |    | Kg   | Specifications | Insert       | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----|-----|----|------|----------------|--------------|-------|
|                      |                                       |   | ØDc                                       | ØM  | Ødg | L  |      | Ap max (mm)    |              |       |
| 181113500            | 016R06320-02-14-M08025                | 2 | 16                                        | M08 | 13  | 25 | 0,02 | 1,0            | POKT 0403... | Ⓢ     |
| 181113600            | 020R06320-02-14-M10025                | 2 | 20                                        | M10 | 18  | 25 | 0,05 | 1,0            | POKT 0403... | Ⓢ     |
| 181113700            | 025R06320-03-14-M12028                | 3 | 25                                        | M12 | 21  | 28 | 0,07 | 1,0            | POKT 0403... | Ⓢ     |
| 181129100            | 032R06320-05-14-M16035                | 5 | 32                                        | M16 | 29  | 35 | 0,17 | 1,0            | POKT 0403... | Ⓢ     |
| 181129200            | 035R06320-05-14-M16035                | 5 | 35                                        | M16 | 29  | 35 | 0,19 | 1,0            | POKT 0403... | Ⓢ     |
| 181130900            | 042R06320-05-14-M16035                | 5 | 42                                        | M16 | 29  | 35 | 0,23 | 1,0            | POKT 0403... | Ⓢ     |

Ⓢ Stock item | Produto de stock | Itens de stock

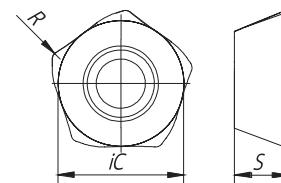
○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

## POKT 0403... || Inserts | Pastilhas | Plaquetas

POKT-MP



POKT-MP



|                                    |                     | P                                                                                   |                                                                                     |                                                                                     |                                                                                     | K                                                                                     |                                                                                       | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |
|------------------------------------|---------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------|------|------|
|                                    |                     | PVD                                                                                 |                                                                                     |                                                                                     |                                                                                     | PVD                                                                                   |                                                                                       |                                                |      |      |
|                                    |                     | G1                                                                                  | G4                                                                                  | P3                                                                                  | G6                                                                                  | G1                                                                                    | G4                                                                                    |                                                |      |      |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference    | PH7910                                                                              | PH7920                                                                              | PH7930                                                                              | PH7740                                                                              | PH7910                                                                                | PH7920                                                                                | iC                                             | S    | R    |
| 1112365                            | POKT 040305 ZDSR-MP |  |  |  |  |  |  | 7,00                                           | 3,00 | 0,50 |

Ⓢ First choice | Primeira opção | 1ª opción

Ⓢ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

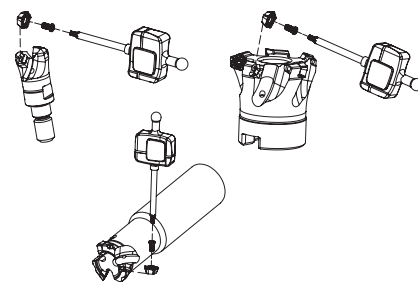
Insert order code = (1) Geometry Code + (2) Grade Code

# PENTA HIFEED 06320

## SPARE PARTS Complementos | Repuestos

| Cutter<br>ØDc  | Order separately |            |                 |              | Order separately |                 |
|----------------|------------------|------------|-----------------|--------------|------------------|-----------------|
|                | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value | Screw            | DIN 6368 Wrench |
| R06320 - 16-42 | P0250503         | XT08       | DT0812          | 1,20         | -                | -               |
| E06320 - 25-40 | P0250503         | XT08       | DT0812          | 1,20         | -                | -               |
| A06320 - 40-60 | P0250503         | XT08       | DT0812          | 1,20         | -                | -               |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material            | HB<br>(Brinell) | Grades            |        |             |        |
|-----|-----|---------------------|-----------------|-------------------|--------|-------------|--------|
|     |     |                     |                 | ← Wear Resistance |        | Toughness → |        |
|     |     |                     |                 | PH7910            | PH7920 | PH7930      | PH7740 |
| P   | 1   | Unalloyed Steel     | 125-220         | ✓                 | ✓      | ✓           | ✓      |
|     | 2   | Low-Alloyed Steel   | 220-280         | ✓                 | ✓      | ✓           | ✓      |
|     | 3   | High-Alloyed Steel  | 280-380         | ✓                 | ✓      | ✓           | ✓      |
| K   | 7   | Malleable Cast Iron | 130-230         | ✓                 | ✓      |             |        |
|     | 8   | Grey Cast Iron      | 180-245         | ✓                 | ✓      |             |        |
|     | 9   | Nodular Cast iron   | 160-250         | ✓                 | ✓      |             |        |



## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material            | HB<br>(Brinell) | Vc (m/min)        |         |         |             | Feed fz (mm/t) |
|-----|-----|---------------------|-----------------|-------------------|---------|---------|-------------|----------------|
|     |     |                     |                 | ← Wear Resistance |         |         | Toughness → |                |
|     |     |                     |                 | PH7910            | PH7920  | PH7930  | PH7740      | POKT 04...-MP  |
| P   | 1   | Unalloyed Steel     | 125-220         | 180-250           | 180-240 | 160-220 | 140-200     | 0,50-1,50      |
|     | 2   | Low-Alloyed Steel   | 220-280         | 160-230           | 160-220 | 140-200 | 130-180     | 0,50-1,51      |
|     | 3   | High-Alloyed Steel  | 280-380         | 140-220           | 140-210 | 120-190 | 100-170     | 0,50-1,52      |
| K   | 7   | Malleable Cast Iron | 130-230         | 180-300           | 160-260 | -       | -           | 0,50-1,53      |
|     | 8   | Grey Cast Iron      | 180-245         | 160-250           | 140-240 | -       | -           | 0,50-1,54      |
|     | 9   | Nodular Cast iron   | 160-250         | 150-200           | 120-200 | -       | -           | 0,50-1,55      |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

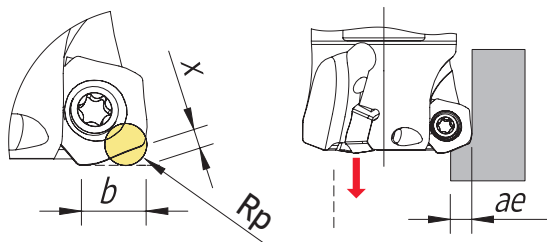
(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) PH5... and PH8... can be used wet or dry. PH7... use only air.

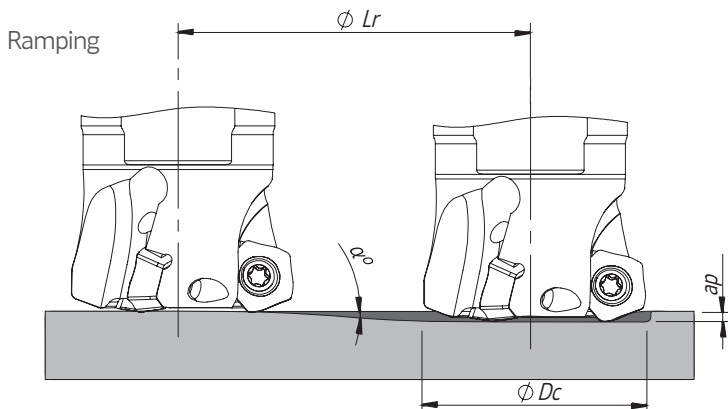
## PROGRAMMING DATA | Dados para programação | Datos para la programación

| Insert       | Programming Data |     |     |       |
|--------------|------------------|-----|-----|-------|
|              | Rp               | X   | b   | $a_e$ |
| POKT 0403... | 2,5              | 1,2 | 4,3 | 4,0   |

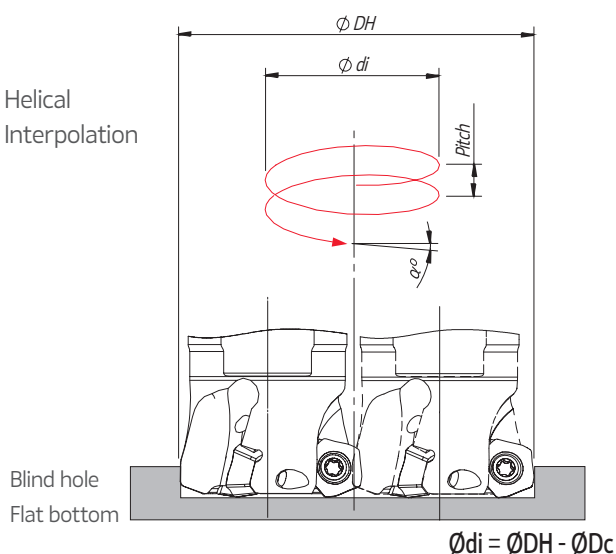


## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular



Helical Interpolation



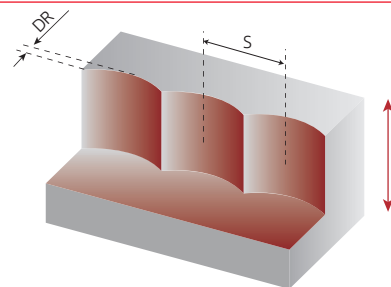
$$\phi di = \phi DH - \phi Dc$$

| $\phi Dc$ | Ramping            |           |           | Helical Interpolation |                 |                |
|-----------|--------------------|-----------|-----------|-----------------------|-----------------|----------------|
|           | Max Ramp $a^\circ$ | Max $a_p$ | Min $L_r$ | $\phi DH_{min}$       | $\phi DH_{max}$ | Max Pitch/Rev. |
| 16        | 15                 | 1,0       | 3,7       | 23,4                  | -               | 6              |
|           |                    |           |           | -                     | 30,0            | 11             |
| 20        | 9,0                | 1,0       | 6,3       | 31,4                  | -               | 5              |
|           |                    |           |           | -                     | 38,0            | 8              |
| 25        | 5,0                | 1,0       | 11,4      | 41,4                  | -               | 4              |
|           |                    |           |           | -                     | 48,0            | 6              |
| 32        | 3,4                | 1,0       | 16,8      | 55,4                  | -               | 4              |
|           |                    |           |           | -                     | 62,0            | 5              |
| 35        | 3,0                | 1,0       | 19,1      | 61,4                  | -               | 4              |
|           |                    |           |           | -                     | 68,0            | 5              |
| 40        | 2,0                | 1,0       | 28,6      | 71,4                  | -               | 3              |
|           |                    |           |           | -                     | 78,0            | 4              |
| 42        | 2,0                | 1,0       | 28,6      | 84,0                  | -               | 4              |
|           |                    |           |           | -                     | 82,0            | 4              |
| 50        | 2,0                | 1,0       | 28,6      | 91,4                  | -               | 4              |
|           |                    |           |           | -                     | 98,0            | 5              |
| 52        | 2,0                | 1,0       | 28,6      | 95,4                  | -               | 4              |
|           |                    |           |           | -                     | 102,0           | 5              |
| 63        | 2,0                | 1,0       | 28,6      | 117,4                 | -               | 5              |
|           |                    |           |           | -                     | 124,0           | 6              |
| 66        | 1,8                | 1,0       | 31,8      | 123,4                 | -               | 5              |
|           |                    |           |           | -                     | 130,0           | 6              |

Note: During helical interpolation do not exceed max Pitch.

## PLUNGING | Mergulho | Plunge

| L≤3Dc                 | L>3Dc       | S max.                                    |
|-----------------------|-------------|-------------------------------------------|
| f <sub>z</sub> (mm/t) |             |                                           |
| 0,08-0,15             | 0,05 - 0,10 | S <sub>max</sub> = √DC.Dr-Dr <sup>2</sup> |



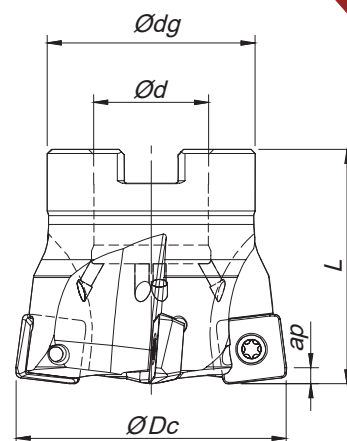
| S max and DR corresponding cutting diameter Dc (mm) |                    |     |     |      |      |      |      |      |      |      |      |
|-----------------------------------------------------|--------------------|-----|-----|------|------|------|------|------|------|------|------|
| DR (mm)                                             | Dc (mm) POKT 04... |     |     |      |      |      |      |      |      |      |      |
|                                                     | 16                 | 20  | 25  | 32   | 35   | 40   | 42   | 50   | 52   | 63   | 66   |
| 1,0                                                 | 3,9                | 4,4 | 4,9 | 5,7  | 5,8  | 6,2  | 6,4  | 7,0  | 7,1  | 7,9  | 8,1  |
| 2,0                                                 | 5,3                | 6,0 | 6,8 | 7,7  | 8,1  | 8,7  | 8,9  | 9,8  | 10,0 | 11,0 | 11,3 |
| 3,0                                                 | 6,2                | 7,1 | 8,1 | 9,3  | 9,8  | 10,5 | 10,8 | 11,9 | 12,1 | 13,4 | 13,7 |
| 4,0                                                 | 6,9                | 8,0 | 9,2 | 10,6 | 11,1 | 12,0 | 12,3 | 13,6 | 13,9 | 15,4 | 15,7 |

Note: Recommended for  $L \leq 4 Dc$  for extra long tool this step and side cut must be reduced.



## Arbor Mounting

$K_r=10^\circ$  |  $\gamma_p=+2^\circ$  |  $\gamma_f=+2^\circ$  |  $R_p=2,0$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg    | Specifications |               | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|-------|----------------|---------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | Ødg | L  |       | Ap max<br>(in) | Arbor<br>Type |                               |       |
| 181149800            | 040A06410-05-02-016040                | 5 | 40                                        | 16 | 30  | 40 | 0,157 | 1,00           | A             | SO...0803...                  |       |
| 181153200            | 050A06410-06-02-022045                | 6 | 50                                        | 22 | 40  | 45 | 0,312 | 1,00           | A             | SO...0803...                  |       |
| 181149900            | 052A06410-06-02-022045                | 6 | 52                                        | 22 | 40  | 45 | 0,331 | 1,00           | A             | SO...0803...                  |       |

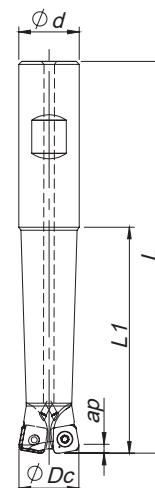
Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta



## Weldon Shank

$K_r=10^\circ$  |  $\gamma_p=+2^\circ$  |  $\gamma_f=+2^\circ$  |  $R_p=2,0$

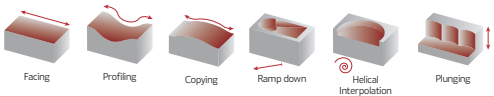


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |     | Kg    | Specifications |  | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|-----|-------|----------------|--|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1  |       | Ap max<br>(mm) |  |                               |       |
| 181076300            | 020W06410-02-02-020130                | 2 | 20                                        | 20 | 130 | 75  | 0,360 | 1,00           |  | SO...0803...                  |       |
| 181080900            | 020W06410-02-02-020190                | 2 | 20                                        | 20 | 190 | 110 | 0,340 | 1,00           |  | SO...0803...                  |       |
| 181076400            | 025W06410-03-02-025140                | 3 | 25                                        | 25 | 140 | 80  | 0,410 | 1,00           |  | SO...0803...                  |       |
| 181081100            | 025W06410-03-02-025200                | 3 | 25                                        | 25 | 200 | 130 | 0,570 | 1,00           |  | SO...0803...                  |       |
| 181076500            | 032W06410-04-02-032150                | 4 | 32                                        | 32 | 150 | 90  | 0,760 | 1,00           |  | SO...0803...                  |       |
| 181081300            | 032W06410-04-02-032200                | 4 | 32                                        | 32 | 200 | 130 | 1,010 | 1,00           |  | SO...0803...                  |       |

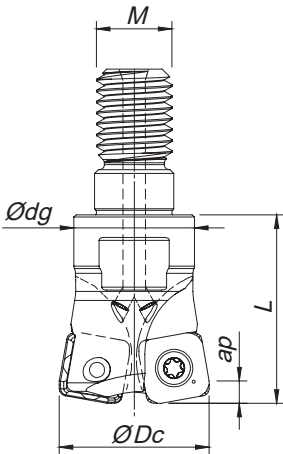
Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta





Threaded Coupling  
 $K_r=10^\circ$  |  $\gamma_p=+2^\circ$  |  $\gamma_f=+2^\circ$  |  $R_p=2,0$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |     |     |    | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----|-----|----|-------|----------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | ØM  | Ødg | L  |       | Ap max (mm)    |                               |       |
| 181071900            | 020R06410-02-02-M10025                | 2 | 20                                        | M10 | 16  | 25 | 0,040 | 1,00           | SO...0803...                  |       |
| 181076600            | 025R06410-03-02-M12028                | 3 | 25                                        | M12 | 21  | 28 | 0,070 | 1,00           | SO...0803...                  |       |
| 181076700            | 032R06410-04-02-M16035                | 4 | 32                                        | M16 | 29  | 35 | 0,160 | 1,00           | SO...0803...                  |       |
| 181076800            | 035R06410-04-02-M16035                | 4 | 35                                        | M16 | 29  | 35 | 0,180 | 1,00           | SO...0803...                  |       |
| 181076900            | 042R06410-05-02-M16035                | 5 | 42                                        | M16 | 29  | 35 | 0,220 | 1,00           | SO...0803...                  |       |

Stock item | Produto de stock | Itens de stock      Available under request | Disponível sobre consulta | Disponible bajo consulta

SO...0803... || Inserts | Pastilhas | Plaquetas

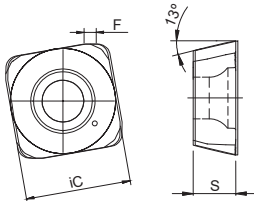
SOEW



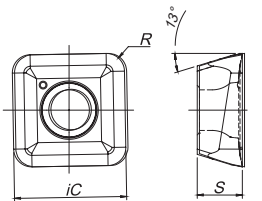
SOET



SOEW



SOET



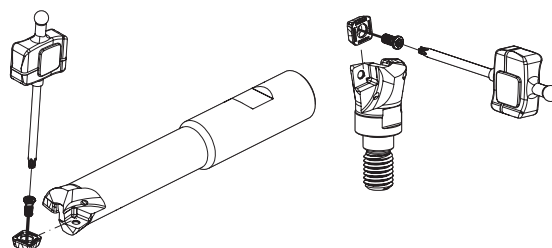
|                         |                  | P             |        |        | M      |        | K      |        |        | S      |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |     |     |
|-------------------------|------------------|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|-----|-----|
|                         |                  | PVD           |        |        | PVD    |        | PVD    |        |        | PVD    |        |                                                |      |     |     |
|                         |                  | (2)Grade code | X5     | T1     | G6     | X9     | G6     | X5     | T1     | G6     | X9     |                                                |      |     |     |
| (1)<br>Geometry<br>code | ISO<br>Reference | PHP910        | PHP920 | PH7740 | PHH930 | PH7740 | PHP910 | PHP920 | PH7740 | PHH930 | PH7740 | iC                                             | S    | R   | F   |
| 1111884                 | SOEW 080310 S    |               |        |        |        |        |        |        |        |        |        | 8,60                                           | 3,47 | 1,0 | 1,0 |
| 1112149                 | SOET 080315-MS   |               |        |        |        |        |        |        |        |        |        | 8,60                                           | 3,47 | 1,5 | -   |

First choice | Primeira opção | 1ª opción      Stock item | Produto de stock | Itens de stock      Available under request | Disponível sobre consulta | Disponible bajo consulta      Insert order code = (1) Geometry Code + (2) Grade Code

# HIFEED 06410

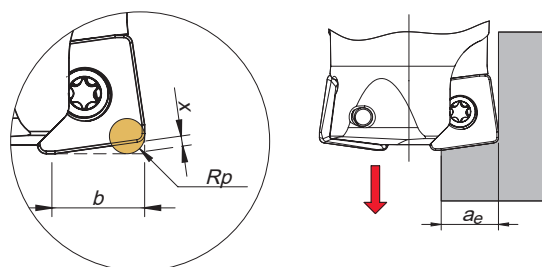
## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc    | Insert Screw                                                                      | Key (Torx)                                                                        | Order separately<br>Key<br>(Torx - Nm)                                            | Torque Value                                                                      |
|------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                  |  |  |  |  |
| A06410 - 40 - 52 | P0300800                                                                          | XT09                                                                              | DT0914                                                                            | 1,4                                                                               |
| R06410 - 20 - 42 | P0300800                                                                          | XT09                                                                              | DT0914                                                                            | 1,4                                                                               |
| W06410 - 20 - 32 | P0300800                                                                          | XT09                                                                              | DT0914                                                                            | 1,4                                                                               |



## PROGRAMMING DATA | Dados para programação | Datos para la programación

| Insert       | Programming Data |     |     |     |
|--------------|------------------|-----|-----|-----|
|              | Rp               | X   | b   | ae  |
| SO... 0803.. | 2,0              | 0,8 | 6,8 | 6,3 |



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades            |        |             |        |
|-----|-----|-----------------------------------|-----------------|-------------------|--------|-------------|--------|
|     |     |                                   |                 | ← Wear Resistance |        | Toughness → |        |
|     |     |                                   |                 | PHP910            | PHP920 | PHH930      | PH7740 |
| P   | 1   | Unalloyed Steel                   | 125-220         | ✓                 | ✓      |             | ✓      |
|     | 2   | Low-Alloyed Steel                 | 220-280         | ✓                 | ✓      |             | ✓      |
|     | 3   | High-Alloyed Steel                | 280-380         | ✓                 | ✓      |             | ✓      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                   |        | ✓           | ✓      |
|     | 5   | SS - Austenitic                   | 200-330         |                   |        | ✓           | ✓      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                   |        | ✓           | ✓      |
| K   | 7   | Malleable Cast Iron               | 130-230         | ✓                 | ✓      |             |        |
|     | 8   | Grey Cast Iron                    | 180-245         | ✓                 | ✓      |             |        |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓                 | ✓      |             |        |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                   |        | ✓           | ✓      |

-  Good Conditions
-  Average Conditions
-  Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |             |         | Feed fz (mm/t) |            |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|-------------|---------|----------------|------------|
|     |     |                                   |                 | ← Wear Resistance |         | Toughness → |         |                |            |
|     |     |                                   |                 | PHP910            | PHP920  | PHH930      | PH7740  | SOEW 08...     | SOET 08... |
| P   | 1   | Unalloyed Steel                   | 125-220         | 180-250           | 180-250 | -           | 140-200 | 0,40-1,80      | 0,40-1,80  |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 160-240           | 160-230 | -           | 130-180 | 0,40-1,80      | -          |
|     | 3   | High-Alloyed Steel                | 280-380         | 140-230           | 140-220 | -           | 100-170 | 0,40-1,50      | -          |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | 140-210     | 130-180 | -              | 0,40-1,30  |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | 120-170     | 110-160 | -              | 0,40-1,30  |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | 100-150     | 90-150  | -              | 0,10-1,00  |
| K   | 7   | Malleable Cast Iron               | 130-230         | 180-300           | 160-270 | -           | -       | 0,40-1,80      | 0,40-1,80  |
|     | 8   | Grey Cast Iron                    | 180-245         | 160-250           | 140-250 | -           | -       | 0,40-1,80      | -          |
|     | 9   | Nodular Cast iron                 | 160-250         | 150-210           | 120-210 | -           | -       | 0,40-1,80      | -          |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                   |         | 30-110      | 30-100  | -              | 0,40-1,00  |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) PH5... and PH5... can be used wet or dry. PH7... use only air.

(Note 4) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

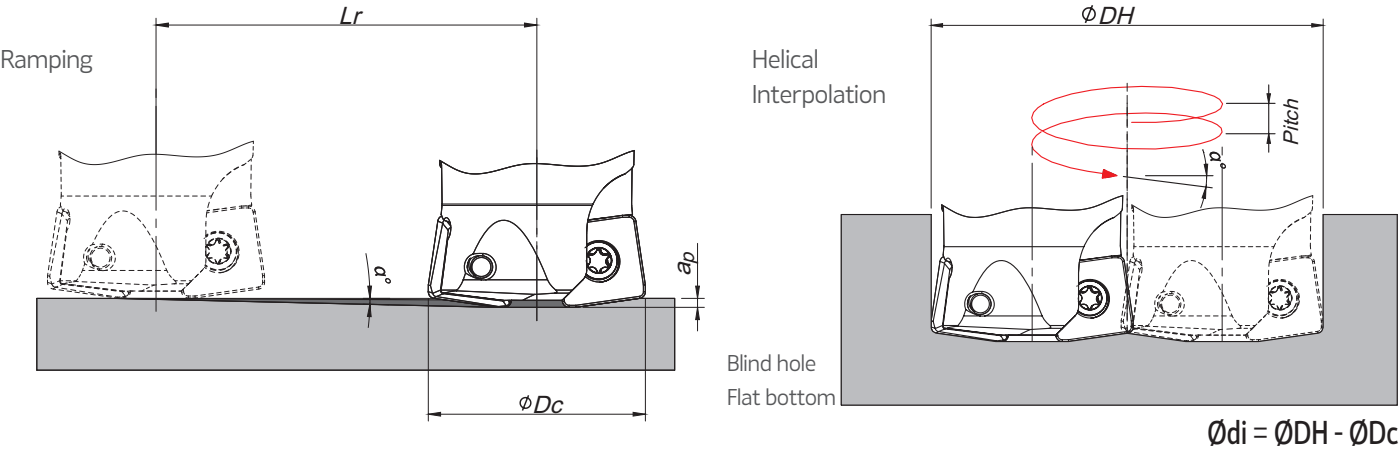
- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra-aperas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | SOET 08...               | SOEW 08...           |
|     | 2   | Low-Alloyed Steel                 | 220-280         | SOEW 08...               | -                    |
|     | 3   | High-Alloyed Steel                | 280-380         | SOEW 08...               | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | SOET 08...               | -                    |
|     | 5   | SS - Austenitic                   | 200-330         | SOET 08...               | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | SOET 08...               | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230         | SOET 08...               | SOEW 08...           |
|     | 8   | Grey Cast Iron                    | 180-245         | SOEW 08...               | -                    |
|     | 9   | Nodular Cast iron                 | 160-250         | SOEW 08...               | -                    |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | SOET 08...               | -                    |

RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular

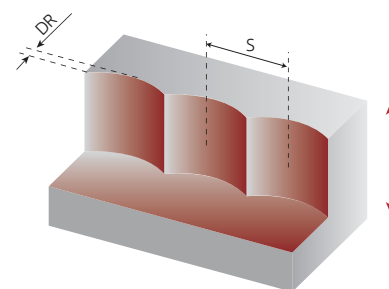


| $\varnothing Dc$ | Ramping            |           |        | Helical Interpolation  |                        |                |
|------------------|--------------------|-----------|--------|------------------------|------------------------|----------------|
|                  | Max Ramp $a^\circ$ | Max $a_p$ | Min Lr | $\varnothing DH_{min}$ | $\varnothing DH_{max}$ | Max Pitch/Rev. |
| 20               | 15                 | 1,0       | 3,2    | 26,4<br>-              | -<br>38,0              | 6<br>17        |
| 25               | 9,5                | 1,0       | 6,0    | 36,4<br>-              | -<br>48,0              | 5<br>12        |
| 32               | 5,5                | 1,0       | 10,4   | 50,4<br>-              | -<br>62,0              | 5<br>9         |
| 35               | 4,5                | 1,0       | 12,7   | 56,4<br>-              | -<br>68,0              | 5<br>8         |
| 40               | 3,5                | 1,0       | 16,3   | 66,4<br>-              | -<br>80,0              | 5<br>7         |
| 42               | 3,5                | 1,0       | 16,3   | 70,4<br>-              | -<br>82,0              | 5<br>7         |
| 50               | 3,5                | 1,0       | 16,3   | 86,4<br>-              | -<br>100,0             | 6<br>9         |
| 52               | 3,5                | 1,0       | 16,3   | 90,4<br>-              | -<br>104,0             | 7<br>9         |

Note: During helical interpolation do not exceed max Pitch.

# PLUNGING | Mergulho | Plunge

| L≤3Dc                 | L>3Dc     | S max.                                    |
|-----------------------|-----------|-------------------------------------------|
| f <sub>z</sub> (mm/t) |           |                                           |
| 0,08-0,15             | 0,05-0,10 | S <sub>max</sub> = √Dc.DR-DR <sup>2</sup> |



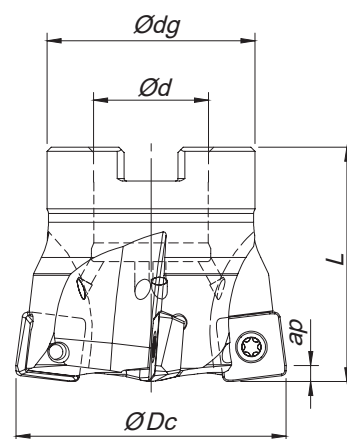
| S max and DR corresponding cutting diameter Dc (mm) |         |      |      |      |      |      |      |      |
|-----------------------------------------------------|---------|------|------|------|------|------|------|------|
| DR (mm)                                             | Dc (mm) |      |      |      |      |      |      |      |
|                                                     | 20      | 25   | 32   | 35   | 40   | 42   | 50   | 52   |
| 1,0                                                 | 4,4     | 4,9  | 5,6  | 5,8  | 6,2  | 6,4  | 7,0  | 7,1  |
| 2,0                                                 | 6,0     | 6,8  | 7,7  | 8,1  | 8,7  | 8,9  | 9,8  | 10,0 |
| 3,0                                                 | 7,1     | 8,1  | 9,3  | 9,8  | 10,5 | 10,8 | 11,9 | 12,1 |
| 4,0                                                 | 8,0     | 9,2  | 10,6 | 11,1 | 12,0 | 12,3 | 13,6 | 13,9 |
| 5,0                                                 | 8,7     | 10,0 | 11,6 | 12,2 | 13,2 | 13,6 | 15,0 | 15,3 |
| 6,0                                                 | 9,2     | 10,7 | 12,5 | 13,2 | 14,3 | 14,7 | 16,2 | 16,6 |

Note: Recommended for  $L \leq 4 D_c$  for extra long tool this step and side cut must be reduced.





## Arbor Mounting

 $K_r=10^\circ$  |  $\gamma_p=+5^\circ$  |  $R_p=2,5$ 


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg    | Specifications |               | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|-------|----------------|---------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | Ødg | L  |       | Ap max<br>(mm) | Arbor<br>Type |                               |       |
| 181069100            | 050A06690-04-05-022045                | 4 | 50                                        | 22 | 40  | 45 | 0,274 | 1,50           | A             | SO...13M5...                  |       |
| 181111100            | 050A06690-05-05-022045                | 5 | 50                                        | 22 | 40  | 45 | 0,272 | 1,50           | A             | SO...13M5...                  |       |
| 181029800            | 052A06690-04-05-022045                | 4 | 52                                        | 22 | 40  | 45 | 0,290 | 1,50           | A             | SO...13M5...                  |       |
| 181033500            | 063A06690-05-05-027050                | 5 | 63                                        | 27 | 48  | 50 | 0,500 | 1,50           | A             | SO...13M5...                  |       |
| 181029900            | 066A06690-05-05-027050                | 5 | 66                                        | 27 | 48  | 50 | 0,550 | 1,50           | A             | SO...13M5...                  |       |
| 181030000            | 080A06690-06-05-027050                | 6 | 80                                        | 27 | 60  | 50 | 0,955 | 1,50           | A             | SO...13M5...                  |       |
| 181113100            | 100A06690-08-05-032050                | 8 | 100                                       | 32 | 70  | 50 | 1,500 | 1,50           | A             | SO...13M5...                  |       |

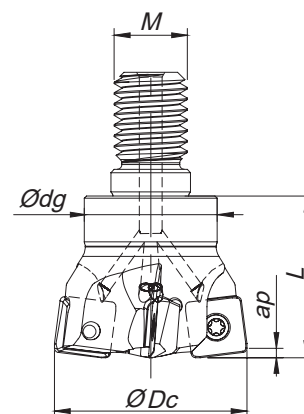
Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

\* For shank assembly a DIN 6912 screw is needed.



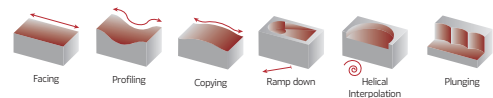
## Threaded Coupling

 $K_r=10^\circ$  |  $\gamma_p=+5^\circ$  |  $R_p=2,5$ 


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |     |     |    | Kg    | Specifications |  | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----|-----|----|-------|----------------|--|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | ØM  | Ødg | L  |       | Ap max<br>(mm) |  |                               |       |
| 181038700            | 032R06690-03-05-M16035                | 3 | 32                                        | M16 | 29  | 35 | 0,145 | 1,50           |  | SO...13M5                     |       |
| 181064600            | 035R06690-03-05-M16035                | 3 | 35                                        | M16 | 29  | 35 | 0,163 | 1,50           |  | SO...13M5                     |       |
| 181038800            | 042R06690-04-05-M16035                | 4 | 42                                        | M16 | 29  | 35 | 0,194 | 1,50           |  | SO...13M5                     |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)



## SO...13M5... || Inserts | Pastilhas | Plaquetas

SOEW



SOEW-MD



NEW

PHH

NEW

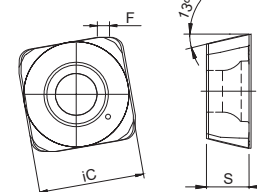
GRADE

PHP

NEW

GRADE

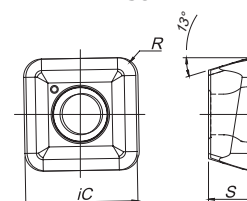
SOEW | SOEW-MD



SOET



SOET



|                                    |                  | P                         |        |        | M      |        |        | K      |        |        | S      |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |       |      |      |     |
|------------------------------------|------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|-------|------|------|-----|
|                                    |                  | PVD                       |        |        | PVD    |        |        | PVD    |        |        | PVD    |        |                                                |       |      |      |     |
|                                    |                  | <sup>(2)</sup> Grade code | X5     | T1     | G6     | P3     | X9     | G6     | X5     | T1     | G6     | X9     |                                                |       |      |      | G6  |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference | PHP910                    | PHP920 | PH7740 | PH7930 | PHH930 | PH7740 | PHP910 | PHP920 | PH7740 | PHH930 | PH7740 | iC                                             | S     | R    | F    |     |
| NEW                                | 1111906          | SOEW 13M510 S             | ⊗      | ⊗      | ⊗      |        |        |        | ⊗      | ⊗      | ⊗      |        |                                                | 12,43 | 5,00 | 1,20 | 1,0 |
|                                    | 1112813          | SOEW 13M510-MD            |        | ⊗      |        |        |        |        |        | ⊗      |        |        |                                                | 12,43 | 5,00 | 1,20 | 1,0 |
|                                    | 1112147          | SOET 13M520-MS            |        |        | ⊗      | ⊗      | ⊗      | ⊗      |        |        | ⊗      | ⊗      | ⊗                                              | 12,43 | 5,00 | 2,0  | -   |

⊗ First choice | Primeira opção | 1ª opción

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

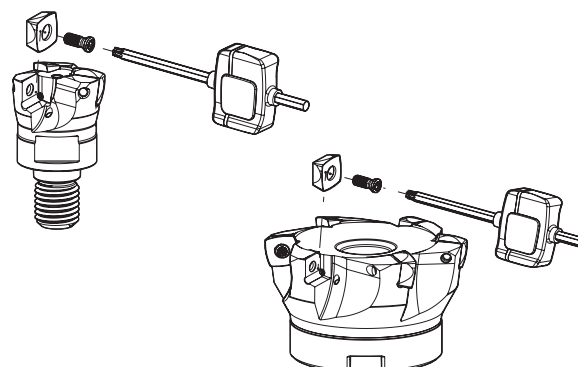
⊗ Stock available until sold out | Stock disponível até acabar o stock | Stock disponible hasta acabar el stock

Insert order code = (1) Geometry Code + (2) Grade Code

## SPARE PARTS || Complementos | Repuestos

| Cutter<br>ØDc    | Order separately |            |                 |              |                 |
|------------------|------------------|------------|-----------------|--------------|-----------------|
|                  | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value | Retaining Screw |
| R06690 - 32 - 42 | P0401200         | XT15       | DT1530          | 3            | -               |
| A06690 - 50 - 80 | P0401200         | XT15       | DT1530          | 3            | -               |
| A06690 - 100     | P0401200         | XT15       | DT1530          | 3            | D1603500        |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.





# GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades                                                                            |                                                                                   |                                                                                     |                                                                                     |
|-----|-----|-----------------------------------|-----------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|     |     |                                   |                 | ← Wear Resistance                                                                 |                                                                                   | Toughness →                                                                         |                                                                                     |
|     |     |                                   |                 | PHP910                                                                            | PHP920                                                                            | PHH930                                                                              | PH7740                                                                              |
|     |     |                                   |                 |  |  |  |  |
| P   | 1   | Unalloyed Steel                   | 125-220         | ✓                                                                                 | ✓                                                                                 |                                                                                     | ✓                                                                                   |
|     | 2   | Low-Alloyed Steel                 | 220-280         | ✓                                                                                 | ✓                                                                                 |                                                                                     | ✓                                                                                   |
|     | 3   | High-Alloyed Steel                | 280-380         | ✓                                                                                 | ✓                                                                                 |                                                                                     | ✓                                                                                   |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                                                                                   |                                                                                   | ✓                                                                                   | ✓                                                                                   |
|     | 5   | SS - Austenitic                   | 200-330         |                                                                                   |                                                                                   | ✓                                                                                   | ✓                                                                                   |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                                                                                   |                                                                                   | ✓                                                                                   | ✓                                                                                   |
| K   | 7   | Malleable Cast Iron               | 130-230         | ✓                                                                                 | ✓                                                                                 |                                                                                     | ✓                                                                                   |
|     | 8   | Grey Cast Iron                    | 180-245         | ✓                                                                                 | ✓                                                                                 |                                                                                     | ✓                                                                                   |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓                                                                                 | ✓                                                                                 |                                                                                     | ✓                                                                                   |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                                                                                   |                                                                                   | ✓                                                                                   | ✓                                                                                   |

 Good Conditions  
 Average Conditions  
 Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |             |         | Feed fz (mm/t) |           |           |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|-------------|---------|----------------|-----------|-----------|
|     |     |                                   |                 | ← Wear Resistance |         | Toughness → |         | SOEW S         | SOEW MD   | SOET MS   |
|     |     |                                   |                 | PHP910            | PHP920  | PHH930      | PH7740  |                |           |           |
| P   | 1   | Unalloyed Steel                   | 125-220         | 180-250           | 180-250 | -           | 140-200 | 0,50-2,10      | 0,50-2,20 | 0,50-2,10 |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 160-240           | 160-230 | -           | 130-180 | 0,50-2,10      | 0,50-2,20 | -         |
|     | 3   | High-Alloyed Steel                | 280-380         | 140-230           | 140-220 | -           | 100-170 | 0,50-2,00      | 0,50-2,10 | -         |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | 140-210     | 130-180 | -              | -         | 0,50-1,80 |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | 120-170     | 110-160 | -              | -         | 0,50-1,80 |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | 100-150     | 90-150  | -              | -         | 0,50-1,50 |
| K   | 7   | Malleable Cast Iron               | 130-230         | 180-300           | 160-270 | -           | 140-220 | 0,50-2,10      | 0,50-2,20 | 0,50-2,10 |
|     | 8   | Grey Cast Iron                    | 180-245         | 160-250           | 140-250 | -           | 120-210 | 0,50-2,10      | 0,50-2,20 | -         |
|     | 9   | Nodular Cast iron                 | 160-250         | 150-210           | 120-210 | -           | 100-190 | 0,50-2,10      | 0,50-2,20 | -         |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       | 30-110      | 30-100  | -              | -         | 0,40-1,30 |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

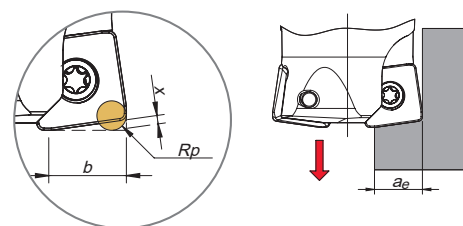
- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra-apanas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | SOEW-MD                  | SOEW-S               |
|     | 2   | Low-Alloyed Steel                 | 220-280         | SOEW-MD                  | SOEW-S               |
|     | 3   | High-Alloyed Steel                | 280-380         | SOEW-MD                  | SOEW-S               |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | SOET-MS                  | -                    |
|     | 5   | SS - Austenitic                   | 200-330         | SOET-MS                  | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | SOET-MS                  | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230         | SOET-MS                  | SOEW-S               |
|     | 8   | Grey Cast Iron                    | 180-245         | SOEW-MD                  | SOEW-S               |
|     | 9   | Nodular Cast iron                 | 160-250         | SOEW-MD                  | SOEW-S               |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | SOET-MS                  | -                    |

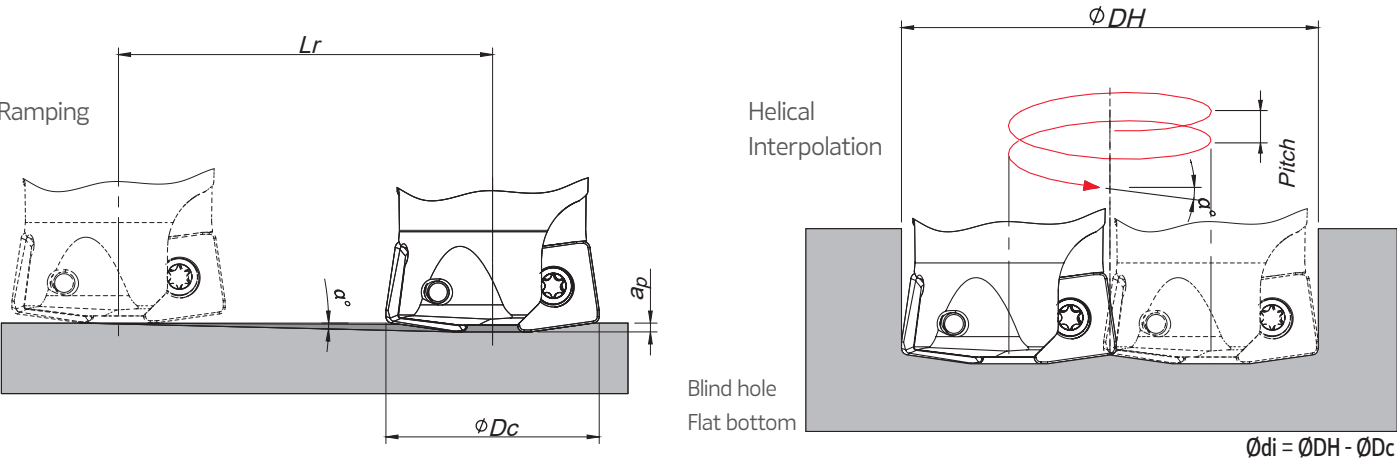
## PROGRAMMING DATA | Dados para programação | Datos para la programación

| Insert       | Programming Data |     |      |      |
|--------------|------------------|-----|------|------|
|              | Rp               | X   | b    | ae   |
| SO... 13M5.. | 2,5              | 1,1 | 10,5 | 10,0 |



RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular

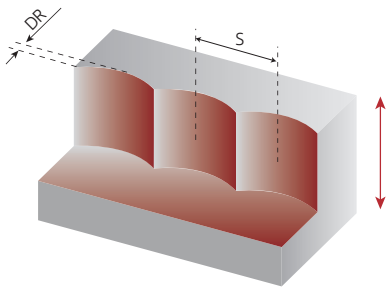


| $\phi Dc$ | Ramping            |           |           | Helical Interpolation |                 |                |
|-----------|--------------------|-----------|-----------|-----------------------|-----------------|----------------|
|           | Max Ramp $a^\circ$ | Max $a_p$ | Min $L_r$ | $\phi DH_{min}$       | $\phi DH_{max}$ | Max Pitch/Rev. |
| 32        | 10,0               | 1,5       | 6,0       | 43<br>-               | -<br>62,0       | 6<br>16        |
| 35        | 9,0                | 1,5       | 9,5       | 49<br>-               | -<br>68,0       | 6<br>16        |
| 42        | 6,4                | 1,5       | 13,4      | 63<br>-               | -<br>82,0       | 7<br>14        |
| 50        | 4,3                | 1,5       | 19,9      | 79<br>-               | -<br>98,0       | 6<br>11        |
| 52        | 4,0                | 1,5       | 21,5      | 83<br>-               | -<br>102,0      | 6<br>10        |
| 63        | 3,0                | 1,5       | 28,6      | 105<br>-              | -<br>124,0      | 6<br>10        |
| 66        | 2,6                | 1,5       | 33,0      | 111<br>-              | -<br>130,0      | 6<br>9         |
| 80        | 2,0                | 1,5       | 43,0      | 139<br>-              | -<br>158,0      | 6<br>8         |
| 100       | 1,0                | 1,5       | 85,9      | 179<br>-              | -<br>198,0      | 4<br>5         |

Note: During helical interpolation do not exceed max Pitch.

PLUNGING | Mergulho | Plunge

| L≤3Dc                 | L>3Dc     | S max.                                     |
|-----------------------|-----------|--------------------------------------------|
| f <sub>z</sub> (mm/t) |           |                                            |
| 0,10-0,20             | 0,07-0,14 | $S_{max} = \sqrt{D_C \cdot DR \cdot DR^2}$ |



| S max and DR corresponding cutting diameter Dc (mm) |         |      |      |      |      |      |      |      |
|-----------------------------------------------------|---------|------|------|------|------|------|------|------|
| DR (mm)                                             | Dc (mm) |      |      |      |      |      |      |      |
|                                                     | 32      | 35   | 42   | 50   | 52   | 63   | 66   | 80   |
| 1,0                                                 | 5,6     | 5,8  | 6,4  | 7,0  | 7,1  | 7,9  | 8,1  | 8,9  |
| 2,0                                                 | 7,7     | 8,1  | 8,9  | 9,8  | 10,0 | 11,0 | 11,3 | 12,5 |
| 3,0                                                 | 9,3     | 9,8  | 10,8 | 11,9 | 12,1 | 13,4 | 13,7 | 15,2 |
| 4,0                                                 | 10,6    | 11,1 | 12,3 | 13,6 | 13,9 | 15,4 | 15,7 | 17,4 |
| 5,0                                                 | 11,6    | 12,2 | 13,6 | 15,0 | 15,3 | 17,0 | 17,5 | 19,4 |
| 6,0                                                 | 12,5    | 13,2 | 14,7 | 16,2 | 16,6 | 18,5 | 19,0 | 21,1 |
| 7,0                                                 | 13,2    | 14,0 | 15,7 | 17,3 | 17,7 | 19,8 | 20,3 | 22,6 |
| 8,0                                                 | 13,9    | 14,7 | 16,5 | 18,3 | 18,8 | 21,0 | 21,5 | 24,0 |
| 9,0                                                 | 14,4    | 15,3 | 17,2 | 19,2 | 19,7 | 22,0 | 22,6 | 25,3 |
| 10,0                                                | 14,8    | 15,8 | 17,9 | 20,2 | 20,5 | 23,0 | 23,7 | 26,5 |

Note: Recommended for L ≤ 4 Dc for extra long tool this step and side cut must be reduced.



A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

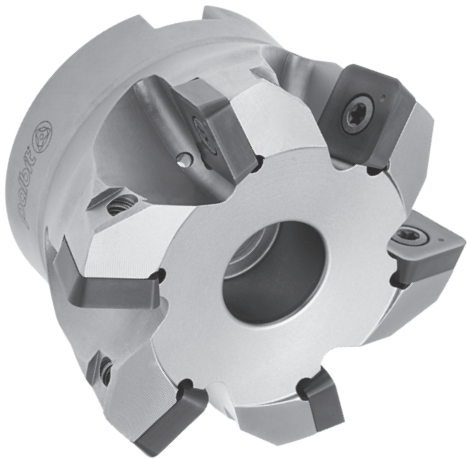
Center & Chamfer

Spot face

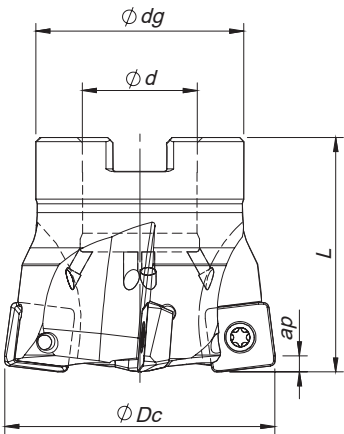
Spare Parts

Technical Data

End Mills



Arbor Mounting  
 $K_r=15^\circ$  |  $\gamma_p=+2^\circ$  |  $R_p=4,5$



| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |                 |                  |    | Kg    | Specifications |               | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|-----------------|------------------|----|-------|----------------|---------------|-------------------------------|-------|
|                      |                                       |    | $\varnothing Dc$                          | $\varnothing d$ | $\varnothing dg$ | L  |       | Ap max<br>(mm) | Arbor<br>Type |                               |       |
| 181100400            | 063A06815-05-02-027050                | 5  | 63                                        | 27              | 48               | 50 | 0,460 | 3,50           | A             | SO...1605...                  |       |
| 181081900            | 066A06815-05-02-027050                | 5  | 66                                        | 27              | 48               | 50 | 0,500 | 3,50           | A             | SO...1605...                  |       |
| 181082000            | 080A06815-06-02-027050                | 6  | 80                                        | 27              | 60               | 50 | 0,900 | 3,50           | A             | SO...1605...                  |       |
| 181082100            | 100A06815-08-02-032050                | 8  | 100                                       | 32              | 80               | 50 | 1,600 | 3,50           | B             | SO...1605...                  |       |
| 181082200            | 125A06815-10-02-040063                | 10 | 125                                       | 40              | 90               | 63 | 2,900 | 3,50           | B             | SO...1605...                  |       |
| 181082300            | 160A06815-12-02-U040063               | 12 | 160                                       | 40              | 110              | 63 | 4,400 | 3,50           | C             | SO...1605...                  |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

SO...1605... || Inserts | Pastilhas | Plaquetas

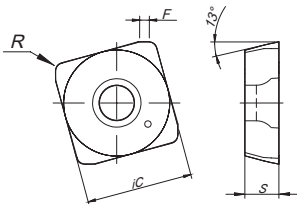
SOEW



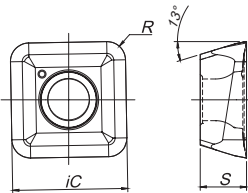
SOET



SOEW



SOET



|                                    |                  | P     |        |       |        |        | M     |        |        | K     |        |       |        |        | S     |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |      |
|------------------------------------|------------------|-------|--------|-------|--------|--------|-------|--------|--------|-------|--------|-------|--------|--------|-------|--------|------------------------------------------------|------|------|------|
|                                    |                  | PVD   |        |       |        |        | PVD   |        |        | PVD   |        |       |        |        | PVD   |        |                                                |      |      |      |
|                                    |                  | X5    | G1     | T1    | G4     | G6     | X9    | P3     | G6     | X5    | G1     | T1    | G4     | G6     | X9    | G6     |                                                |      |      |      |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference | PH910 | PH7910 | PH920 | PH7920 | PH7740 | PH930 | PH7930 | PH7740 | PH910 | PH7910 | PH920 | PH7920 | PH7740 | PH930 | PH7740 | iC                                             | S    | R    | F    |
| 1111907                            | SOEW 160512 S    |       |        |       |        |        |       |        |        |       |        |       |        |        |       |        | 16,40                                          | 5,26 | 1,20 | 1,50 |
| 1112221                            | SOET 160520-MS   |       |        |       |        |        |       |        |        |       |        |       |        |        |       |        | 16,40                                          | 5,26 | 2,00 | -    |

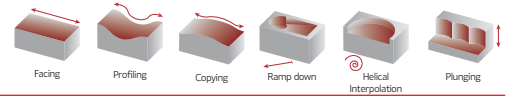
First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

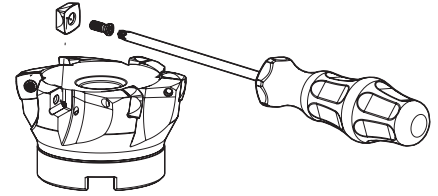
Insert order code = (1) Geometry Code + (2) Grade Code

Stock available until sold out | Stock disponível até acabar o stock | Stock disponible hasta acabar el stock



## SPARE PARTS || Complementos | Repuestos

| Cutter<br>ØDc  | Order separately |            |                 |              | Order separately |                 |
|----------------|------------------|------------|-----------------|--------------|------------------|-----------------|
|                | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value | Screw            | DIN 6368 Wrench |
| A06815 - 63-80 | P0501302         | PT20       | DT2050          | 5,0          | -                | -               |
| A06815 - 100   | P0501302         | PT20       | DT2050          | 5,0          | J0123510         | SD6368-12       |
| A06815 - 125   | P0501302         | PT20       | DT2050          | 5,0          | J0164110         | SD6368-16       |
| A06815 - 160   | P0501302         | PT20       | DT2050          | 5,0          | -                | -               |



Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.

## GRADES SELECTION GUIDE || Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades            |        |             |        |
|-----|-----|-----------------------------------|-----------------|-------------------|--------|-------------|--------|
|     |     |                                   |                 | ← Wear Resistance |        | Toughness → |        |
|     |     |                                   |                 | PHP910            | PHP920 | PHH930      | PH7740 |
| P   | 1   | Unalloyed Steel                   | 125-220         | ✓                 | ✓      |             | ✓      |
|     | 2   | Low-Alloyed Steel                 | 220-280         | ✓                 | ✓      |             | ✓      |
|     | 3   | High-Alloyed Steel                | 280-380         | ✓                 | ✓      |             | ✓      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                   |        | ✓           | ✓      |
|     | 5   | SS - Austenitic                   | 200-330         |                   |        | ✓           | ✓      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                   |        | ✓           | ✓      |
| K   | 7   | Malleable Cast Iron               | 130-230         | ✓                 | ✓      |             | ✓      |
|     | 8   | Grey Cast Iron                    | 180-245         | ✓                 | ✓      |             | ✓      |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓                 | ✓      |             | ✓      |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                   |        | ✓           | ✓      |

Good Conditions  
 Average Conditions  
 Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |             |         | Feed fz (mm/t) |            |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|-------------|---------|----------------|------------|
|     |     |                                   |                 | ← Wear Resistance |         | Toughness → |         | SOEW S...      | SOET MS... |
|     |     |                                   |                 | PHP910            | PHP920  | PHH930      | PH7740  |                |            |
| P   | 1   | Unalloyed Steel                   | 125-220         | 180-250           | 180-250 | -           | 140-200 | 0,50-2,10      | 0,50-2,20  |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 160-240           | 160-230 | -           | 130-180 | 0,50-2,10      | 0,50-2,20  |
|     | 3   | High-Alloyed Steel                | 280-380         | 140-230           | 140-220 | -           | 100-170 | 0,50-2,00      | 0,50-1,80  |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | 140-210     | 130-180 | -              | 0,50-1,80  |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | 120-170     | 110-160 | -              | 0,50-1,80  |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | 100-150     | 90-150  | -              | 0,50-1,50  |
| K   | 7   | Malleable Cast Iron               | 130-230         | 180-300           | 160-270 | -           | 140-220 | 0,50-2,10      | 0,50-2,00  |
|     | 8   | Grey Cast Iron                    | 180-245         | 160-250           | 140-250 | -           | 120-210 | 0,50-2,10      | 0,50-2,00  |
|     | 9   | Nodular Cast iron                 | 160-250         | 150-210           | 120-210 | -           | 100-190 | 0,50-2,10      | 0,50-1,80  |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       | 30-110      | 30-100  | -              | 0,40-1,30  |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:  
 - When using long shank;  
 - When using long tool overhang with arbor type;  
 - When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) PH5... and PH8... can be used wet or dry. PH7... use only air.

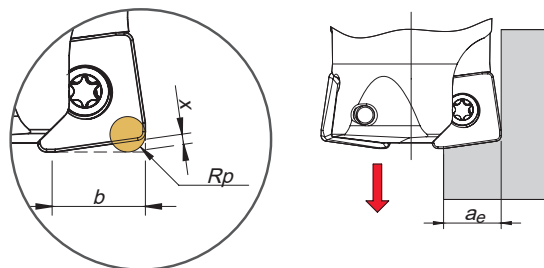
(Note 4) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:  
 - When using long shank;  
 - When using long tool overhang with arbor type;  
 - When application has poor clamping rigidity or when using a low rigidity machine.

## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra- aparas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB (Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|--------------|--------------------------|----------------------|
|     |     |                                   |              | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220      | SOET 16...               | SOEW 16...           |
|     | 2   | Low-Alloyed Steel                 | 220-280      | SOEW 16...               | -                    |
|     | 3   | High-Alloyed Steel                | 280-380      | SOEW 16...               | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      | SOET 16...               | -                    |
|     | 5   | SS - Austenitic                   | 200-330      | SOET 16...               | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      | SOET 16...               | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230      | SOET 16...               | SOEW 16...           |
|     | 8   | Grey Cast Iron                    | 180-245      | SOEW 16...               | -                    |
|     | 9   | Nodular Cast iron                 | 160-250      | SOEW 16...               | -                    |
| S   | 11  | Heat Resistant Super Alloys       | 200-320      | SOET 16...               | -                    |

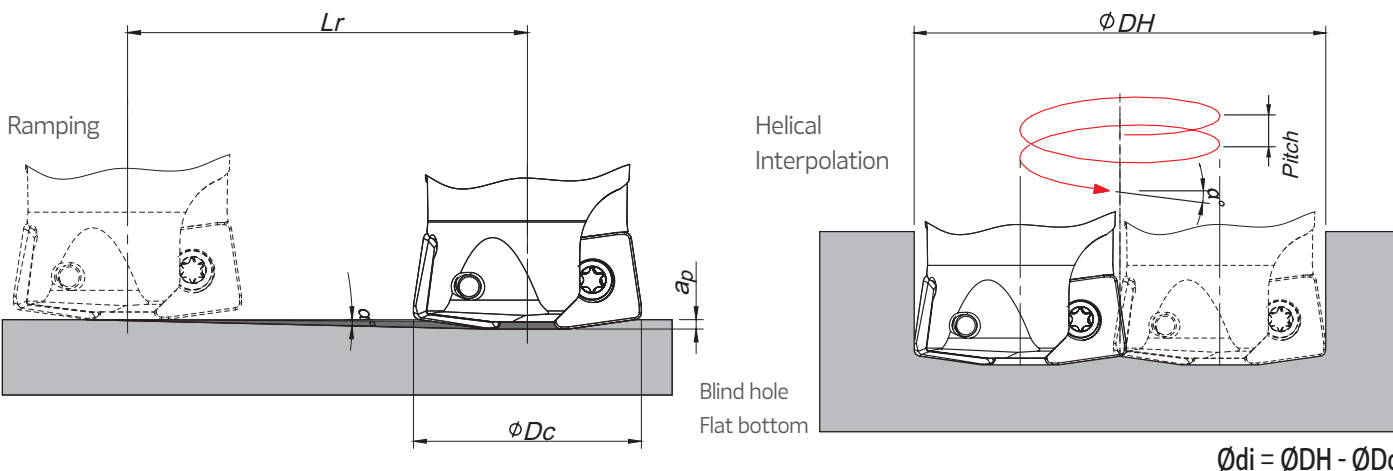
## PROGRAMMING DATA | Dados para programação | Datos para la programación

| Insert       | Programming Data |     |      |      |
|--------------|------------------|-----|------|------|
|              | Rp               | X   | b    | ae   |
| SO... 1605.. | 4,5              | 2,3 | 13,5 | 12,8 |



## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular



$$\varnothing di = \varnothing DH - \varnothing Dc$$

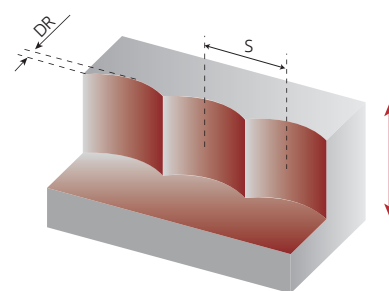
| $\varnothing Dc$ | Ramping            |           |           | Helical Interpolation  |                        |                |
|------------------|--------------------|-----------|-----------|------------------------|------------------------|----------------|
|                  | Max Ramp $a^\circ$ | Max $a_p$ | Min $L_r$ | $\varnothing DH_{min}$ | $\varnothing DH_{max}$ | Max Pitch/Rev. |
| 63               | 3,5                | 3,5       | 80,2      | 99,0                   | -                      | 6              |
|                  |                    |           |           | -                      | 123,6                  | 11             |
| 66               | 3,0                | 3,5       | 66,8      | 105                    | -                      | 6              |
|                  |                    |           |           | -                      | 129,6                  | 10             |
| 80               | 2,0                | 3,5       | 100,2     | 133                    | -                      | 5              |
|                  |                    |           |           | -                      | 157,5                  | 8              |
| 100              | 1,5                | 3,5       | 133,7     | 173                    | -                      | 6              |
|                  |                    |           |           | -                      | 197,5                  | 8              |
| 125              | 1,0                | 3,5       | 200,5     | 223                    | -                      | 5              |
|                  |                    |           |           | -                      | 247,5                  | 6              |
| 160              | 0,5                | 3,5       | 401,1     | 293                    | -                      | 3              |
|                  |                    |           |           | -                      | 317,5                  | 4              |

Note: During helical interpolation do not exceed max Pitch.



# PLUNGING | Mergulho | Plunge

| L≤3Dc                 | L>3Dc     | S max.                                    |
|-----------------------|-----------|-------------------------------------------|
| f <sub>z</sub> (mm/t) |           |                                           |
| 0,10-0,20             | 0,07-0,14 | S <sub>max</sub> = √DC.DR-DR <sup>2</sup> |

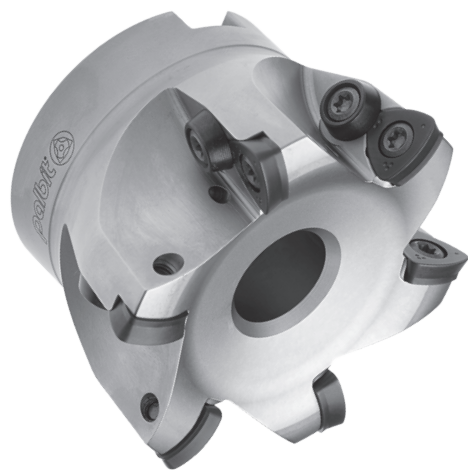


| S max and DR corresponding cutting diameter Dc (mm) |         |      |
|-----------------------------------------------------|---------|------|
| DR (mm)                                             | Dc (mm) |      |
|                                                     | 66      | 80   |
| 1,0                                                 | 8,1     | 8,9  |
| 2,0                                                 | 11,3    | 12,5 |
| 3,0                                                 | 13,7    | 15,2 |
| 4,0                                                 | 15,7    | 17,4 |
| 5,0                                                 | 17,5    | 19,4 |
| 6,0                                                 | 19,0    | 21,1 |
| 7,0                                                 | 20,3    | 22,6 |
| 8,0                                                 | 21,5    | 24,0 |
| 9,0                                                 | 22,6    | 25,3 |
| 10,0                                                | 23,7    | 26,5 |
| 11,0                                                | 24,6    | 27,5 |
| 12,0                                                | 25,5    | 28,6 |

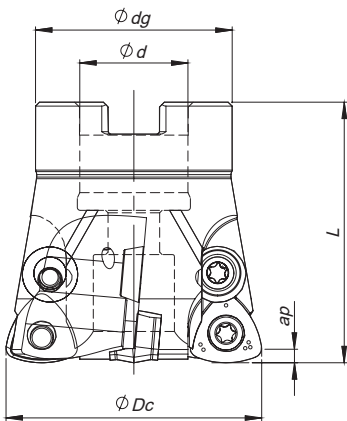
Note: Recommended for  $L \leq 4 D_c$  for extra long tool this step and side cut must be reduced.



# HIFEED 50560



Arbor Mounting  
 $\gamma_p = +5^\circ$  |  $R_p = 3,2$



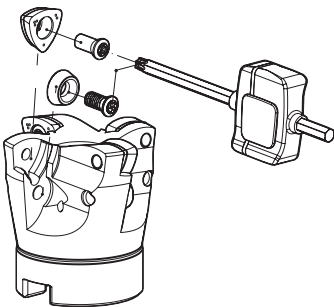
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg    | Specifications |            | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----------|----|-------|----------------|------------|-------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi d$ | $\phi dg$ | L  |       | Ap max (mm)    | Arbor Type |                               |       |
| 181020800            | 052C50560-04-05-022053                | 4 | 52                                        | 22       | 40        | 53 | 0,390 | 1,5            | A          | WD... 1204...                 |       |
| 181020200            | 066C50560-05-05-027053                | 5 | 66                                        | 27       | 48        | 53 | 0,640 | 1,5            | A          | WD... 1204...                 |       |
| 181020300            | 080C50560-06-05-027053                | 6 | 80                                        | 27       | 60        | 53 | 1,060 | 1,5            | A          | WD... 1204...                 |       |
| 181172400            | 063C50560-05-05-027053                | 5 | 63                                        | 27       | 48        | 53 | 0,59  | 1,5            | A          | WD... 1204...                 |       |

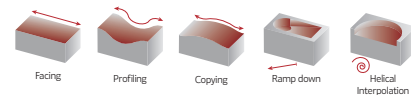
Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

## SPARE PARTS | Complementos | Repuestos

| ScrewCutter<br>$\phi Dc$ | Order separately |            |                    |              | Order separately |              |
|--------------------------|------------------|------------|--------------------|--------------|------------------|--------------|
|                          | Insert Screw     | Key (Torx) | Key<br>(Torx - Nm) | Torque Value | Washer           | Washer Screw |
| A50560 - 52 - 80         |                  |            |                    |              |                  |              |
|                          | P0451001         | XT20       | DT2050             | 5,0          | HC01200          | P0451001     |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



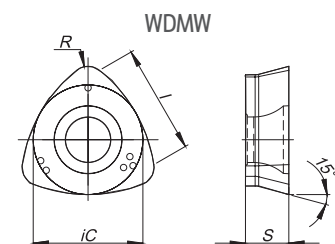
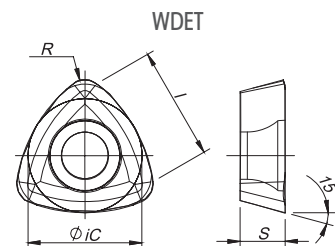


## WD... 1204... || Inserts | Pastilhas | Plaquetas

WDET



WDMW



|                                    |                  | P                                                                                   |                                                                                     |                                                                                     | M                                                                                   |                                                                                     | K                                                                                   |                                                                                     | S                                                                                   |                                                                                      | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |      |
|------------------------------------|------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------|------|------|------|
|                                    |                  | PVD                                                                                 |                                                                                     |                                                                                     | PVD                                                                                 |                                                                                     | PVD                                                                                 |                                                                                     | PVD                                                                                 |                                                                                      |                                                |      |      |      |
|                                    |                  | G4                                                                                  | P3                                                                                  | G6                                                                                  | P3                                                                                  | G6                                                                                  | G4                                                                                  | G6                                                                                  | P3                                                                                  | G6                                                                                   |                                                |      |      |      |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference | PH7920                                                                              | PH7930                                                                              | PH7740                                                                              | PH7930                                                                              | PH7740                                                                              | PH7920                                                                              | PH7740                                                                              | PH7930                                                                              | PH7740                                                                               | iC                                             | S    | I    | R    |
| 1112148                            | WDET 120420-MS   |                                                                                     |  |  |  |  |                                                                                     |                                                                                     |  |  | 12,00                                          | 4,76 | 11,9 | 2,00 |
| 1111123                            | WDMW 120420-T    |  |                                                                                     |  |                                                                                     |                                                                                     |  |  |                                                                                     |                                                                                      | 12,00                                          | 4,76 | 11,9 | 2,00 |

⊗ First choice | Primeira opção | 1ª opción

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

## GRADES SELECTION GUIDE || Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades            |        |             |        |
|-----|-----|-----------------------------------|-----------------|-------------------|--------|-------------|--------|
|     |     |                                   |                 | ← Wear Resistance |        | Toughness → |        |
|     |     |                                   |                 | PH7910            | PH7920 | PH7930      | PH7740 |
|     |     |                                   |                 | ●                 | ●      | ●           | ●      |
| P   | 1   | Unalloyed Steel                   | 125-220         | ✓                 | ✓      | ✓           | ✓      |
|     | 2   | Low-Alloyed Steel                 | 220-280         | ✓                 | ✓      | ✓           | ✓      |
|     | 3   | High-Alloyed Steel                | 280-380         | ✓                 | ✓      | ✓           | ✓      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                   |        | ✓           | ✓      |
|     | 5   | SS - Austenitic                   | 200-330         |                   |        | ✓           | ✓      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                   |        | ✓           | ✓      |
| K   | 7   | Malleable Cast Iron               | 130-230         | ✓                 | ✓      | ✓           | ✓      |
|     | 8   | Grey Cast Iron                    | 180-245         | ✓                 | ✓      | ✓           | ✓      |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓                 | ✓      | ✓           | ✓      |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                   |        | ✓           | ✓      |

● Good Conditions  
● Average Conditions  
● Difficult Conditions



## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |             |         | Feed fz (mm/t) |            |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|-------------|---------|----------------|------------|
|     |     |                                   |                 | ← Wear Resistance |         | Toughness → |         | WDMW 12...     | WDET 12... |
|     |     |                                   |                 | PH7910            | PH7920  | PH7930      | PH7740  |                |            |
| P   | 1   | Unalloyed Steel                   | 125-220         | 180-250           | 180-240 | 160-220     | 140-200 | 0,30-1,50      | 0,30-1,30  |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 160-230           | 160-220 | 140-200     | 130-180 | 0,30-1,50      | 0,30-1,30  |
|     | 3   | High-Alloyed Steel                | 280-380         | 140-220           | 140-210 | 120-190     | 100-170 | 0,30-1,30      | 0,30-1,00  |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                   |         | 140-200     | 130-180 | -              | 0,30-1,30  |
|     | 5   | SS - Austenitic                   | 200-330         |                   |         | 120-160     | 110-160 | -              | 0,30-1,30  |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                   |         | 100-140     | 90-150  | -              | 0,30-1,00  |
| K   | 7   | Malleable Cast Iron               | 130-230         | 180-300           | 160-260 |             | 140-220 | 0,30-1,50      | -          |
|     | 8   | Grey Cast Iron                    | 180-245         | 160-250           | 140-240 |             | 120-210 | 0,30-1,50      | -          |
|     | 9   | Nodular Cast iron                 | 160-250         | 150-200           | 120-200 |             | 100-190 | 0,30-1,40      | -          |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       | 30-100      | 30-100  | -              | 0,30-1,00  |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

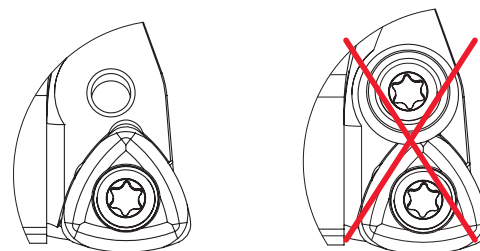
- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) PH5... and PH8... can be used wet or dry. PH7... use only air.

(Note 4) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

When using WDET insert, please remove the washer and the washer screw, otherwise it will break the insert.

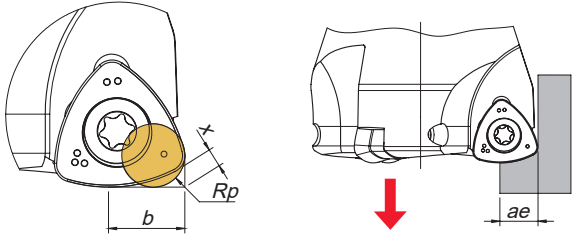


## CHIP-BREAKER SELECTION GUIDE || Guia para aplicações do quebra- aparas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | WDET 12...               | WDMW 12...           |
|     | 2   | Low-Alloyed Steel                 | 220-280         | WDMW 12...               | -                    |
|     | 3   | High-Alloyed Steel                | 280-380         | WDMW 12...               | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | WDET 12...               | -                    |
|     | 5   | SS - Austenitic                   | 200-330         | WDET 12...               | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | WDET 12...               | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230         | WDMW 12...               | -                    |
|     | 8   | Grey Cast Iron                    | 180-245         | WDMW 12...               | -                    |
|     | 9   | Nodular Cast iron                 | 160-250         | WDMW 12...               | -                    |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | WDET 12...               | -                    |

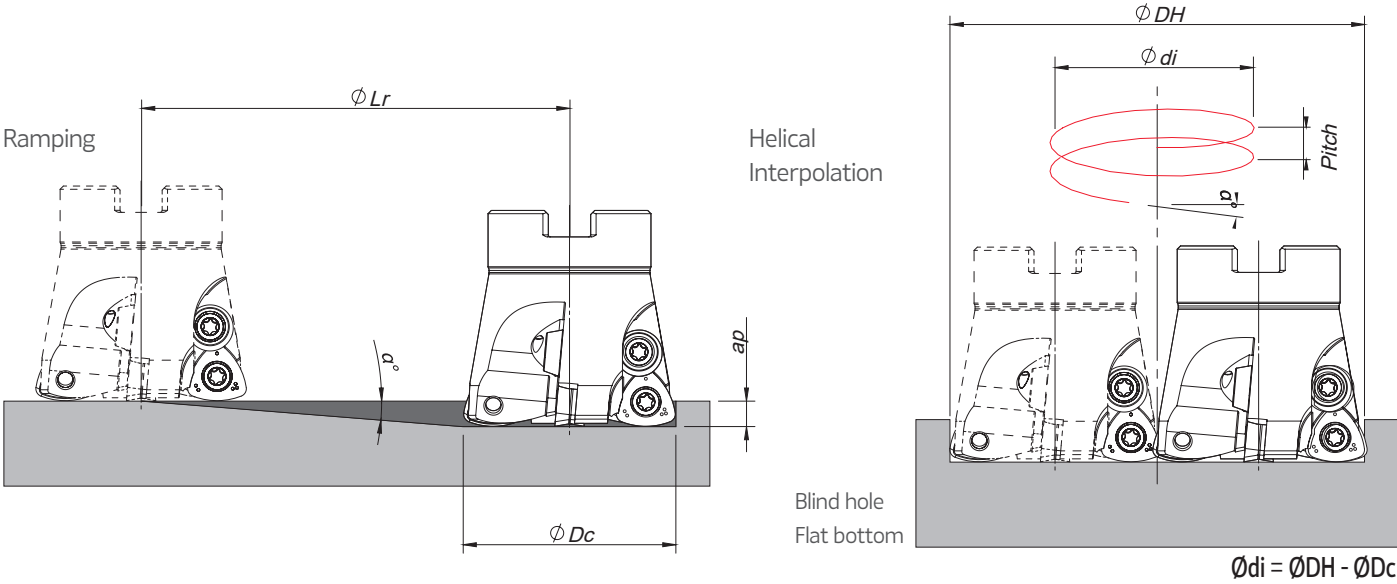
PROGRAMMING DATA | Dados para programação | Datos para la programación

| Insert     | Programming Data |     |     |     |
|------------|------------------|-----|-----|-----|
|            | Rp               | x   | b   | ae  |
| WD... 1204 | 3,2              | 0,7 | 7,2 | 7,0 |



RAMPING AND HELICAL INTERPOLATION

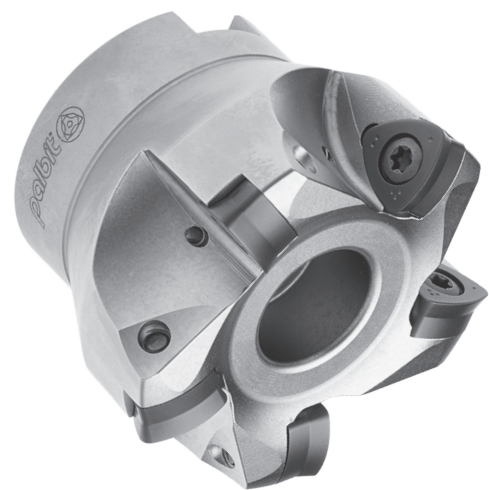
Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular



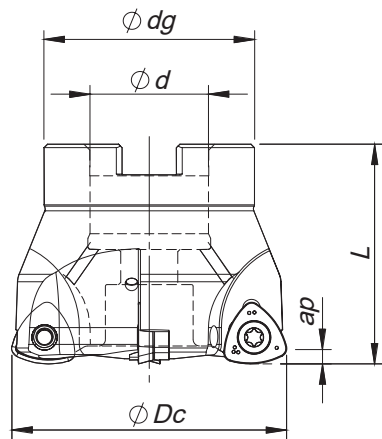
| ØDc | Ramping     |        |        | Helical Interpolation |            |                |
|-----|-------------|--------|--------|-----------------------|------------|----------------|
|     | Max Ramp a° | Max ap | Min Lr | ØDHmin                | ØDHmax     | Max Pitch/Rev. |
| 52  | 0,8         | 1,5    | 107,4  | 89,6<br>-             | -<br>102,0 | 1<br>2         |
| 66  | 0,4         | 1,5    | 214,9  | 117,6<br>-            | -<br>130,0 | 1<br>1         |
| 80  | 0,3         | 1,5    | 286,5  | 145,6<br>-            | -<br>158,0 | 1<br>1         |

Note: During helical interpolation do not exceed max Pitch.

# HIFEED 50060



Arbor Mounting  
 $\gamma_p=0^\circ$  |  $R_p=3,5$

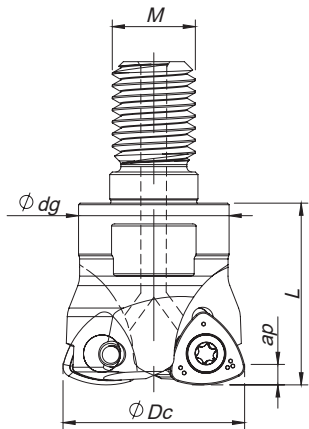


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg    | Specifications    |               | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----------|----|-------|-------------------|---------------|-------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi d$ | $\phi dg$ | L  |       | $A_p$ max<br>(mm) | Arbor<br>Type |                               |       |
| 181020400            | 052A50060-03-022045                   | 3 | 52                                        | 22       | 40        | 45 | 0,320 | 1,8               | A             | WN... 1207                    |       |
| 181033900            | 063A50060-04-027050                   | 4 | 63                                        | 27       | 48        | 50 | 0,547 | 1,8               | A             | WN... 1207                    |       |
| 181028700            | 066A50060-04-027050                   | 4 | 66                                        | 27       | 48        | 50 | 0,597 | 1,8               | A             | WN... 1207                    |       |
| 181035900            | 066A50060-05-027050                   | 5 | 66                                        | 27       | 48        | 50 | 0,610 | 1,8               | A             | WN... 1207                    |       |
| 181020100            | 080A50060-05-027050                   | 5 | 80                                        | 27       | 60        | 50 | 1,000 | 1,8               | A             | WN... 1207                    |       |

Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

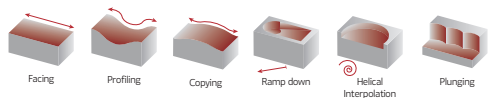


Threaded Coupling  
 $\gamma_p=0^\circ$  |  $R_p=3,5$



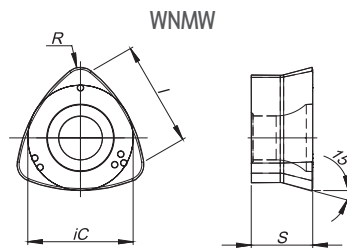
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg    | Specifications    |  | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----------|----|-------|-------------------|--|-------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi M$ | $\phi dg$ | L  |       | $A_p$ max<br>(mm) |  |                               |       |
| 181039000            | 035R50060-02-M16035                   | 2 | 35                                        | M16      | 29        | 35 | 0,166 | 1,8               |  | WN... 1207                    |       |

Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)



## WNMW 1207 | Inserts | Pastilhas | Plaquitas

WNMW



|                         |                  | P                                                                                 |                                                                                   |                                                                                   |                                                                                   | K                                                                                   |                                                                                     | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |       |      |
|-------------------------|------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------|------|-------|------|
|                         |                  | PVD                                                                               |                                                                                   |                                                                                   |                                                                                   | PVD                                                                                 |                                                                                     |                                                |      |       |      |
|                         |                  | (2) Grade code                                                                    | G1                                                                                | G4                                                                                | 78                                                                                | 86                                                                                  | G1                                                                                  |                                                |      |       |      |
| (1)<br>Geometry<br>code | ISO<br>Reference | PH7910                                                                            | PH7920                                                                            | PH6125                                                                            | PH6135                                                                            | PH7910                                                                              | PH7920                                                                              | iC                                             | S    | I     | R    |
| 1121148                 | WNMW 1207-SP     |  |  |  |  |  |  | 12,00                                          | 7,00 | 11,90 | 2,00 |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

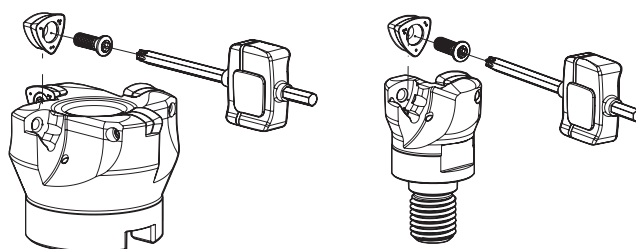
Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc    | Insert Screw | Key (Torx) | Order separately |              |
|------------------|--------------|------------|------------------|--------------|
|                  |              |            | Key (Torx - Nm)  | Torque Value |
| R50060 - 35      | P0451400     | XT20       | DT2050           | 5,0          |
| A50060 - 52 - 80 | P0451400     | XT20       | DT2050           | 5,0          |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material            | HB<br>(Brinell) | Grades            |        |             |        |
|-----|-----|---------------------|-----------------|-------------------|--------|-------------|--------|
|     |     |                     |                 | ← Wear Resistance |        | Toughness → |        |
|     |     |                     |                 | PH7910            | PH7920 | PH6125      | PH6135 |
| P   | 1   | Unalloyed Steel     | 125-220         |                   |        |             |        |
|     | 2   | Low-Alloyed Steel   | 220-280         |                   |        |             |        |
|     | 3   | High-Alloyed Steel  | 280-380         |                   |        |             |        |
| K   | 7   | Malleable Cast Iron | 130-230         |                   |        |             |        |
|     | 8   | Grey Cast Iron      | 180-245         |                   |        |             |        |
|     | 9   | Nodular Cast iron   | 160-250         |                   |        |             |        |

Good Conditions  
 Average Conditions  
 Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material            | HB<br>(Brinell) | Vc (m/min)        |         |             |         | Feed fz (mm/t) |
|-----|-----|---------------------|-----------------|-------------------|---------|-------------|---------|----------------|
|     |     |                     |                 | ← Wear Resistance |         | Toughness → |         |                |
|     |     |                     |                 | PH7910            | PH7920  | PH6125      | PH6135  | WNMW 12...     |
| P   | 1   | Unalloyed Steel     | 125-220         | 180-250           | 180-240 | 160-190     | 150-180 | 0,30-1,50      |
|     | 2   | Low-Alloyed Steel   | 220-280         | 160-230           | 160-220 | 140-180     | 140-170 | 0,30-1,50      |
|     | 3   | High-Alloyed Steel  | 280-380         | 140-220           | 140-210 | 130-160     | 120-150 | 0,30-1,30      |
| K   | 7   | Malleable Cast Iron | 130-230         | 180-300           | 160-260 | -           | -       | 0,30-1,50      |
|     | 8   | Grey Cast Iron      | 180-245         | 160-250           | 140-240 | -           | -       | 0,30-1,50      |
|     | 9   | Nodular Cast iron   | 160-250         | 150-200           | 120-200 | -           | -       | 0,30-1,40      |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

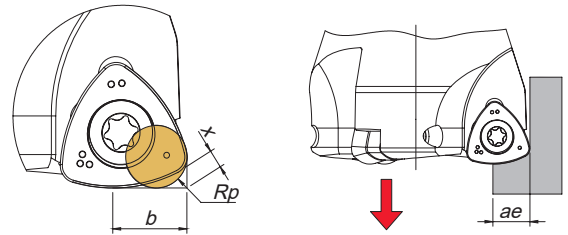
(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) PH5... and PH8... can be used wet or dry. PH7... use only air.

## PROGRAMMING DATA | Dados para programação | Datos para la programación

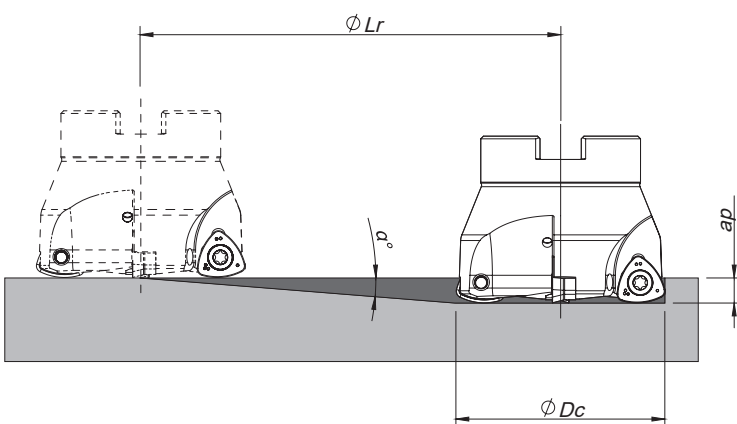
| Insert  | Programming Data |     |     |                |
|---------|------------------|-----|-----|----------------|
|         | Rp               | X   | b   | a <sub>e</sub> |
| WNMW 12 | 3,5              | 0,9 | 8,4 | 8,0            |





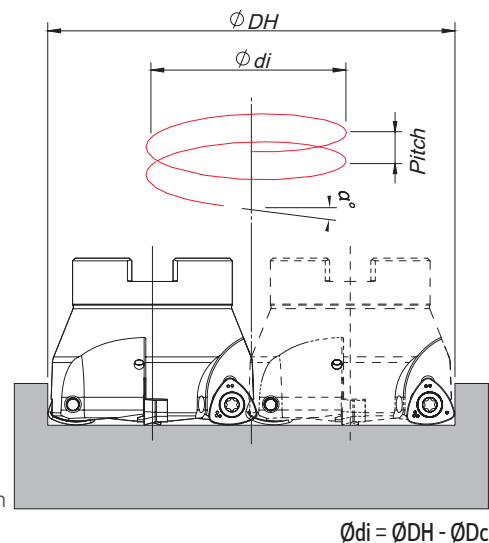
## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular



Helical Interpolation

Blind hole  
Flat bottom



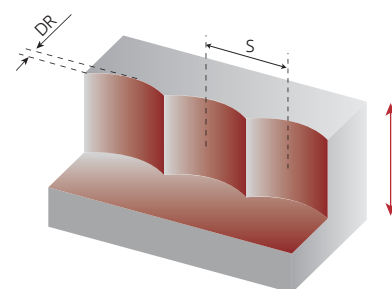
$$\phi di = \phi DH - \phi Dc$$

| $\phi Dc$ | Ramping            |           |           | Helical Interpolation |                 |                |
|-----------|--------------------|-----------|-----------|-----------------------|-----------------|----------------|
|           | Max Ramp $a^\circ$ | Max $a_p$ | Min $L_r$ | $\phi DH_{min}$       | $\phi DH_{max}$ | Max Pitch/Rev. |
| 35        | 3,0                | 1,8       | 34,3      | 53,2<br>-             | -<br>68,0       | 2<br>5         |
| 52        | 1,8                | 1,8       | 57,3      | 87,2<br>-             | -<br>102,0      | 3<br>4         |
| 63        | 1,2                | 1,8       | 85,9      | 109,2<br>-            | -<br>124,0      | 3<br>4         |
| 66        | 1,0                | 1,8       | 114,6     | 115,2<br>-            | -<br>130,0      | 3<br>3         |
| 80        | 0,9                | 1,8       | 114,6     | 143,0<br>-            | -<br>158,0      | 3<br>3         |

Note: During helical interpolation do not exceed max Pitch.

## PLUNGING | Mergulho | Plunge

| L≤3Dc                 | L>3Dc     | S max.                                    |
|-----------------------|-----------|-------------------------------------------|
| f <sub>z</sub> (mm/t) |           |                                           |
| 0,10-0,20             | 0,07-0,14 | S <sub>max</sub> = √DC.DR-DR <sup>2</sup> |



| S max and DR corresponding cutting diameter Dc (mm) |         |      |      |      |      |
|-----------------------------------------------------|---------|------|------|------|------|
| DR (mm)                                             | Dc (mm) |      |      |      |      |
|                                                     | 35      | 52   | 63   | 66   | 80   |
| 1,0                                                 | 5,8     | 7,1  | 7,9  | 8,1  | 8,9  |
| 2,0                                                 | 8,1     | 10,0 | 11,0 | 11,3 | 12,5 |
| 3,0                                                 | 9,8     | 12,1 | 13,4 | 13,7 | 15,2 |
| 4,0                                                 | 11,1    | 13,9 | 15,4 | 15,7 | 17,4 |
| 5,0                                                 | 12,2    | 15,3 | 17,0 | 17,5 | 19,4 |
| 6,0                                                 | 13,2    | 16,6 | 18,5 | 19,0 | 21,1 |
| 7,0                                                 | 14,0    | 17,7 | 19,8 | 20,3 | 22,6 |
| 8,0                                                 | 14,7    | 18,8 | 21,0 | 21,5 | 24,0 |

Note: Recommended for  $L \leq 4 Dc$ , for  $L > 4 Dc$  steps must be reduced to 40%.

# HIFEED 06590

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center &amp; Chamfer

Spot face

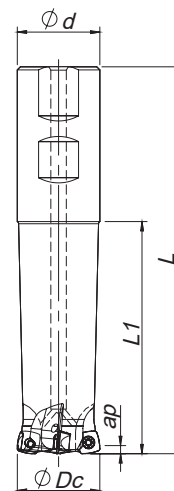
Spare Parts

Technical Data

End Mills



## Weldon Shank

 $\gamma_p = +5^\circ$  |  $R_p = 1,8$ 


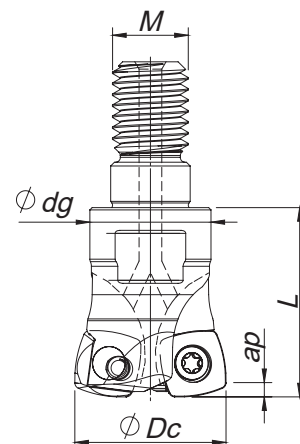
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |     | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|-----|-------|----------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1  |       | Ap max<br>(mm) |                               |       |
| 181047600            | 020W06590-02-05-020130                | 2 | 20                                        | 20 | 130 | 75  | 0,250 | 1,2            | SP... 08T3...                 | ⊗     |
| 181047900            | 020W06590-02-05-020190                | 2 | 20                                        | 20 | 190 | 110 | 0,380 | 1,2            | SP... 08T3...                 | ⊗     |
| 181047700            | 025W06590-03-05-025140                | 3 | 25                                        | 25 | 140 | 80  | 0,431 | 1,2            | SP... 08T3...                 | ⊗     |
| 181048000            | 025W06590-03-05-025200                | 3 | 25                                        | 25 | 200 | 130 | 0,611 | 1,2            | SP... 08T3...                 | ⊗     |
| 181047800            | 032W06590-04-05-032150                | 4 | 32                                        | 32 | 150 | 90  | 0,780 | 1,2            | SP... 08T3...                 | ⊗     |
| 181048100            | 032W06590-04-05-032200                | 4 | 32                                        | 32 | 200 | 130 | 1,040 | 1,2            | SP... 08T3...                 | ⊗     |

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)



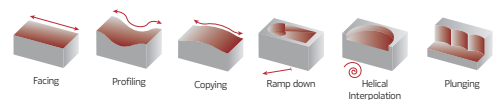
## Threaded Coupling

 $\gamma_p = +5^\circ$  |  $R_p = 1,8$ 


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |     |     |    | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----|-----|----|-------|----------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | ØM  | Ødg | L  |       | Ap max<br>(mm) |                               |       |
| 181031100            | 020R06590-02-05-M10025                | 2 | 20                                        | M10 | 16  | 25 | 0,040 | 1,2            | SP... 08T3...                 | ⊗     |
| 181029400            | 025R06590-03-05-M12028                | 3 | 25                                        | M12 | 21  | 28 | 0,071 | 1,2            | SP... 08T3...                 | ⊗     |
| 181029600            | 032R06590-04-05-M16035                | 4 | 32                                        | M16 | 29  | 35 | 0,162 | 1,2            | SP... 08T3...                 | ⊗     |
| 181045800            | 035R06590-04-05-M16035                | 4 | 35                                        | M16 | 29  | 35 | 0,176 | 1,2            | SP... 08T3...                 | ⊗     |
| 181031000            | 042R06590-05-05-M16035                | 5 | 42                                        | M16 | 29  | 35 | 0,215 | 1,2            | SP... 08T3...                 | ⊗     |

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

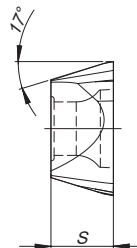
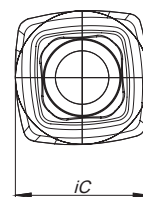


## SP..08T3... || Inserts | Pastilhas | Plaquetas

SPKW

SPKT

SPKW | SPKT



|                                 |                           | P      | M      | K      | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |
|---------------------------------|---------------------------|--------|--------|--------|------------------------------------------------|------|
|                                 |                           | PVD    | PVD    | PVD    |                                                |      |
|                                 | <sup>(2)</sup> Grade code | 68     | 68     | 68     |                                                |      |
| <sup>(1)</sup><br>Geometry code | ISO<br>Reference          | PH6920 | PH6920 | PH6920 | iC                                             | S    |
| 1111364                         | SPKW 08T308-E             |        |        |        | 8,50                                           | 3,97 |
| 1121227                         | SPKW 08T308-S             |        |        |        | 8,50                                           | 3,97 |
| 1111314                         | SPKT 08T308-E             |        |        |        | 8,50                                           | 3,97 |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

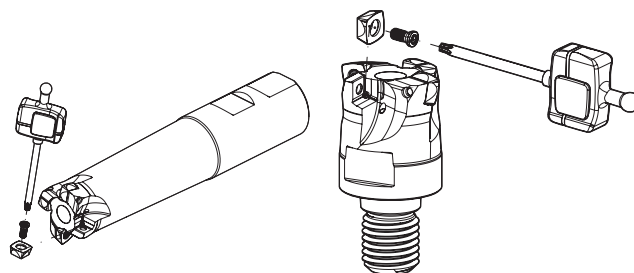
Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

## SPARE PARTS || Complementos | Repuestos

| Cutter<br>ØDc    | Insert Screw | Key (Torx) | Order separately   |              |
|------------------|--------------|------------|--------------------|--------------|
|                  |              |            | Key<br>(Torx - Nm) | Torque Value |
| W06590 - 20 - 32 | P0300800     | XT09       | DT0914             | 1,4          |
| R06590 - 20 - 42 | P0300800     | XT09       | DT0914             | 1,4          |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min) | Feed fz (mm/t) |
|-----|-----|-----------------------------------|-----------------|------------|----------------|
|     |     |                                   |                 | PH6920     | SP ... 08T308  |
| P   | 1   | Unalloyed Steel                   | 125-220         | 150-230    | 0,30-1,50      |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 140-220    | 0,30-1,50      |
|     | 3   | High-Alloyed Steel                | 280-380         | 130-180    | 0,30-1,30      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | 120-160    | 0,30-1,40      |
|     | 5   | SS - Austenitic                   | 200-330         | 100-150    | 0,30-1,40      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | 70-110     | 0,30-1,20      |
| K   | 7   | Malleable Cast Iron               | 130-230         | 150-280    | 0,30-1,50      |
|     | 8   | Grey Cast Iron                    | 180-245         | 130-230    | 0,30-1,50      |
|     | 9   | Nodular Cast iron                 | 160-250         | 80-190     | 0,30-1,40      |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) Use only air.

(Note 4) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

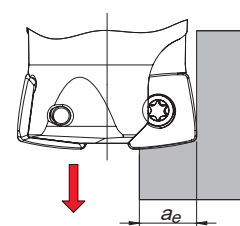
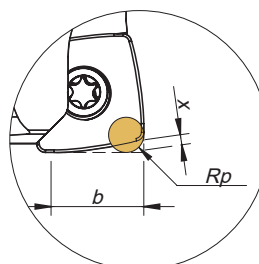
- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

## CHIP-BREAKER SELECTION GUIDE || Guia para aplicações do quebra- aparas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | SPKT 08...               | SPKW 08...           |
|     | 2   | Low-Alloyed Steel                 | 220-280         | SPKW 08...               | -                    |
|     | 3   | High-Alloyed Steel                | 280-380         | SPKW 08...               | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | SPKT 08...               | -                    |
|     | 5   | SS - Austenitic                   | 200-330         | SPKT 08...               | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | SPKW 08...               | SPKW 08...           |
| K   | 7   | Malleable Cast Iron               | 130-230         | SPKT 08...               | SPKW 08...           |
|     | 8   | Grey Cast Iron                    | 180-245         | SPKW 08...               | -                    |
|     | 9   | Nodular Cast iron                 | 160-250         | SPKW 08...               | -                    |

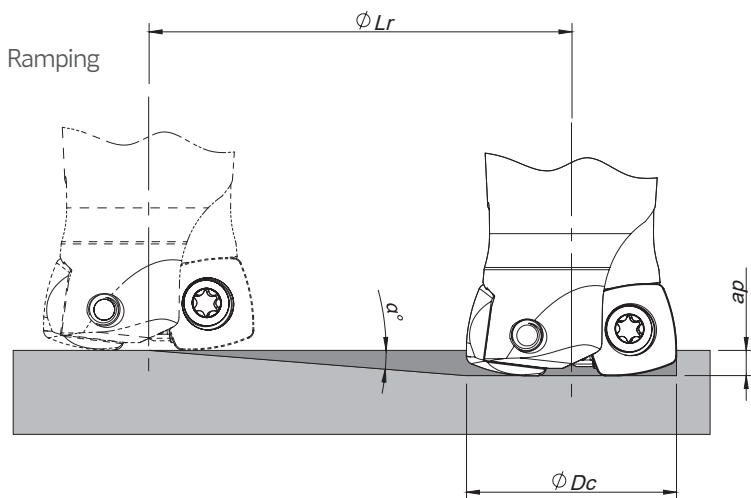
## PROGRAMMING DATA || Dados para programação | Datos para la programación

| Insert        | Programming Data |     |     |       |
|---------------|------------------|-----|-----|-------|
|               | Rp               | X   | b   | $a_e$ |
| SP... 08T3... | 1,9              | 0,7 | 5,6 | 6,6   |



## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular



Helical Interpolation

Blind hole  
Flat bottom

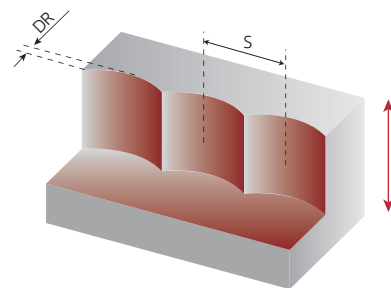
$$\phi di = \phi DH - \phi Dc$$

| $\phi Dc$ | Ramping                 |          |          | Helical Interpolation |                 |                |
|-----------|-------------------------|----------|----------|-----------------------|-----------------|----------------|
|           | Max Ramp $\alpha^\circ$ | Max $ap$ | Min $Lr$ | $\phi DH_{min}$       | $\phi DH_{max}$ | Max Pitch/Rev. |
| 20        | 0,5                     | 1,2      | 137,5    | 27,8<br>-             | -<br>38,0       | 0,2<br>0,5     |
| 25        | 1                       | 1,2      | 68,7     | 37,8<br>-             | -<br>48,0       | 0,7<br>1,2     |
| 32        | 1,4                     | 1,2      | 49,1     | 51,8<br>-             | -<br>62,0       | 1,5<br>2,3     |
| 35        | 1,1                     | 1,2      | 62,5     | 57,8<br>-             | -<br>68,0       | 1,3<br>2,0     |
| 42        | 0,9                     | 1,2      | 76,4     | 71,8<br>-             | -<br>82,0       | 1,4<br>1,9     |

Note: During helical interpolation do not exceed max Pitch.

## PLUNGING | Mergulho | Plunge

| L≤3Dc                 | L>3Dc     | S max.                                      |
|-----------------------|-----------|---------------------------------------------|
| f <sub>z</sub> (mm/t) |           |                                             |
| 0,08-0,15             | 0,05-0,10 | S <sub>max</sub> = √DC·Dr - Dr <sup>2</sup> |



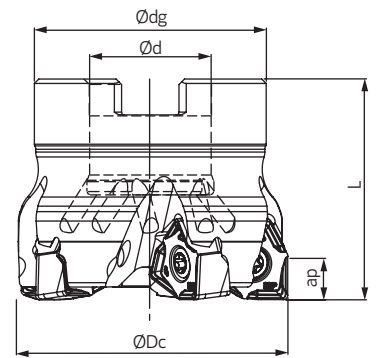
| S max and DR corresponding cutting diameter Dc (mm) |         |      |      |      |      |
|-----------------------------------------------------|---------|------|------|------|------|
| DR (mm)                                             | Dc (mm) |      |      |      |      |
|                                                     | 20      | 25   | 32   | 35   | 42   |
| 1,0                                                 | 4,4     | 4,9  | 5,6  | 5,8  | 6,4  |
| 2,0                                                 | 6,0     | 6,8  | 7,7  | 8,1  | 8,9  |
| 3,0                                                 | 7,1     | 8,1  | 9,3  | 9,8  | 10,8 |
| 4,0                                                 | 8,0     | 9,2  | 10,6 | 11,1 | 12,3 |
| 5,0                                                 | 8,7     | 10,0 | 11,6 | 12,2 | 13,6 |
| 6,0                                                 | 9,2     | 10,7 | 12,5 | 13,2 | 14,7 |

Note: Recommended for  $L \leq 4 Dc$  for extra long tool this step and side cut must be reduced.



## Arbor Mounting

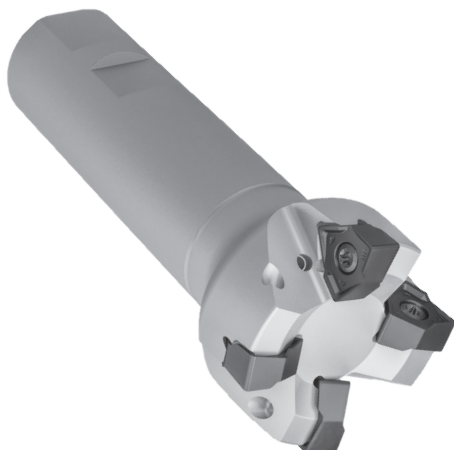
$K_r = 90^\circ$  |  $\gamma_p = -6^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg   | Specifications |             | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|----|-----|----|------|----------------|-------------|-------------------------------|-------|
|                      |                                       |    | ØDc                                       | Ød | Ødg | L  |      | Arbor Type     | Ap max (mm) |                               |       |
| 181174900            | 040A49590-03-06-016040                | 3  | 40                                        | 16 | 32  | 40 | 0,15 | A              | 7,5         | WNXT 0806...                  |       |
| 181175000            | 040A49590-04-06-016040                | 4  | 40                                        | 16 | 32  | 40 | 0,13 | A              | 7,5         | WNXT 0806...                  |       |
| 181173400            | 050A49590-04-06-022040                | 4  | 50                                        | 22 | 42  | 40 | 0,39 | A              | 7,5         | WNXT 0806...                  |       |
| 181165600            | 050A49590-05-06-022040                | 5  | 50                                        | 22 | 42  | 40 | 0,38 | A              | 7,5         | WNXT 0806...                  |       |
| 181173500            | 063A49590-05-06-022040                | 5  | 63                                        | 22 | 52  | 40 | 0,5  | A              | 7,5         | WNXT 0806...                  |       |
| 181173600            | 063A49590-06-06-022040                | 6  | 63                                        | 22 | 52  | 40 | 0,49 | A              | 7,5         | WNXT 0806...                  |       |
| 181173700            | 080A49590-07-06-027050                | 7  | 80                                        | 27 | 60  | 50 | 1,18 | B              | 7,5         | WNXT 0806...                  |       |
| 181173800            | 080A49590-09-06-027050                | 9  | 80                                        | 27 | 60  | 50 | 1,16 | B              | 7,5         | WNXT 0806...                  |       |
| 181173900            | 100A49590-08-06-032050                | 8  | 100                                       | 32 | 80  | 50 | 1,62 | B              | 7,5         | WNXT 0806...                  |       |
| 181174000            | 100A49590-11-06-032050                | 11 | 100                                       | 32 | 80  | 50 | 1,55 | B              | 7,5         | WNXT 0806...                  |       |
| 181174100            | 125A49590-11-06-040063                | 11 | 125                                       | 40 | 90  | 63 | 2,82 | B              | 7,5         | WNXT 0806...                  |       |
| 181174200            | 125A49590-14-06-040063                | 14 | 125                                       | 40 | 90  | 63 | 2,76 | B              | 7,5         | WNXT 0806...                  |       |

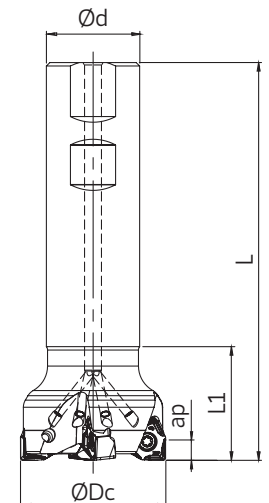
Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta  
Disponível bajo consulta



## Weldon Shank

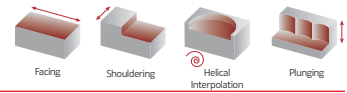
$K_r = 90^\circ$  |  $\gamma_p = -6^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg   | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|------|----------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1 |      | ap max (mm)    |                               |       |
| 181174300            | 032W49590-02-06-032125                | 2 | 32                                        | 32 | 125 | 40 | 0,65 | 7,5            | WNXT 0806...                  |       |
| 181174400            | 032W49590-03-06-032125                | 3 | 32                                        | 32 | 125 | 40 | 0,60 | 7,5            | WNXT 0806...                  |       |
| 181174500            | 040W49590-03-06-032130                | 3 | 40                                        | 32 | 130 | 40 | 0,70 | 7,5            | WNXT 0806...                  |       |
| 181174600            | 040W49590-04-06-032130                | 4 | 40                                        | 32 | 130 | 40 | 0,65 | 7,5            | WNXT 0806...                  |       |
| 181174700            | 050W49590-04-06-032140                | 4 | 50                                        | 32 | 140 | 45 | 0,86 | 7,5            | WNXT 0806...                  |       |
| 181174800            | 050W49590-05-06-032140                | 5 | 50                                        | 32 | 140 | 45 | 0,81 | 7,5            | WNXT 0806...                  |       |

Stock item | Produto de stock | Itens de stock

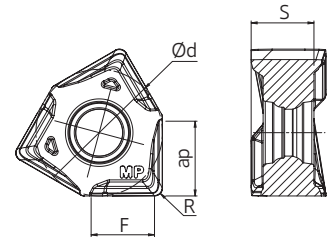
Available under request | Disponível sobre consulta  
Disponível bajo consulta



WNXT | Inserts | Pastilhas | Plaquitas

WNXT

NEW



|                                 |                                       | P      |        | K      |        | Dimensions   Dimensões   Dimensiones (mm) |     |     |     |
|---------------------------------|---------------------------------------|--------|--------|--------|--------|-------------------------------------------|-----|-----|-----|
|                                 |                                       | PVD    |        | PVD    |        |                                           |     |     |     |
|                                 |                                       | T1     | P4     | T1     | P4     |                                           |     |     |     |
| <sup>(1)</sup><br>Geometry code | Reference<br>Referência<br>Referencia | PHP920 | PHP930 | PHP920 | PHP930 | iC                                        | S   | R   | F   |
| 1113000                         | WNXT 080608 PNSR-MP                   |        |        |        |        | 12,7                                      | 6,3 | 0,8 | 4,1 |

First choice | Primeira opção | 1ª opción

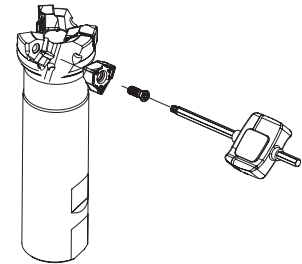
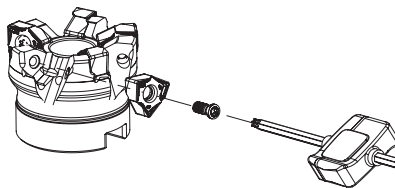
Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta  
 Disponible bajo consulta

Insert order code = (1) Geometry Code + (2) Grade Code

SPARE PARTS Complementos | Repuestos

| Cutter<br>ØDc    | Insert Screw<br> | Key (Torx)<br> | Key<br>(Torx - Nm)<br> | Torque Value<br> | Screw<br> | DIN 6368<br>Wrench<br> | Retaining<br>Screw<br> |
|------------------|------------------|----------------|------------------------|------------------|-----------|------------------------|------------------------|
| W49590 - 32 - 50 | P0401200         | XT15           | DT1530                 | 3,0              | -         | -                      | -                      |
| A49590 - 40      | P0401200         | XT15           | DT1530                 | 3,0              | -         | -                      | 290087600              |
| A49590 - 50 - 63 | P0401200         | XT15           | DT1530                 | 3,0              | -         | -                      | -                      |
| A49590 - 80      | P0401200         | XT15           | DT1530                 | 3,0              | J0123510  | SD6368-12              | -                      |
| A49590 - 100     | P0401200         | PT15           | DT1530                 | 3,0              | J0164110  | SD6368-16              | -                      |
| A49590 - 125     | P0401200         | PT15           | DT1530                 | 3,0              | J0204610  | SD6368-20              | -                      |



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material            | HB (Brinell) | Grades                      |                       |
|-----|-----|---------------------|--------------|-----------------------------|-----------------------|
|     |     |                     |              | ← Wear Resistance<br>PHP920 | Toughness →<br>PHP930 |
| P   | 1   | Unalloyed Steel     | 125-220      | ✓                           | ✓                     |
|     | 2   | Low-Alloyed Steel   | 220-280      | ✓                           | ✓                     |
|     | 3   | High-Alloyed Steel  | 280-380      | ✓                           | ✓                     |
| K   | 7   | Malleable Cast Iron | 130-230      | ✓                           | ✓                     |
|     | 8   | Grey Cast Iron      | 180-245      | ✓                           | ✓                     |
|     | 9   | Nodular Cast iron   | 160-250      | ✓                           | ✓                     |

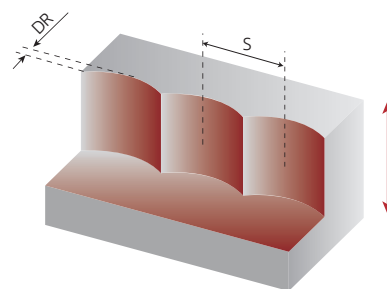


## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material            | HB (Brinell) | Vc (m/min)                  |                       | Feed fz (mm/t) |
|-----|-----|---------------------|--------------|-----------------------------|-----------------------|----------------|
|     |     |                     |              | ← Wear Resistance<br>PHP920 | Toughness →<br>PHP930 |                |
| P   | 1   | Unalloyed Steel     | 125-220      | 180-250                     | 160-230               | 0,08 - 0,25    |
|     | 2   | Low-Alloyed Steel   | 220-280      | 160-230                     | 140-210               | 0,08 - 0,25    |
|     | 3   | High-Alloyed Steel  | 280-380      | 140-220                     | 120-200               | 0,08 - 0,20    |
| K   | 7   | Malleable Cast Iron | 130-230      | 130-230                     | 150-250               | 0,08 - 0,25    |
|     | 8   | Grey Cast Iron      | 180-245      | 180-245                     | 140-230               | 0,08 - 0,25    |
|     | 9   | Nodular Cast iron   | 160-250      | 120-210                     | 100-200               | 0,08 - 0,20    |

## PLUNGING | Mergulho | Plunge

| L≤3Dc                 | L>3Dc     | S max.                                |
|-----------------------|-----------|---------------------------------------|
| f <sub>z</sub> (mm/t) |           |                                       |
| 0,10-0,15             | 0,08-0,12 | $S_{max} = \sqrt{DC \cdot Dr - Dr^2}$ |



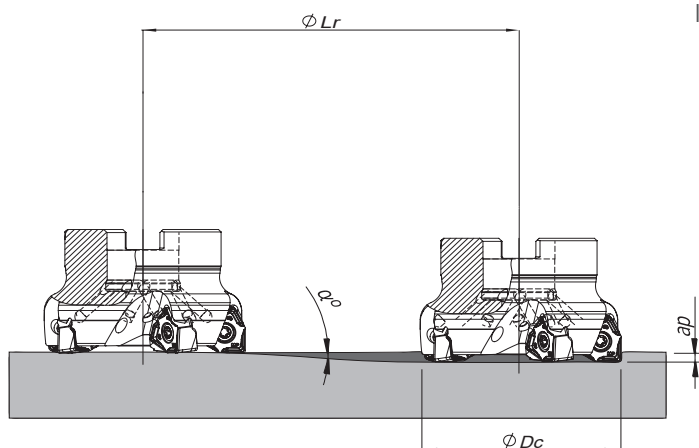
| S max and DR corresponding cutting diameter Dc (mm) |         |      |      |      |      |      |      |
|-----------------------------------------------------|---------|------|------|------|------|------|------|
| DR (mm)                                             | Dc (mm) |      |      |      |      |      |      |
|                                                     | 32      | 40   | 50   | 63   | 80   | 100  | 125  |
| 1,0                                                 | 5,6     | 6,2  | 7,0  | 7,9  | 8,9  | 9,9  | 11,1 |
| 2,0                                                 | 7,7     | 8,7  | 9,8  | 11,0 | 12,5 | 14,0 | 15,7 |
| 3,0                                                 | 9,3     | 10,5 | 11,9 | 13,4 | 15,2 | 17,1 | 19,1 |
| 4,0                                                 | 10,6    | 12,0 | 13,6 | 15,4 | 17,4 | 19,6 | 22,0 |



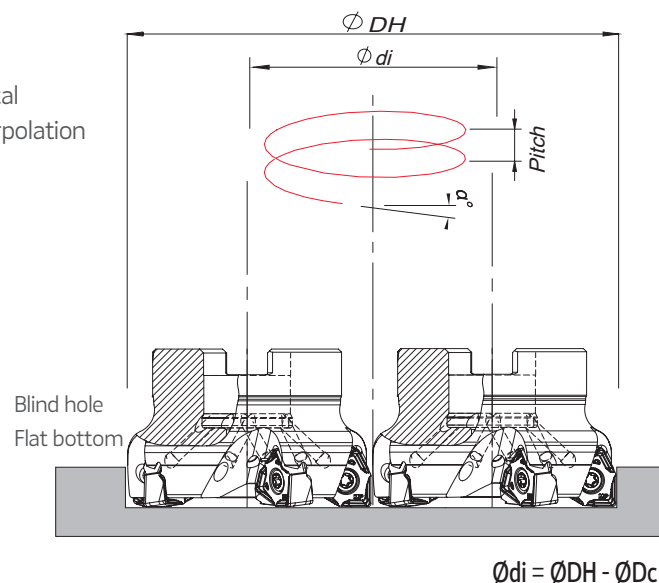
## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular

### Ramping



### Helical Interpolation



| $\phi Dc$ | Ramping            |           |        | Helical Interpolation |                 |                |
|-----------|--------------------|-----------|--------|-----------------------|-----------------|----------------|
|           | Max Ramp $a^\circ$ | Max $a_p$ | Min Lr | $\phi DH_{min}$       | $\phi DH_{max}$ | Max Pitch/Rev. |
| 32        | 4,0                | 7,5       | 107,3  | 52<br>-               | -<br>62         | 4,3<br>6,6     |
| 40        | 3,8                | 7,5       | 112,9  | 68<br>-               | -<br>78         | 5,8<br>8       |
| 50        | 3,5                | 7,5       | 122,6  | 88<br>-               | -<br>98         | 7,3<br>9,2     |
| 63        | 3,5                | 7,5       | 122,6  | 114<br>-              | -<br>124        | 9<br>11,7      |
| 80        | 3,0                | 7,5       | 143,1  | 148<br>-              | -<br>158        | 11,1<br>12,9   |
| 100       | 2,1                | 7,5       | 204,5  | 188<br>-              | -<br>198        | 10,1<br>11,3   |
| 125       | 1,4                | 7,5       | 306,9  | 238<br>-              | -<br>248        | 8,6<br>9,4     |

Note: During helical interpolation do not exceed max Pitch.

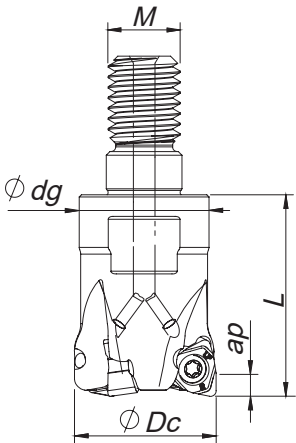
(\*) Down cutting is recommended, tool pass rotation should be counter-clockwise.

(\*) In case of ramping and helical interpolation, apply 70% or less feed ( $f_z$ ) from recommended cutting conditions table.





Threaded Coupling  
 $K_r = 90^\circ$  |  $\gamma_p = -7^\circ$



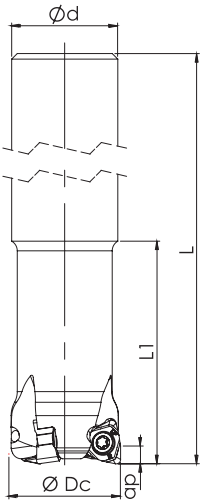
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |     |     |    | Kg    | Specification | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----|-----|----|-------|---------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | M   | Ødg | L  |       | Ap max (mm)   |                               |       |
| 181136000            | 016R49090-02-07-M08023                | 2 | 16                                        | M08 | 13  | 23 | 0,023 | 3,00          | WNHU 04T308-LP                |       |
| 181128300            | 020R49090-03-07-M10028                | 3 | 20                                        | M10 | 18  | 28 | 0,052 | 3,00          | WNHU 04T308-LP                |       |
| 181110900            | 025R49090-04-07-M12030                | 4 | 25                                        | M12 | 21  | 30 | 0,078 | 3,00          | WNHU 04T308-LP                |       |
| 181128400            | 032R49090-05-07-M16035                | 5 | 32                                        | M16 | 29  | 35 | 0,150 | 3,00          | WNHU 04T308-LP                |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)



Cylindrical Shank  
 $K_r = 90^\circ$  |  $\gamma_p = -7^\circ$



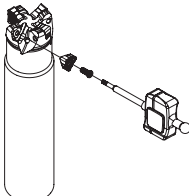
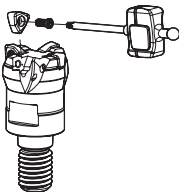
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg    | Specification | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|-------|---------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1 |       | Ap max (mm)   |                               |       |
| 181136100            | 016E49090-02-07-U015150               | 2 | 16                                        | 15 | 150 | 32 | 0,185 | 3,00          | WNHU 04T308-LP                |       |
| 181136200            | 020E49090-03-07-U019150               | 3 | 20                                        | 19 | 150 | 40 | 0,292 | 3,00          | WNHU 04T308-LP                |       |
| 181136300            | 025E49090-04-07-U024150               | 4 | 25                                        | 24 | 150 | 50 | 0,471 | 3,00          | WNHU 04T308-LP                |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

SPARE PARTS | Complementos | Repuestos

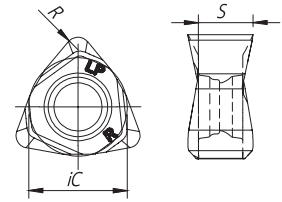
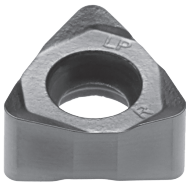
| Cutter<br>ØDc  | Order separately |            |                 |              |
|----------------|------------------|------------|-----------------|--------------|
|                | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value |
| R49090 - 20-32 | P0250704         | XT08       | DT0812          | 1,2          |
| E49090 - 16-25 | P0250704         | XT08       | DT0812          | 1,2          |



Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



WNHU 04T308 | Inserts | Pastilhas | Plaquitas



|                                    |                     | P                         |        |        | K      |        |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |
|------------------------------------|---------------------|---------------------------|--------|--------|--------|--------|--------|------------------------------------------------|------|------|
|                                    |                     | PVD                       |        |        | PVD    |        |        |                                                |      |      |
|                                    |                     | <sup>(2)</sup> Grade code | X5     | T1     | P4     | X5     | T1     |                                                |      |      |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference    | PHP910                    | PHP920 | PHP930 | PHP910 | PHP920 | PHP930 | iC                                             | S    | R    |
| 1112277                            | WNHU 04T308 PNER-LP |                           |        |        |        |        |        | 6,35                                           | 3,50 | 0,80 |

First choice | Primeira opção | 1ª opción Stock item | Produto de stock | Itens de stock Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9) Insert order code = (1) Geometry Code + (2) Grade Code

GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material            | HB<br>(Brinell) | Grades            |            |             |
|-----|-----|---------------------|-----------------|-------------------|------------|-------------|
|     |     |                     |                 | ← Wear Resistance |            | Toughness → |
|     |     |                     |                 | PHP910<br>        | PHP920<br> | PHP930<br>  |
| P   | 1   | Unalloyed Steel     | 125-220         | ✓                 | ✓          | ✓           |
|     | 2   | Low-Alloyed Steel   | 220-280         | ✓                 | ✓          | ✓           |
|     | 3   | High-Alloyed Steel  | 280-380         | ✓                 | ✓          | ✓           |
| K   | 7   | Malleable Cast Iron | 130-230         | ✓                 | ✓          | ✓           |
|     | 8   | Grey Cast Iron      | 180-245         | ✓                 | ✓          | ✓           |
|     | 9   | Nodular Cast iron   | 160-250         | ✓                 | ✓          | ✓           |

- Good Conditions
- Average Conditions
- Difficult Conditions

RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material            | HB<br>(Brinell) | Vc (m/min)        |         |             | Feed fz (mm/t) |
|-----|-----|---------------------|-----------------|-------------------|---------|-------------|----------------|
|     |     |                     |                 | ← Wear Resistance |         | Toughness → |                |
|     |     |                     |                 | PHP910            | PHP920  | PHP930      | WNHU 04T3      |
| P   | 1   | Unalloyed Steel     | 125-220         | 180-250           | 180-250 | 160-230     | 0,10-0,30      |
|     | 2   | Low-Alloyed Steel   | 220-280         | 160-240           | 160-230 | 140-210     | 0,10-0,30      |
|     | 3   | High-Alloyed Steel  | 280-380         | 140-230           | 140-220 | 120-200     | 0,10-0,25      |
| K   | 7   | Malleable Cast Iron | 130-230         | 180-300           | 160-270 | 150-250     | 0,10-0,30      |
|     | 8   | Grey Cast Iron      | 180-245         | 160-250           | 140-250 | 140-230     | 0,10-0,30      |
|     | 9   | Nodular Cast iron   | 160-250         | 150-210           | 120-210 | 100-200     | 0,10-0,25      |

| Insert         | Feed fz (mm/t) |           | ap Rec.   |
|----------------|----------------|-----------|-----------|
|                | Roughing       | Finishing |           |
| WNHU 04T308-LP | 0.15-0.30      | 0.10-0.25 | 0.50-3.00 |

(Note 1) Cutting conditions should be adjusted according to the machine and work rigidity.  
(Note 2) If chattering occurs, reduce ap and Vc by 30% and keep the same fz per tooth.



A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

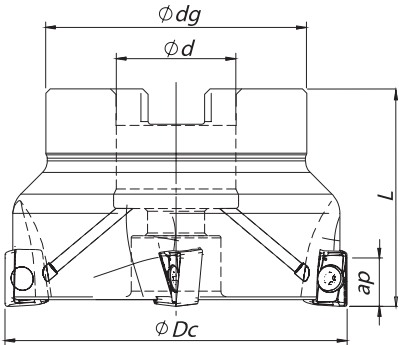
Spare Parts

Technical Data

End Mills



Arbor Mounting  
K<sub>r</sub> = 90° | γ<sub>p</sub> = -7°



| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg   | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|----|-----|----|------|----------------|----------------|-------------------------------|-------|
|                      |                                       |    | ØDc                                       | Ød | Ødg | L  |      | Arbor<br>Type  | Ap max<br>(mm) |                               |       |
| 181075300            | 040A17190-04-07-016040                | 4  | 40                                        | 16 | 32  | 40 | 0,21 | A              | 9,00           | ANHX 1004...                  |       |
| 181075400            | 040A17190-05-07-016040                | 5  | 40                                        | 16 | 32  | 40 | 0,21 | A              | 9,00           | ANHX 1004...                  |       |
| 181075500            | 050A17190-05-07-022040                | 5  | 50                                        | 22 | 42  | 40 | 0,35 | A              | 9,00           | ANHX 1004...                  |       |
| 181075600            | 050A17190-07-07-022040                | 7  | 50                                        | 22 | 42  | 40 | 0,34 | A              | 9,00           | ANHX 1004...                  |       |
| 181075700            | 063A17190-07-07-022040                | 7  | 63                                        | 22 | 52  | 40 | 0,55 | A              | 9,00           | ANHX 1004...                  |       |
| 181075800            | 063A17190-09-07-022040                | 9  | 63                                        | 22 | 52  | 40 | 0,54 | A              | 9,00           | ANHX 1004...                  |       |
| 181075900            | 080A17190-08-07-027050                | 8  | 80                                        | 27 | 60  | 50 | 1,00 | B              | 9,00           | ANHX 1004...                  |       |
| 181076000            | 080A17190-10-07-027050                | 10 | 80                                        | 27 | 60  | 50 | 1,00 | B              | 9,00           | ANHX 1004...                  |       |
| 181076100            | 100A17190-09-07-032050                | 9  | 100                                       | 32 | 80  | 50 | 1,80 | B              | 9,00           | ANHX 1004...                  |       |
| 181076200            | 100A17190-12-07-032050                | 12 | 100                                       | 32 | 80  | 50 | 1,80 | B              | 9,00           | ANHX 1004...                  |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

ANHX 1004.. | Inserts | Pastilhas | Plaquitas

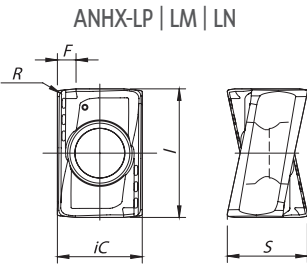
ANHX-LP



ANHX-LM



ANHX-LN



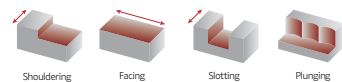
|                                    |                     | P      |        |        |        | M      |        | K      |        |        |        | N      | S      |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |       |      |      |
|------------------------------------|---------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|-------|------|------|
|                                    |                     | PVD    |        |        |        | PVD    |        | PVD    |        |        |        | UNC    | PVD    |        |                                                |      |       |      |      |
|                                    |                     | X5     | T1     | P4     | G6     | X9     | G6     | X5     | T1     | P4     | G6     | 10     | X9     | G6     |                                                |      |       |      |      |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference    | PHP910 | PHP920 | PHP930 | PH7740 | PHH930 | PH7740 | PHP910 | PHP920 | PHP930 | PH7740 | PH0910 | PHH930 | PH7740 | iC                                             | S    | I     | R    | F    |
| 1111652                            | ANHX 100405 PNR-LP  |        |        |        |        |        |        |        |        |        |        |        |        |        | 6,60                                           | 6,20 | 10,00 | 0,50 | 0,85 |
| 1112106                            | ANHX 100408 PNR-LP  |        |        |        |        |        |        |        |        |        |        |        |        |        | 6,60                                           | 6,20 | 10,00 | 0,80 | 0,60 |
| 1111908                            | ANHX 100412 PNR-LP  |        |        |        |        |        |        |        |        |        |        |        |        |        | 6,60                                           | 6,20 | 10,00 | 1,20 | 0,30 |
| 1112005                            | ANHX 100405 PNER-LM |        |        |        |        |        |        |        |        |        |        |        |        |        | 6,60                                           | 6,20 | 10,00 | 0,50 | 0,85 |
| 1112162                            | ANHX 100408 PNER-LM |        |        |        |        |        |        |        |        |        |        |        |        |        | 6,60                                           | 6,20 | 10,00 | 0,80 | 0,60 |
| 1112103                            | ANHX 100412 PNER-LM |        |        |        |        |        |        |        |        |        |        |        |        |        | 6,60                                           | 6,20 | 10,00 | 1,20 | 0,30 |
| 1111997                            | ANHX 100405 PNFR-LN |        |        |        |        |        |        |        |        |        |        |        |        |        | 6,60                                           | 6,20 | 10,00 | 0,50 | 0,85 |
| 1112102                            | ANHX 100412 PNR-LN  |        |        |        |        |        |        |        |        |        |        |        |        |        | 6,60                                           | 6,20 | 10,00 | 1,20 | 0,30 |

First choice | Primeira opção | 1ª opción

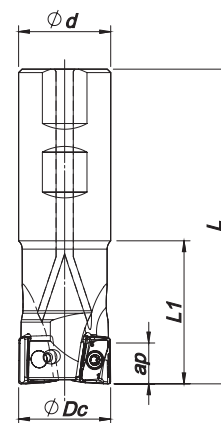
Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

Insert order code = (1) Geometry Code + (2) Grade Code



**Weldon Shank**  
 $K_r = 90^\circ$  |  $\gamma_p = -7^\circ (-6^\circ)$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|-------|----------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1 |       | Ap max<br>(mm) |                               |       |
| 181075000            | 014W17190-01-06-016090*               | 1 | 14                                        | 16 | 90  | 23 | 0,188 | 9,00           | ANHX 1004...                  |       |
| 181101400            | 016W17190-02-06-016090*               | 2 | 16                                        | 16 | 90  | 25 | 0,123 | 9,00           | ANHX 1004...                  |       |
| 181096800            | 016W17190-02-06-016150*               | 2 | 16                                        | 16 | 150 | 25 | 0,190 | 9,00           | ANHX 1004...                  |       |
| 181075200            | 018W17190-02-06-016090*               | 2 | 18                                        | 16 | 90  | 23 | 0,125 | 9,00           | ANHX 1004...                  |       |
| 181071400            | 020W17190-02-06-020100*               | 2 | 20                                        | 20 | 100 | 30 | 0,210 | 9,00           | ANHX 1004...                  |       |
| 181071500            | 020W17190-03-06-020100*               | 3 | 20                                        | 20 | 100 | 30 | 0,206 | 9,00           | ANHX 1004...                  |       |
| 181074400            | 025W17190-02-06-025115*               | 2 | 25                                        | 25 | 115 | 35 | 0,391 | 9,00           | ANHX 1004...                  |       |
| 181074500            | 025W17190-03-06-025115*               | 3 | 25                                        | 25 | 115 | 35 | 0,387 | 9,00           | ANHX 1004...                  |       |
| 181074600            | 032W17190-03-06-032125*               | 3 | 32                                        | 32 | 125 | 40 | 0,701 | 9,00           | ANHX 1004...                  |       |
| 181074700            | 032W17190-04-06-032125*               | 4 | 32                                        | 32 | 125 | 40 | 0,698 | 9,00           | ANHX 1004...                  |       |
| 181074800            | 040W17190-04-07-032130                | 4 | 40                                        | 32 | 130 | 40 | 0,780 | 9,00           | ANHX 1004...                  |       |
| 181074900            | 040W17190-05-07-032130                | 5 | 40                                        | 32 | 130 | 40 | 0,777 | 9,00           | ANHX 1004...                  |       |

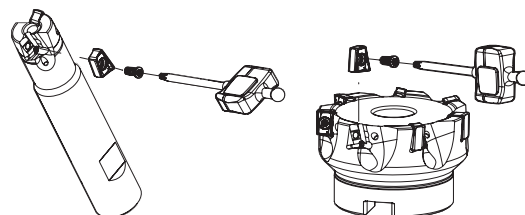
Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc    | Order separately |            |                 |              | Order separately |                 |
|------------------|------------------|------------|-----------------|--------------|------------------|-----------------|
|                  | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value | Screw            | DIN 6368 Wrench |
| W17190 - 14 - 40 | P0300800         | XT09       | DT0914          | 1,4          | -                | -               |
| A17190 - 40 - 63 | P0300800         | XT09       | DT0914          | 1,4          | -                | -               |
| A17190 - 80      | P0300800         | XT09       | DT0914          | 1,4          | J0123510         | SD6368-12       |
| A17190 - 100     | P0300800         | XT09       | DT0914          | 1,4          | J0164110         | SD6368-16       |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades            |        |        |             |        |        |
|-----|-----|-----------------------------------|-----------------|-------------------|--------|--------|-------------|--------|--------|
|     |     |                                   |                 | ← Wear Resistance |        |        | Toughness → |        |        |
|     |     |                                   |                 | PH0910            | PHP910 | PHP920 | PHP930      | PHH930 | PH7740 |
| P   | 1   | Unalloyed Steel                   | 125-220         | ●                 | ✓      | ✓      | ✓           |        | ✓      |
|     | 2   | Low-Alloyed Steel                 | 220-280         |                   | ✓      | ✓      | ✓           |        | ✓      |
|     | 3   | High-Alloyed Steel                | 280-380         |                   | ✓      | ✓      | ✓           |        | ✓      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                   |        |        |             | ✓      | ✓      |
|     | 5   | SS - Austenitic                   | 200-330         |                   |        |        |             | ✓      | ✓      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                   |        |        |             | ✓      | ✓      |
| K   | 7   | Malleable Cast Iron               | 130-230         |                   | ✓      | ✓      | ✓           |        | ✓      |
|     | 8   | Grey Cast Iron                    | 180-245         |                   | ✓      | ✓      | ✓           |        | ✓      |
|     | 9   | Nodular Cast iron                 | 160-250         |                   | ✓      | ✓      | ✓           |        | ✓      |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | ✓                 |        |        |             |        |        |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                   |        |        |             | ✓      | ✓      |

- Good Conditions
- Average Conditions
- Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |         |             |         |         | Feed fz (mm/t) |           |           |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|---------|-------------|---------|---------|----------------|-----------|-----------|
|     |     |                                   |                 | ← Wear Resistance |         |         | Toughness → |         |         | ANH... LP      | ANH... LM | ANH... LN |
|     |     |                                   |                 | PH0910            | PHP910  | PHP920  | PHP930      | PHH930  | PH7740  |                |           |           |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                 | 180-250 | 180-250 | 160-230     | -       | 140-200 | 0,08-0,20      | 0,08-0,20 | -         |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                 | 160-240 | 160-230 | 140-210     | -       | 130-180 | 0,08-0,20      | 0,08-0,15 | -         |
|     | 3   | High-Alloyed Steel                | 280-380         | -                 | 140-230 | 140-220 | 120-200     | -       | 100-170 | 0,08-0,15      | 0,08-0,15 | -         |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | -       | -           | 140-210 | 130-180 | -              | 0,08-0,20 | -         |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | -       | -           | 120-170 | 110-160 | -              | 0,08-0,15 | -         |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | -       | -           | 100-150 | 90-150  | -              | 0,08-0,15 | -         |
| K   | 7   | Malleable Cast Iron               | 130-230         | -                 | 180-300 | 160-270 | 150-250     | -       | 140-220 | 0,08-0,25      | 0,08-0,20 | -         |
|     | 8   | Grey Cast Iron                    | 180-245         | -                 | 160-250 | 140-250 | 140-230     | -       | 120-210 | 0,08-0,20      | 0,08-0,20 | -         |
|     | 9   | Nodular Cast iron                 | 160-250         | -                 | 150-210 | 120-210 | 100-200     | -       | 100-190 | 0,08-0,20      | 0,08-0,15 | -         |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | 100-2000          | -       | -       | -           | -       |         | -              |           | 0,08-0,20 |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       | -       | -           | 30-110  | 30-100  | -              | 0,08-0,15 | -         |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2)

| Operation   | $a_e$ | Vc & fz | $a_p$ (mm) |
|-------------|-------|---------|------------|
| Slotting    | 100%  | <20%    | 2,0-3,5    |
| Shouldering | <50%  | >8%     | 3,0-6,0    |
|             | ≤25%  | >12%    | 6,0-8,5    |

(Note 3)

It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

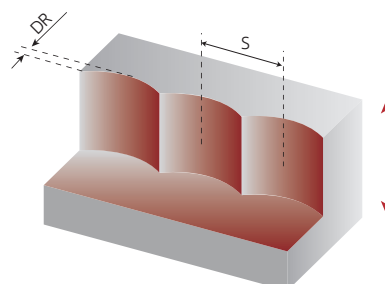
- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

## CHIP-BREAKER SELECTION GUIDE | Guia de selecção do quebra-aparas | Guía de selección del rompevirutas

| ISO      | PSM | Material                          | HB<br>(Brinell) | Chip Breaker Application |                      |
|----------|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|          |     |                                   |                 | 1 <sup>st</sup> choice   | Difficult Operations |
| <b>P</b> | 1   | Unalloyed Steel                   | 125-220         | ANHX 10... LM            | ANHX 10... LP        |
|          | 2   | Low-Alloyed Steel                 | 220-280         | ANHX 10... LM            | ANHX 10... LP        |
|          | 3   | High-Alloyed Steel                | 280-380         | ANHX 10... LM            | ANHX 10... LP        |
| <b>M</b> | 4   | SS - Ferritic / Martensitic       | 200-330         | ANHX 10... LM            | -                    |
|          | 5   | SS - Austenitic                   | 200-330         | ANHX 10... LM            | -                    |
|          | 6   | SS - Austenitic-ferritic (Duplex) | 220-260         | ANHX 10... LM            | -                    |
| <b>K</b> | 7   | Malleable Cast Iron               | 130-230         | ANHX 10... LM            | ANHX 10... LP        |
|          | 8   | Grey Cast Iron                    | 180-245         | ANHX 10... LM            | ANHX 10... LP        |
|          | 9   | Nodular Cast iron                 | 160-250         | ANHX 10... LP            | -                    |
| <b>N</b> | 10  | Aluminium and Non Ferrous         | 30-130          | ANHX 10... LN            | -                    |
| <b>S</b> | 11  | Heat Resistant Super Alloys       | 200-320         | ANHX 10... LM            | -                    |

## PLUNGING | Mergulho | Plunge

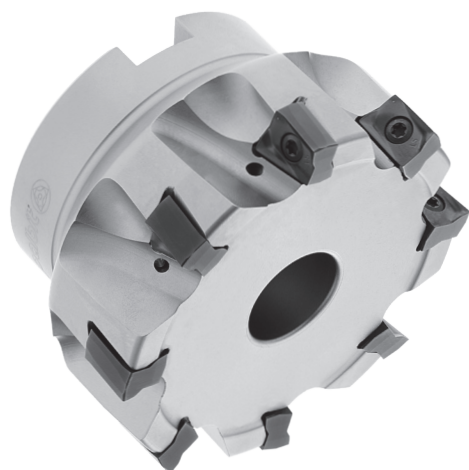
| L≤3Dc                 | L>3Dc     | S max.                                      |
|-----------------------|-----------|---------------------------------------------|
| f <sub>z</sub> (mm/t) |           |                                             |
| 0,10-0,20             | 0,10-0,14 | S <sub>max</sub> = √DC.Dr - Dr <sup>2</sup> |



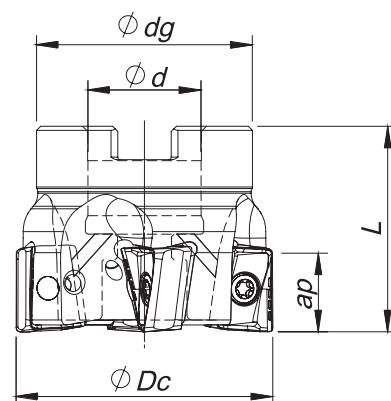
| S max and DR corresponding cutting diameter Dc (mm) |         |     |     |     |     |     |      |      |      |      |      |
|-----------------------------------------------------|---------|-----|-----|-----|-----|-----|------|------|------|------|------|
| DR (mm)                                             | Dc (mm) |     |     |     |     |     |      |      |      |      |      |
|                                                     | 14      | 16  | 18  | 20  | 25  | 32  | 40   | 50   | 63   | 80   | 100  |
| 1,0                                                 | 3,6     | 3,9 | 4,1 | 4,4 | 4,9 | 5,6 | 6,2  | 7,0  | 7,9  | 8,9  | 9,9  |
| 2,0                                                 | 4,9     | 5,3 | 5,7 | 6,0 | 6,8 | 7,7 | 8,7  | 9,8  | 11,0 | 12,5 | 14,0 |
| 3,0                                                 | 5,7     | 6,2 | 6,7 | 7,1 | 8,1 | 9,3 | 10,5 | 11,9 | 13,4 | 15,2 | 17,1 |







## Arbor Mounting

 $K_r = 90^\circ$  |  $\gamma_p = -6^\circ$ 


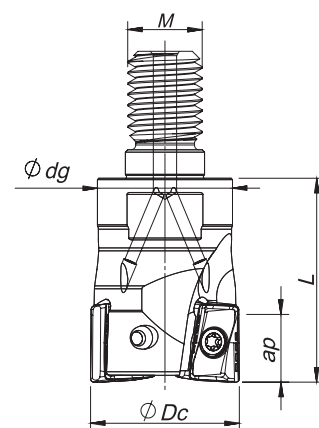
| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg   | Specifications |        | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|----------|-----------|----|------|----------------|--------|-------------------------------|-------|
|                      |                                       |    | $\phi Dc$                                 | $\phi d$ | $\phi dg$ | L  |      | Arbor<br>Type  | Ap max |                               |       |
| 181116400            | 040A17590-04-06-016040                | 4  | 40                                        | 16       | 32        | 40 | 0,17 | A              | 11,00  | ANHX 1206...                  |       |
| 181114500            | 050A17590-05-06-022040                | 5  | 50                                        | 22       | 42        | 40 | 0,30 | A              | 11,00  | ANHX 1206...                  |       |
| 181115900            | 050A17590-06-06-022040                | 6  | 50                                        | 22       | 42        | 40 | 0,30 | A              | 11,00  | ANHX 1206...                  |       |
| 181116500            | 063A17590-05-06-022040                | 5  | 63                                        | 22       | 52        | 40 | 0,55 | A              | 11,00  | ANHX 1206...                  |       |
| 181116600            | 063A17590-07-06-022040                | 7  | 63                                        | 22       | 52        | 40 | 0,52 | A              | 11,00  | ANHX 1206...                  |       |
| 181116700            | 080A17590-08-06-027050                | 8  | 80                                        | 27       | 60        | 50 | 1,10 | A              | 11,00  | ANHX 1206...                  |       |
| 181116800            | 080A17590-10-06-027050                | 10 | 80                                        | 27       | 60        | 50 | 1,10 | A              | 11,00  | ANHX 1206...                  |       |
| 181116900            | 100A17590-12-06-032050                | 12 | 100                                       | 32       | 80        | 50 | 1,65 | B              | 11,00  | ANHX 1206...                  |       |
| 181117000            | 125A17590-14-06-040063                | 14 | 125                                       | 40       | 90        | 63 | 3,16 | B              | 11,00  | ANHX 1206...                  |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)



## Threaded Coupling

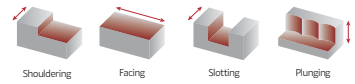
 $K_r = 90^\circ$  |  $\gamma_p = -6^\circ$ 


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg   | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----------|----|------|----------------|-------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi M$ | $\phi dg$ | L  |      | Ap max         |                               |       |
| 181117100            | 025R17590-02-06-M12035                | 2 | 25                                        | M12      | 21        | 35 | 0,09 | 11,00          | ANHX 1206...                  |       |
| 181117200            | 032R17590-03-06-M16043                | 3 | 32                                        | M16      | 29        | 43 | 0,20 | 11,00          | ANHX 1206...                  |       |
| 181117300            | 042R17590-04-06-M16043                | 4 | 42                                        | M16      | 29        | 43 | 0,26 | 11,00          | ANHX 1206...                  |       |

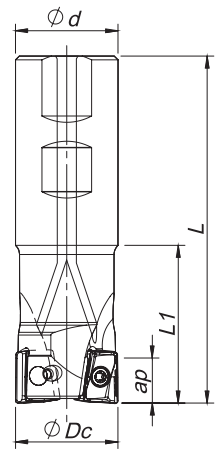
Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)





Weldon Shank  
 $K_r = 90^\circ$  |  $\gamma_p = -6^\circ$



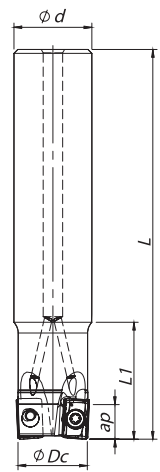
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |     |    | Kg   | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----|----|------|----------------|-------------------------------|-------|
|                      |                                       |   | $\phi D_c$                                | $\phi d$ | L   | L1 |      | Ap max         |                               |       |
| 181116000            | 025W17590-02-06-025110                | 2 | 25                                        | 25       | 110 | 35 | 0,37 | 11,00          | ANHX 1206...                  |       |
| 181120600            | 032W17590-03-06-032150                | 3 | 32                                        | 32       | 150 | 35 | 0,84 | 11,00          | ANHX 1206...                  |       |
| 181116100            | 040W17590-04-06-032150                | 4 | 40                                        | 32       | 150 | 40 | 0,88 | 11,00          | ANHX 1206...                  |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)



Cylindrical Shank  
 $K_r = 90^\circ$  |  $\gamma_p = -6^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |     |    | Kg   | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----|----|------|----------------|-------------------------------|-------|
|                      |                                       |   | $\phi D_c$                                | $\phi d$ | L   | L1 |      | Ap max         |                               |       |
| 181116300            | 026E17590-02-06-025200                | 2 | 26                                        | 25       | 200 | 40 | 0,66 | 11,00          | ANHX 1206...                  |       |
| 181116200            | 033E17590-03-06-032250                | 3 | 33                                        | 32       | 250 | 40 | 1,40 | 11,00          | ANHX 1206...                  |       |

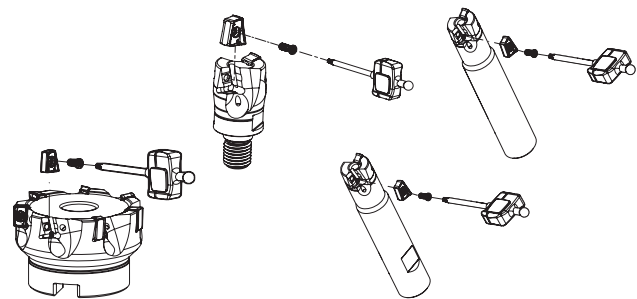
Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

SPARE PARTS | Complementos | Repuestos

| Cutter<br>$\phi D_c$ | Insert Screw | Key (Torx) | Key (Torx - Nm) | Torque Value |
|----------------------|--------------|------------|-----------------|--------------|
|                      |              |            |                 |              |
| E17590 - 26 - 33     | P0350904     | XT10       | DT1020          | 2,0          |
| A17590 - 40 - 100    | P0350904     | XT10       | DT1020          | 2,0          |
| A17590 - 125         | P0350904     | PT10       | DT1020          | 2,0          |
| R17590 - 25 - 42     | P0350904     | XT10       | DT1020          | 2,0          |
| W17590 - 25-40       | P0350904     | XT10       | DT1020          | 2,0          |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



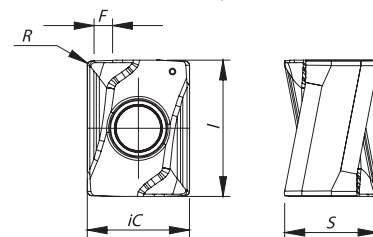
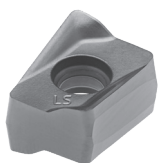
# PLUS 17590

## ANHX 1206.. | Inserts | Pastilhas | Plaquitras

ANHX-LS

ANHX-MP

ANHX-LS | MP



|                         |                     | P      |               |        |        |        | M      |        |        | K      |        |        |        |        | S      |        |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |     |      |     |     |
|-------------------------|---------------------|--------|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|-----|------|-----|-----|
|                         |                     | CVD    | PVD           |        |        |        | PVD    |        |        | PVD    |        |        |        |        | PVD    |        |        |                                                |     |      |     |     |
|                         |                     |        | (2)Grade code | T9     | G4     | T1     | P3     | G6     | P3     | X9     | G6     | L6     | G4     | T1     | P3     | G6     | P3     |                                                |     |      |     |     |
| (1)<br>Geometry<br>code | ISO<br>Reference    | PHS740 | PH7920        | PHP920 | PH7930 | PH7740 | PH7930 | PHH930 | PH7740 | PH5320 | PH7920 | PHP920 | PH7930 | PH7740 | PH7930 | PHH930 | PH7740 | iC                                             | S   | I    | R   | F   |
| 1112474                 | ANHX 120604 PNER-LS |        |               |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 9,0                                            | 8,3 | 12,0 | 0,4 | 1,6 |
| 1112237                 | ANHX 120608 PNER-LS |        |               |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 9,0                                            | 8,3 | 12,0 | 0,8 | 1,2 |
| 1112429                 | ANHX 120616 PNER-LS |        |               |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 9,0                                            | 8,3 | 12,0 | 1,6 | 0,4 |
| 1112473                 | ANHX 120604 PNSR-MP |        |               |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 9,0                                            | 8,3 | 12,0 | 0,4 | 1,6 |
| 1112238                 | ANHX 120608 PNSR-MP |        |               |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 9,0                                            | 8,3 | 12,0 | 0,8 | 1,2 |
| 1112430                 | ANHX 120616 PNSR-MP |        |               |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 9,0                                            | 8,3 | 12,0 | 1,6 | 0,4 |

⊗ First choice | Primeira opção | 1ª opción
⊗ Stock item | Produto de stock | Itens de stock
○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)
⊗ Stock available until sold out | Stock disponível até acabar o stock | Stock disponible hasta acabar el stock

Insert order code = (1) Geometry Code + (2) Grade Code

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |         |             |         |         |         | Feed fz (mm/t) |               |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|---------|-------------|---------|---------|---------|----------------|---------------|
|     |     |                                   |                 | ← Wear Resistance |         |         | Toughness → |         |         |         |                |               |
|     |     |                                   |                 | PH5320            | PHP920  | PH7920  | PHH930      | PH7930  | PHS740  | PH7740  | ANHX 12... LS  | ANHX 12... MP |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                 | 180-250 | 180-240 | -           | 160-220 | 140-220 | 140-200 | 0,08-0,20      | 0,08-0,30     |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                 | 160-230 | 160-220 | -           | 140-200 | 120-200 | 130-180 | 0,08-0,20      | 0,08-0,25     |
|     | 3   | High-Alloyed Steel                | 280-380         | -                 | 140-220 | 140-210 | -           | 120-190 | 100-190 | 100-170 | 0,08-0,15      | 0,08-0,20     |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | 140-220 | 140-210     | 140-200 | -       | 130-180 | 0,08-0,20      | -             |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | 130-180 | 120-170     | 120-160 | -       | 110-160 | 0,08-0,15      | -             |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | 120-160 | 100-150     | 100-140 | -       | 90-150  | 0,08-0,15      | -             |
| K   | 7   | Malleable Cast Iron               | 130-230         | 150-280           | 160-270 | 160-260 | -           | 150-240 | -       | 140-220 | 0,08-0,20      | 0,08-0,30     |
|     | 8   | Grey Cast Iron                    | 180-245         | 160-320           | 140-250 | 140-240 | -           | 140-230 | -       | 120-210 | 0,08-0,20      | 0,08-0,25     |
|     | 9   | Nodular Cast iron                 | 160-250         | 100-190           | 120-210 | 120-200 | -           | 100-190 | -       | 100-190 | 0,08-0,20      | 0,08-0,20     |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       |         | 30-110      | 30-100  | -       | 30-100  | 0,07-0,10      | -             |

(Note 1)  
Cutting conditions  $a_e/D_c=70\%$ .

(Note 2)

| Operation   | $a_e$ | Vc & fz | $a_p$ (mm) |
|-------------|-------|---------|------------|
| Slotting    | 100%  | <20%    | 2,5-4,0    |
| Shouldering | <50%  | >8%     | 4,0-7,0    |
|             | ≤25%  | >12%    | 7,0-10,0   |

(Note 3)  
It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:  
 - When using long shank;  
 - When using long tool overhang with arbor type;  
 - When application has poor clamping rigidity or when using a low rigidity machine.

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades            |        |        |             |        |        |        |
|-----|-----|-----------------------------------|-----------------|-------------------|--------|--------|-------------|--------|--------|--------|
|     |     |                                   |                 | ← Wear Resistance |        |        | Toughness → |        |        |        |
|     |     |                                   |                 | PH5320            | PHP920 | PH7920 | PHH930      | PH7930 | PHS740 | PH7740 |
| P   | 1   | Unalloyed Steel                   | 125-220         |                   | ✓      | ✓      |             | ✓      | ✓      | ✓      |
|     | 2   | Low-Alloyed Steel                 | 220-280         |                   | ✓      | ✓      |             | ✓      | ✓      | ✓      |
|     | 3   | High-Alloyed Steel                | 280-380         |                   | ✓      | ✓      |             | ✓      | ✓      | ✓      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                   |        |        | ✓           | ✓      |        | ✓      |
|     | 5   | SS - Austenitic                   | 200-330         |                   |        |        | ✓           | ✓      |        | ✓      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                   |        |        | ✓           | ✓      |        | ✓      |
| K   | 7   | Malleable Cast Iron               | 130-230         | ✓                 | ✓      | ✓      |             | ✓      |        | ✓      |
|     | 8   | Grey Cast Iron                    | 180-245         | ✓                 | ✓      | ✓      |             | ✓      |        | ✓      |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓                 | ✓      | ✓      |             | ✓      |        | ✓      |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                   |        |        |             | ✓      |        | ✓      |



Good Conditions



Average Conditions



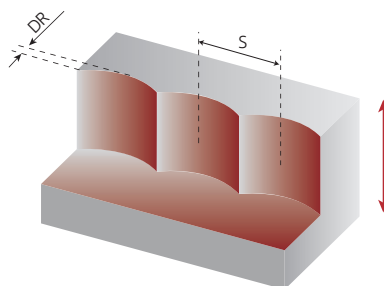
Difficult Conditions

## CHIP-BREAKER SELECTION GUIDE | Guia de selecção do quebra-apanas | Guía de selección del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1 <sup>st</sup> choice   | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | ANHX 12... LS            | ANHX 12... MP        |
|     | 2   | Low-Alloyed Steel                 | 220-280         | ANHX 12... MP            | -                    |
|     | 3   | High-Alloyed Steel                | 280-380         | ANHX 12... MP            | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | ANHX 12... LS            | -                    |
|     | 5   | SS - Austenitic                   | 200-330         | ANHX 12... LS            | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 220-260         | ANHX 12... LS            | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230         | ANHX 12... LS            | ANHX 12... MP        |
|     | 8   | Grey Cast Iron                    | 180-245         | ANHX 12... MP            | -                    |
|     | 9   | Nodular Cast iron                 | 160-250         | ANHX 12... MP            | -                    |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | ANHX 12... LS            | -                    |

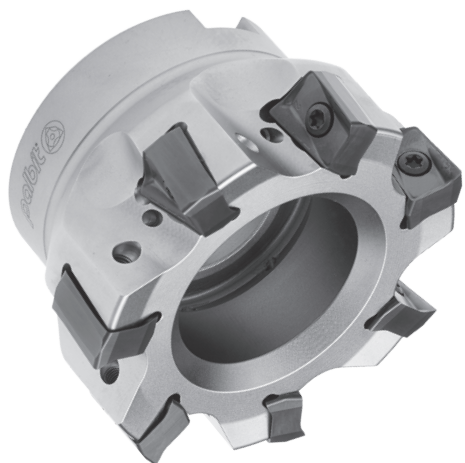
## PLUNGING | Mergulho | Plunge

| L≤3Dc     | L>3Dc     | S max.              |
|-----------|-----------|---------------------|
| fz (mm/t) |           |                     |
| 0,10-0,20 | 0,10-0,14 | Smax = √DC.Dr - Dr² |

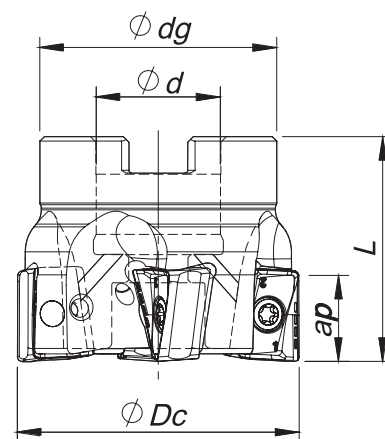


| S max and DR corresponding cutting diameter Dc (mm) |         |      |      |      |      |      |      |
|-----------------------------------------------------|---------|------|------|------|------|------|------|
| DR (mm)                                             | Dc (mm) |      |      |      |      |      |      |
|                                                     | 32      | 40   | 50   | 63   | 80   | 100  | 125  |
| 1,0                                                 | 5,6     | 6,2  | 7,0  | 7,9  | 8,9  | 9,9  | 11,1 |
| 2,0                                                 | 7,7     | 8,7  | 9,8  | 11,0 | 12,5 | 14,0 | 15,7 |
| 3,0                                                 | 9,3     | 10,5 | 11,9 | 13,4 | 15,2 | 17,1 | 19,1 |





## Arbor Mounting

 $K_r = 90^\circ$  |  $\gamma_p = -4^\circ$ 


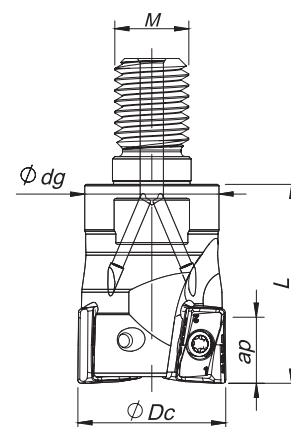
| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg   | Specifications |        | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|----|-----|----|------|----------------|--------|-------------------------------|-------|
|                      |                                       |    | ØDc                                       | Ød | ØDg | L  |      | Arbor<br>Type  | Ap max |                               |       |
| 181067600            | 050A18190-03-04-022040                | 3  | 50                                        | 22 | 42  | 40 | 0,28 | A              | 15,0   | ANHX 1607...                  |       |
| 181067700            | 050A18190-04-04-022040                | 4  | 50                                        | 22 | 42  | 40 | 0,27 | A              | 15,0   | ANHX 1607...                  |       |
| 181067800            | 063A18190-04-04-022040                | 4  | 63                                        | 22 | 52  | 40 | 0,51 | A              | 15,0   | ANHX 1607...                  |       |
| 181067900            | 063A18190-06-04-022040                | 6  | 63                                        | 22 | 52  | 40 | 0,48 | A              | 15,0   | ANHX 1607...                  |       |
| 181068000            | 080A18190-05-04-027050                | 5  | 80                                        | 27 | 60  | 50 | 0,88 | B              | 15,0   | ANHX 1607...                  |       |
| 181051800            | 080A18190-07-04-027050                | 7  | 80                                        | 27 | 60  | 50 | 0,36 | B              | 15,0   | ANHX 1607...                  |       |
| 181068100            | 100A18190-05-04-032050                | 5  | 100                                       | 32 | 80  | 50 | 1,60 | B              | 15,0   | ANHX 1607...                  |       |
| 181068200            | 100A18190-08-04-032050                | 8  | 100                                       | 32 | 80  | 50 | 1,59 | B              | 15,0   | ANHX 1607...                  |       |
| 181068300            | 125A18190-07-04-040063                | 7  | 125                                       | 40 | 90  | 63 | 2,93 | B              | 15,0   | ANHX 1607...                  |       |
| 181068400            | 125A18190-10-04-040063                | 10 | 125                                       | 40 | 90  | 63 | 2,89 | B              | 15,0   | ANHX 1607...                  |       |
| 181068500            | 160A18190-08-04-U040063               | 8  | 160                                       | 40 | 110 | 63 | 4,29 | C              | 15,0   | ANHX 1607...                  |       |
| 181068600            | 160A18190-12-04-U040063               | 12 | 160                                       | 40 | 110 | 63 | 4,29 | C              | 15,0   | ANHX 1607...                  |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)



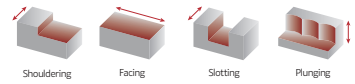
## Threaded Coupling

 $K_r = 90^\circ$  |  $\gamma_p = -4^\circ$ 


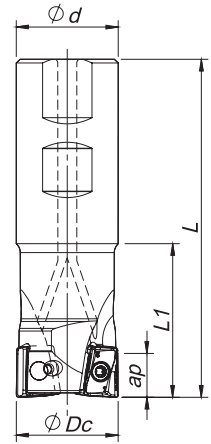
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |     |     |    | Kg   | Specifications |  | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----|-----|----|------|----------------|--|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | ØM  | Ødg | L  |      | Ap max         |  |                               |       |
| 181082800            | 032R18190-02-04-M16043                | 2 | 32                                        | M16 | 29  | 43 | 0,20 | 15,0           |  | ANHX 1607...                  |       |
| 181082900            | 040R18190-03-04-M16043                | 3 | 40                                        | M16 | 29  | 43 | 0,24 | 15,0           |  | ANHX 1607...                  |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)



Weldon Shank  
 $K_r = 90^\circ$  |  $\gamma_p = -4^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |     |    | Kg   | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----|----|------|----------------|-------------------------------|-------|
|                      |                                       |   | $\phi D_c$                                | $\phi d$ | L   | L1 |      | Ap max         |                               |       |
| 181051600            | 032W18190-02-04-032110                | 2 | 32                                        | 32       | 110 | 50 | 0,66 | 15,0           | ANHX 1607...                  |       |
| 181067500            | 040W18190-03-04-032115                | 3 | 40                                        | 32       | 115 | 40 | 0,66 | 15,0           | ANHX 1607...                  |       |

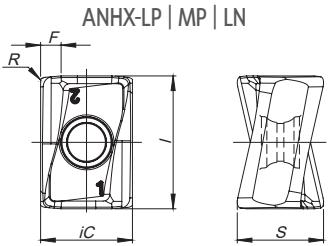
Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

ANHX 1607... | Inserts | Pastilhas | Plaquetas

ANHX-LP

ANHX-MP

ANHX-LN



|                   |                     | P      |        |        |        |        |        | K      |        |        |        |        | N      | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |       |    |     |     |
|-------------------|---------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|-------|----|-----|-----|
|                   |                     | CVD    | PVD    |        |        |        |        | PVD    |        |        |        |        | UNC    |                                                |       |    |     |     |
|                   | (2) Grade code      | T9     | G1     | G4     | T1     | P3     | P4     | G1     | G4     | T1     | P3     | P4     | 10     |                                                |       |    |     |     |
| (1) Geometry code | ISO Reference       | PHS740 | PH7910 | PH7920 | PHP920 | PH7930 | PHP930 | PH7910 | PH7920 | PHP920 | PH7930 | PHP930 | PH0910 | iC                                             | S     | I  | R   | F   |
| 1111519           | ANHX 160708 PNR-LP  |        |        |        |        |        |        |        |        |        |        |        |        | 11,20                                          | 10,80 | 16 | 0,8 | 1,4 |
| 1111596           | ANHX 160712 PNR-LP  |        |        |        |        |        |        |        |        |        |        |        |        | 11,20                                          | 10,50 | 16 | 1,2 | 1,2 |
| 1111595           | ANHX 160708 PNER-MP |        |        |        |        |        |        |        |        |        |        |        |        | 11,20                                          | 10,80 | 16 | 0,8 | 1,4 |
| 1111598           | ANHX 160712 PNER-MP |        |        |        |        |        |        |        |        |        |        |        |        | 11,20                                          | 10,50 | 16 | 1,2 | 1,2 |
| 1111659           | ANHX 160708 PNFR-LN |        |        |        |        |        |        |        |        |        |        |        |        | 11,20                                          | 10,80 | 16 | 0,8 | 1,4 |
| 1111597           | ANHX 160712 PNFR-LN |        |        |        |        |        |        |        |        |        |        |        |        | 11,20                                          | 10,50 | 16 | 1,2 | 1,2 |

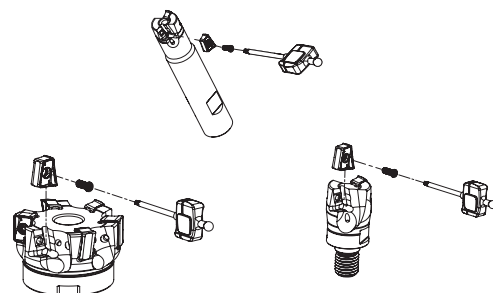
First choice | Primeira opção | 1ª opción      Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)      Insert order code = (1) Geometry Code + (2) Grade Code

Stock available until sold out | Stock disponível até acabar o stock | Stock disponible hasta acabar el stock

## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc    | Insert Screw | Key (Torx) | Order separately   |                 | Order separately |                 |
|------------------|--------------|------------|--------------------|-----------------|------------------|-----------------|
|                  |              |            | Key<br>(Torx - Nm) | Torque<br>Value | Screw            | DIN 6368 Wrench |
| W18190 - 32 - 40 | P0401200     | XT15       | DT1530             | 3,0             | -                | -               |
| R18190 - 32 - 40 | P0401200     | XT15       | DT1530             | 3,0             | -                | -               |
| A18190 - 50 - 63 | P0401200     | XT15       | DT1530             | 3,0             | -                | -               |
| A18190 - 80      | P0401200     | XT15       | DT1530             | 3,0             | J0123510         | SD6368-12       |
| A18190 - 100     | P0401200     | XT15       | DT1530             | 3,0             | J0164110         | SD6368-16       |
| A18190 - 125     | P0401200     | PT15       | DT1530             | 3,0             | J0204610         | SD6368-20       |
| A18190 - 160     | P0401200     | PT15       | DT1530             | 3,0             | -                | -               |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendadas

| ISO | PSM | Material                  | HB<br>(Brinell) | Vc (m/min)        |         |         |             |         |         |         | Feed fz (mm/t) |                |                |
|-----|-----|---------------------------|-----------------|-------------------|---------|---------|-------------|---------|---------|---------|----------------|----------------|----------------|
|     |     |                           |                 | ← Wear Resistance |         |         | Toughness → |         |         |         | ANH12...<br>LP | ANH12...<br>MP | ANH12...<br>LN |
|     |     |                           |                 | PH0910            | PH7910  | PHP920  | PH7920      | PHP930  | PH7930  | PHS740  |                |                |                |
| P   | 1   | Unalloyed Steel           | 125-220         | -                 | 180-250 | 180-250 | 180-240     | 160-230 | 160-220 | 140-220 | 0,10-0,25      | 0,10-0,25      | -              |
|     | 2   | Low-Alloyed Steel         | 220-280         | -                 | 160-230 | 160-230 | 160-220     | 140-210 | 140-200 | 120-200 | 0,10-0,25      | 0,10-0,25      | -              |
|     | 3   | High-Alloyed Steel        | 280-380         | -                 | 140-220 | 140-220 | 140-210     | 120-200 | 120-190 | 100-190 | 0,10-0,20      | 0,10-0,20      | -              |
| K   | 7   | Malleable Cast Iron       | 130-230         | -                 | 180-300 | 160-270 | 160-260     | 150-250 | 150-240 | -       | 0,10-0,25      | 0,10-0,25      | -              |
|     | 8   | Grey Cast Iron            | 180-245         | -                 | 160-250 | 140-250 | 140-240     | 140-230 | 140-230 | -       | 0,10-0,25      | 0,10-0,25      | -              |
|     | 9   | Nodular Cast iron         | 160-250         | -                 | 150-200 | 120-210 | 120-200     | 100-200 | 100-190 | -       | 0,10-0,20      | 0,10-0,25      | -              |
| N   | 10  | Aluminium and Non Ferrous | 30-130          | 100-2000          | -       | -       | -           | -       | -       | -       | -              | -              | 0,10-0,40      |

(Note 1)  
Cutting conditions  $a_e/D_c=70\%$ .

(Note 2)

| Operation   | $a_e$ | Vc & fz | $a_p$ (mm) |
|-------------|-------|---------|------------|
| Slotting    | 100%  | <20%    | 2,0-4,5    |
| Shouldering | <50%  | >8%     | 6,0-8,0    |
|             | ≤25%  | >12%    | 8,0-15,0   |

(Note 3)

It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.



## GRADES SELECTION GUIDE | Guia para selecção de graus | Guía para selección de calidades

| ISO | PSM | Material                  | HB<br>(Brinell) | Grades            |        |        |        |             |        |        |
|-----|-----|---------------------------|-----------------|-------------------|--------|--------|--------|-------------|--------|--------|
|     |     |                           |                 | ← Wear Resistance |        |        |        | Toughness → |        |        |
|     |     |                           |                 | PH0910            | PH7910 | PHP920 | PH7920 | PHP930      | PH7930 | PHS740 |
| P   | 1   | Unalloyed Steel           | 125-220         |                   | ✓      | ✓      | ✓      | ✓           | ✓      | ✓      |
|     | 2   | Low-Alloyed Steel         | 220-280         |                   | ✓      | ✓      | ✓      | ✓           | ✓      | ✓      |
|     | 3   | High-Alloyed Steel        | 280-380         |                   | ✓      | ✓      | ✓      | ✓           | ✓      | ✓      |
| K   | 7   | Malleable Cast Iron       | 130-230         |                   | ✓      | ✓      | ✓      | ✓           | ✓      |        |
|     | 8   | Grey Cast Iron            | 180-245         |                   | ✓      | ✓      | ✓      | ✓           | ✓      |        |
|     | 9   | Nodular Cast iron         | 160-250         |                   | ✓      | ✓      | ✓      | ✓           | ✓      |        |
| N   | 10  | Aluminium and Non Ferrous | 30-130          | ✓                 |        |        |        |             |        |        |

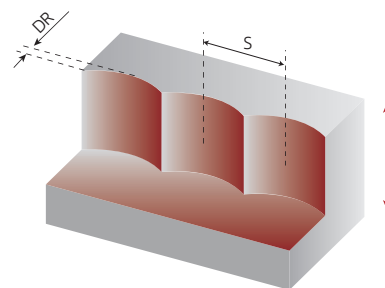
Good Conditions  
 Average Conditions  
 Difficult Conditions

## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra-apanas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                  | HB<br>(Brinell) | Chip Breaker Application |                      |
|-----|-----|---------------------------|-----------------|--------------------------|----------------------|
|     |     |                           |                 | 1 <sup>st</sup> choice   | Difficult Operations |
| P   | 1   | Unalloyed Steel           | 125-220         | ANHX 16... LP            | ANHX 16... MP        |
|     | 2   | Low-Alloyed Steel         | 220-280         | ANHX 16... LP            | ANHX 16... MP        |
|     | 3   | High-Alloyed Steel        | 280-380         | ANHX 16... LP            | ANHX 16... MP        |
| K   | 7   | Malleable Cast Iron       | 130-230         | ANHX 16... LP            | ANHX 16... MP        |
|     | 8   | Grey Cast Iron            | 180-245         | ANHX 16... LP            | ANHX 16... MP        |
|     | 9   | Nodular Cast iron         | 160-250         | ANHX 16... LP            | ANHX 16... MP        |
| N   | 10  | Aluminium and Non Ferrous | 30-130          | ANHX 16... LN            | -                    |

## PLUNGING | Mergulho | Plunge

| L≤3Dc                 | L>3Dc     | S max.                                 |
|-----------------------|-----------|----------------------------------------|
| f <sub>z</sub> (mm/t) |           |                                        |
| 0,10-0,20             | 0,10-0,14 | $S_{max} = \sqrt{D_C \cdot DR - DR^2}$ |



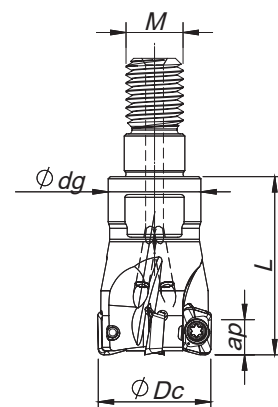
| S max and DR corresponding cutting diameter Dc (mm) |         |      |      |      |      |      |      |      |
|-----------------------------------------------------|---------|------|------|------|------|------|------|------|
| DR (mm)                                             | Dc (mm) |      |      |      |      |      |      |      |
|                                                     | 32      | 40   | 50   | 63   | 80   | 100  | 125  | 160  |
| 1,0                                                 | 5,6     | 6,2  | 7,0  | 7,9  | 8,9  | 9,9  | 11,1 | 12,6 |
| 2,0                                                 | 7,7     | 8,7  | 9,8  | 11,0 | 12,5 | 14,0 | 15,7 | 17,8 |
| 3,0                                                 | 9,3     | 10,5 | 11,9 | 13,4 | 15,2 | 17,1 | 19,1 | 21,7 |
| 4,0                                                 | 10,6    | 12,0 | 13,6 | 15,4 | 17,4 | 19,6 | 22,0 | 25,0 |
| 5,0                                                 | 11,6    | 13,2 | 15,0 | 17,0 | 19,4 | 21,8 | 24,5 | 27,8 |





## Threaded Coupling

$K_r=90^\circ$  |  $\gamma_p=+4^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |     |      |    | Kg   | Max ap (mm) |      |      | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----|------|----|------|-------------|------|------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | ØM  | Ødg  | L  |      | LP LN       | HF   | MH   |                               |       |
| 181120400            | 010R20090-02-04-M06020                | 2 | 10                                        | M6  | 9,8  | 20 | 0,01 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181112800            | 011R20090-02-04-M06020                | 2 | 11                                        | M6  | 9,8  | 20 | 0,01 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181120500            | 012R20090-03-04-M06020                | 3 | 12                                        | M6  | 9,8  | 20 | 0,02 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181112900            | 013R20090-03-04-M06020                | 3 | 13                                        | M6  | 9,8  | 20 | 0,02 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181087500            | 016R20090-04-04-M08025                | 4 | 16                                        | M8  | 13,0 | 25 | 0,03 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181113000            | 017R20090-04-04-M08025                | 4 | 17                                        | M8  | 13,0 | 25 | 0,04 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181087600            | 020R20090-05-04-M10030                | 5 | 20                                        | M10 | 18,0 | 30 | 0,06 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181087700            | 025R20090-07-04-M12030                | 7 | 25                                        | M12 | 21,0 | 30 | 0,09 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181087800            | 032R20090-08-04-M16035                | 8 | 32                                        | M16 | 29,0 | 35 | 0,19 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |

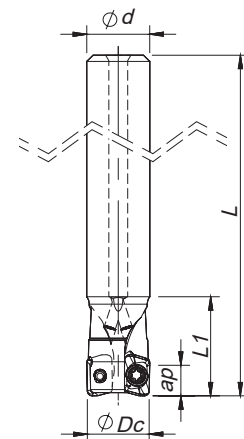
Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



## Cylindrical Shank

$K_r=90^\circ$  |  $\gamma_p=+4^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg   | Max ap (mm) |      |      | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|------|-------------|------|------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1 |      | LP LN       | HF   | MH   |                               |       |
| 181087100            | 010E20090-02-04-010055                | 2 | 10                                        | 10 | 55  | 16 | 0,03 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181108300            | 010E20090-02-04-010100                | 2 | 10                                        | 10 | 100 | 25 | 0,03 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181087200            | 012E20090-02-04-012080                | 2 | 12                                        | 12 | 80  | 17 | 0,06 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181109900            | 012E20090-03-04-012120                | 3 | 12                                        | 12 | 120 | 30 | 0,06 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181087300            | 016E20090-03-04-016090                | 3 | 16                                        | 16 | 90  | 20 | 0,12 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181087400            | 016E20090-04-04-016090                | 4 | 16                                        | 16 | 90  | 20 | 0,11 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181097100            | 017E20090-05-04-016090                | 5 | 17                                        | 16 | 90  | 35 | 0,11 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |
| 181097200            | 021E20090-05-04-020090                | 5 | 21                                        | 20 | 90  | 35 | 0,13 | 4,00        | 0,30 | 2,00 | XP... 0602...                 |       |

Stock item | Produto de stock | Itens de stock

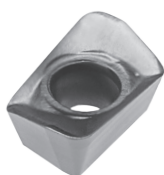
Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



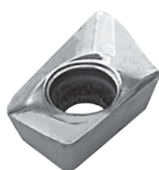


# XP... 0602... || Inserts | Pastilhas | Plaquetas

XPET-LP



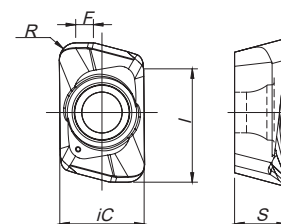
XPET-LN



PHH  
NEW  
GRADE

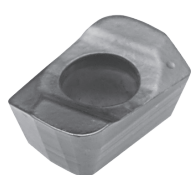
PHP  
NEW  
GRADE

XPET-LP | LN

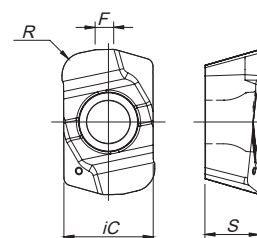


XPET-HF

(HiFeed geometry)

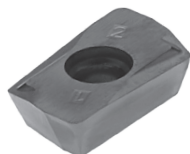


XPET-HF

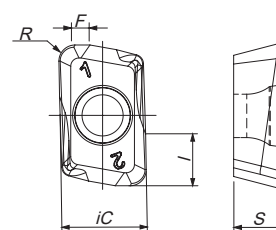


XPHW-MH

(finishing geometry)



XPHW-MH



|                         |                     | P              |        |        |        | M      | K      |        | N      | S      | H      |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |      |      |
|-------------------------|---------------------|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|------|------|------|
|                         |                     | PVD            |        |        |        | PVD    | CVD    | PVD    | UNC    | PVD    | PVD    |        |                                                |      |      |      |      |
|                         |                     | (2) Grade code | X4     | X6     | T1     | P4     | X9     | T1     | P4     | 10     | X9     | X4     |                                                |      |      |      |      |
| (1)<br>Geometry<br>code | ISO<br>Reference    | PHH603         | PHH910 | PHP920 | PHP930 | PHH930 | PHP920 | PHP930 | PH0910 | PHH930 | PHH603 | PHH910 | iC                                             | S    | I    | R    | F    |
| 1112002                 | XPET 060204 PDER-LP |                |        |        |        |        |        |        |        |        |        |        | 3,90                                           | 2,40 | 5,30 | 0,40 | 0,80 |
| 1112003                 | XPET 060208 PDER-LP |                |        |        |        |        |        |        |        |        |        |        | 3,90                                           | 2,40 | 5,30 | 0,80 | 0,70 |
| 1112004                 | XPET 060216 PDER-LP |                |        |        |        |        |        |        |        |        |        |        | 3,90                                           | 2,40 | 5,30 | 1,60 | 0,60 |
| 1112579                 | XPET 060202 PDFR-LN |                |        |        |        |        |        |        |        |        |        |        | 3,90                                           | 2,40 | 5,10 | 0,20 | 0,95 |
| 1112580                 | XPET 060204 PDFR-LN |                |        |        |        |        |        |        |        |        |        |        | 3,90                                           | 2,40 | 5,10 | 0,40 | 0,80 |
| 1112049                 | XPET 060210 ZER-HF  |                |        |        |        |        |        |        |        |        |        |        | 3,90                                           | 2,40 | -    | 1,00 | 0,80 |
| 1112259                 | XPHW 060208 ZER-MH  |                |        |        |        |        |        |        |        |        |        |        | 3,90                                           | 2,40 | 2,40 | 0,80 | 0,70 |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta  
(consulte a página A-9) | Disponible bajo consulta (mire página A-9)

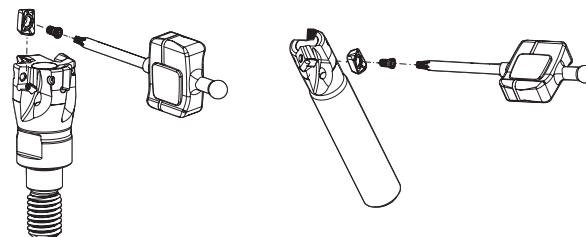
Insert order code = (1) Geometry Code + (2) Grade Code



# LINEPRO 20090

## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc  | Insert Screw | Key (Torx) | Order separately   |              |
|----------------|--------------|------------|--------------------|--------------|
|                |              |            | Key<br>(Torx - Nm) | Torque Value |
| E20090 - 10    | P0180300     | XT06IP     | DT0606IP           | 0,6          |
| E20090 - 12-16 | P0180400     | XT06IP     | DT0606IP           | 0,6          |
| R20090 - 12-16 | P0180400     | XT06IP     | DT0606IP           | 0,6          |



Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades            |        |        |             |        |        |
|-----|-----|-----------------------------------|-----------------|-------------------|--------|--------|-------------|--------|--------|
|     |     |                                   |                 | ← Wear Resistance |        |        | Toughness → |        |        |
|     |     |                                   |                 | PH0910            | PHH603 | PHH910 | PHP920      | PHP930 | PHH930 |
| P   | 1   | Unalloyed Steel                   | 125-220         | ●                 | ●      | ●      | ✓           | ✓      |        |
|     | 2   | Low-Alloyed Steel                 | 220-280         |                   |        | ✓      | ✓           | ✓      |        |
|     | 3   | High-Alloyed Steel                | 280-380         |                   | ✓      | ✓      | ✓           | ✓      |        |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                   |        |        |             |        | ✓      |
|     | 5   | SS - Austenitic                   | 200-330         |                   |        |        |             |        | ✓      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                   |        |        |             |        | ✓      |
| K   | 7   | Malleable Cast Iron               | 130-230         |                   |        |        | ✓           | ✓      |        |
|     | 8   | Grey Cast Iron                    | 180-245         |                   |        |        | ✓           | ✓      |        |
|     | 9   | Nodular Cast iron                 | 160-250         |                   |        |        | ✓           | ✓      |        |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | ✓                 |        |        |             |        |        |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                   |        |        |             |        | ✓      |
| H   | 12  | Hardened Steels                   | 40-55 HRC       |                   | ✓      | ✓      |             |        |        |

- Good Conditions
- Average Conditions
- Difficult Conditions

# RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |         |         |             |         |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|---------|---------|-------------|---------|
|     |     |                                   |                 | ← Wear Resistance |         |         |         | Toughness → |         |
|     |     |                                   |                 | PH0910            | PHH603  | PHH910  | PHP920  | PHP930      | PHH930  |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                 | -       | -       | 180-250 | 160-230     | -       |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                 | -       | 160-270 | 160-230 | 140-210     | -       |
|     | 3   | High-Alloyed Steel                | 280-380         | -                 | 180-310 | 140-230 | 140-220 | 120-200     | -       |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | -       | -       | -           | 140-210 |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | -       | -       | -           | 120-170 |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | -       | -       | -           | 100-150 |
| K   | 7   | Malleable Cast Iron               | 130-230         | -                 | -       | -       | 160-270 | 150-250     | -       |
|     | 8   | Grey Cast Iron                    | 180-245         | -                 | -       | -       | 140-250 | 140-230     | -       |
|     | 9   | Nodular Cast iron                 | 160-250         | -                 | -       | -       | 120-210 | 100-200     | -       |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | 100-2000          | -       | -       | -       | -           | -       |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       | -       | -       | -           | 30-110  |
| H   | 12  | Hardened Steels                   | 40-55 HRC       | -                 | 70-270  | 70-260  | -       | -           | -       |

| ISO | PSM | Material                          | HB<br>(Brinell) | Feed fz (mm/t) |              |              |              |
|-----|-----|-----------------------------------|-----------------|----------------|--------------|--------------|--------------|
|     |     |                                   |                 | XPET 06...LP   | XPET 06...LN | XPET 06...HF | XPHW 06...MH |
| P   | 1   | Unalloyed Steel                   | 125-220         | 0,05-0,07      | -            | 0,40-0,80    | -            |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 0,05-0,07      | -            | 0,40-0,80    | 0,05-0,12    |
|     | 3   | High-Alloyed Steel                | 280-380         | 0,05-0,07      | -            | 0,40-0,60    | 0,05-0,12    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | 0,05-0,07      | -            | 0,40-0,80    | -            |
|     | 5   | SS - Austenitic                   | 200-330         | 0,05-0,07      | -            | 0,40-0,60    | -            |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | 0,05-0,07      | -            | 0,40-0,60    | -            |
| K   | 7   | Malleable Cast Iron               | 130-230         | 0,05-0,07      | -            | 0,40-0,80    | -            |
|     | 8   | Grey Cast Iron                    | 180-245         | 0,05-0,07      | -            | 0,40-0,80    | -            |
|     | 9   | Nodular Cast iron                 | 160-250         | 0,05-0,07      | -            | 0,40-0,80    | -            |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | -              | 0,05-0,07    | -            | -            |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | 0,05-0,07      | -            | 0,40-0,60    | -            |
| H   | 12  | Hardened Steels                   | 40-55 HRC       | -              | -            | -            | 0,03-0,10    |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) PH5... and PH5... can be used wet or dry. PH7... use only air.

(Note 4) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

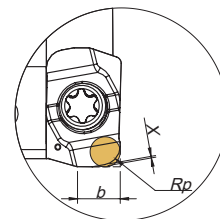
| Operation   | $a_e$ | Vc & fz | $a_p$ (mm) |
|-------------|-------|---------|------------|
| Slotting    | 100%  | <20%    | 1,0-3,0    |
| Shouldering | <50%  | >8%     | 1,0-4,0    |
|             | ≤25%  | >12%    | 1,0-4,0    |

## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra- aparas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | XPET 06... LP/HF         | -                    |
|     | 2   | Low-Alloyed Steel                 | 220-280         | XPET 06... LP/HF         | XPHW 06... MH        |
|     | 3   | High-Alloyed Steel                | 280-380         | XPET 06... LP/HF         | XPHW 06... MH        |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | XPET 06... LP/HF         | -                    |
|     | 5   | SS - Austenitic                   | 200-330         | XPET 06... LP/HF         | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | XPET 06... LP/HF         | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230         | XPET 06... LP/HF         | -                    |
|     | 8   | Grey Cast Iron                    | 180-245         | XPET 06... LP/HF         | -                    |
|     | 9   | Nodular Cast iron                 | 160-250         | XPET 06... LP/HF         | -                    |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | XPET 06... LN            | -                    |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | XPET 06... LP/HF         | -                    |
| H   | 12  | Hardened Steels                   | 40-55 HRC       | XPHW 06... MH            | -                    |

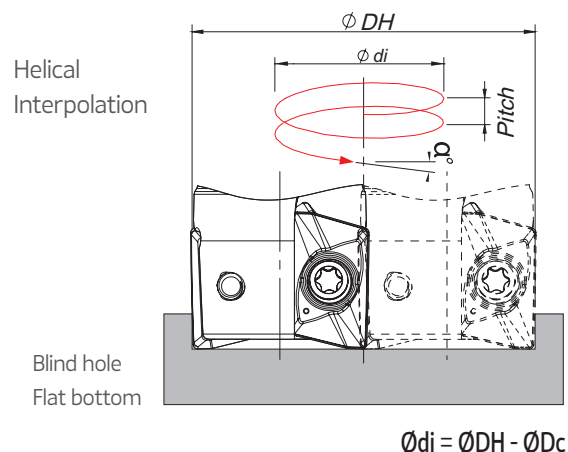
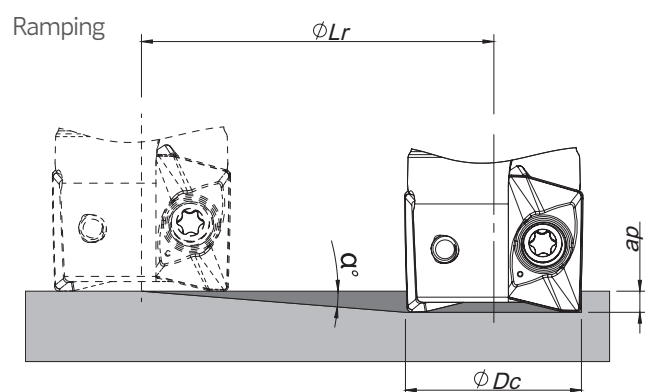
## PROGRAMMING DATA | Dados para programação | Datos para la programación

| Insert     | Programming Data |      |     |
|------------|------------------|------|-----|
|            | Rp               | X    | b   |
| XPET 06 HF | 1,1              | 0,84 | 2,3 |



## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular



| $\varnothing Dc$ | Ramping            |          |          | Helical Interpolation                         |                        |                |
|------------------|--------------------|----------|----------|-----------------------------------------------|------------------------|----------------|
|                  |                    |          |          | Diameter for Blind Hole, Flat Bottom Face (1) |                        | Max Pitch/Rev. |
|                  | Max Ramp $a^\circ$ | Max $ap$ | Min $Lr$ | $\varnothing DH_{min}$                        | $\varnothing DH_{max}$ |                |
| 10               | 5,5                | 4,0      | 41,5     | 17,2<br>-                                     | -<br>18,4              | 2,2<br>2,5     |
| 12               | 4,0                | 4,0      | 57,2     | 21,2<br>-                                     | -<br>22,4              | 2,0<br>2,3     |
| 16               | 2,5                | 4,0      | 91,6     | 29,2<br>-                                     | -<br>30,4              | 1,8<br>2,0     |
| 17               | 2,2                | 4,0      | 104,1    | 31,2<br>-                                     | -<br>32,4              | 1,7<br>1,9     |
| 20               | 1,9                | 4,0      | 120,6    | 37,2<br>-                                     | -<br>38,4              | 1,8<br>1,9     |
| 21               | 1,6                | 4,0      | 143,2    | 39,2<br>-                                     | -<br>40,4              | 1,6<br>1,7     |
| 25               | 1,3                | 4,0      | 171,0    | 47,2<br>-                                     | -<br>48,4              | 1,6<br>1,7     |
| 32               | 1,0                | 4,0      | 229,2    | 61,2<br>-                                     | -<br>62,4              | 1,6<br>1,7     |

(1) using LP insert with radius 0,8 mm

Note: During helical interpolation do not exceed maximum pitch

When using HF insert or other different insert radius to calculate the  $\varnothing DH_{min}$  and  $\varnothing DH_{max}$  use the equation below:

- Minimum Diameter:  $\varnothing DH_{min} = 2 \times (\varnothing Dc - (R \text{ corner radius} + F \text{ width of edge wiper}))$

- Maximum Diameter:  $\varnothing DH_{max} = 2 \times (\varnothing Dc - R \text{ corner radius})$

(On HF insert the corner radius should be corner radius programming)



A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

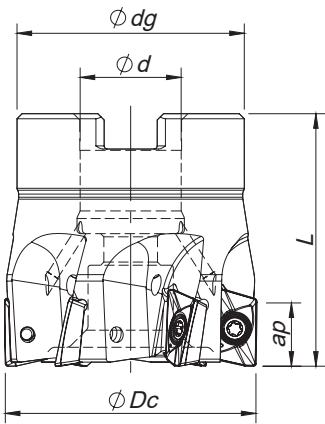
Spare Parts

Technical Data

End Mills



Arbor Mounting  
 $K_r=90^\circ$  |  $\gamma_p=+8^\circ$



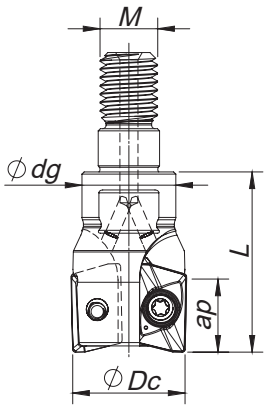
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg   | Max ap (mm) |      |      | Arbor Style | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----------|----|------|-------------|------|------|-------------|-------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi d$ | $\phi dg$ | L  |      | LP/MP       | HF   | MH   |             |                               |       |
| 181088600            | 040A20190-06-08-016040                | 6 | 40                                        | 16       | 36        | 40 | 0,22 | 10,0        | 0,80 | 3,00 | A           | XP... 1003...                 |       |
| 181088700            | 050A20190-07-08-022040                | 7 | 50                                        | 22       | 42        | 40 | 0,31 | 10,0        | 0,80 | 3,00 | A           | XP... 1003...                 |       |
| 181088800            | 063A20190-08-08-022040                | 8 | 63                                        | 22       | 52        | 40 | 0,43 | 10,0        | 0,80 | 3,00 | A           | XP... 1003...                 |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



Threaded Coupling  
 $K_r=90^\circ$  |  $\gamma_p=+5^\circ \sim +6^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg   | Max ap (mm) |      |      | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----------|----|------|-------------|------|------|-------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi M$ | $\phi dg$ | L  |      | LP/MP       | HF   | MH   |                               |       |
| 181088200            | 016R20190-02-05-M08025                | 2 | 16                                        | M8       | 14        | 25 | 0,03 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181088300            | 020R20190-03-05-M10030                | 3 | 20                                        | M10      | 18        | 30 | 0,06 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181088400            | 025R20190-04-05-M12035                | 4 | 25                                        | M12      | 21        | 35 | 0,12 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181088500            | 032R20190-05-06-M16035                | 5 | 32                                        | M16      | 29        | 35 | 0,15 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181149100            | 040R20190-06-08-M16043                | 6 | 40                                        | M16      | 29        | 43 | 0,25 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |

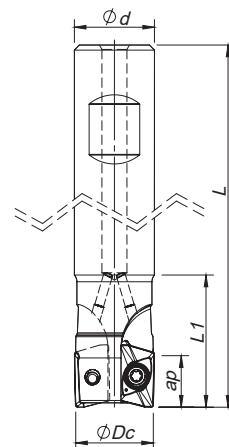
Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



### Weldon Shank

$K_r=90^\circ$  |  $\gamma_p=+5^\circ \sim 8^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg   | Max ap (mm) |      |      | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|------|-------------|------|------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1 |      | LP/MP       | HF   | MH   |                               |       |
| 181087900            | 016W20190-02-05-016085                | 2 | 16                                        | 16 | 85  | 32 | 0,10 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181100600            | 016W20190-02-05-016150                | 2 | 16                                        | 16 | 150 | 70 | 0,13 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181108600            | 017W20190-02-05-016150                | 2 | 17                                        | 16 | 150 | 36 | 0,14 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181088000            | 020W20190-03-05-020090                | 3 | 20                                        | 20 | 90  | 28 | 0,21 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181100700            | 020W20190-03-05-020150                | 3 | 20                                        | 20 | 150 | 70 | 0,26 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181108700            | 022W20190-03-05-020150                | 3 | 22                                        | 20 | 150 | 70 | 0,30 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181088100            | 025W20190-04-05-025095                | 4 | 25                                        | 25 | 95  | 30 | 0,33 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181100800            | 025W20190-04-05-025150                | 4 | 25                                        | 25 | 150 | 80 | 0,36 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181108800            | 027W20190-04-05-025150                | 4 | 27                                        | 25 | 150 | 80 | 0,38 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |
| 181085400            | 032W20190-04-08-032110                | 4 | 32                                        | 32 | 110 | 50 | 0,55 | 10,0        | 0,80 | 3,00 | XP... 1003...                 |       |

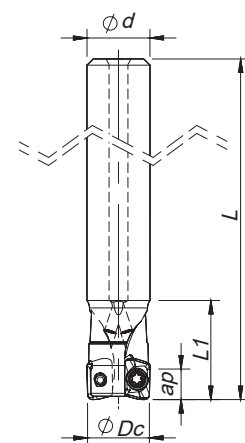
Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



### Cylindrical Shank

$K_r=90^\circ$  |  $\gamma_p=+4^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg   | Max ap (mm) |     |     | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|------|-------------|-----|-----|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1 |      | LP/MP       | HF  | MH  |                               |       |
| 181171700            | 016E20190-02-05-016085                | 2 | 16                                        | 16 | 85  | 32 | 0,10 | 10,0        | 0,8 | 3,0 | XP...1003...                  |       |
| 181173000            | 016E20190-02-05-016150                | 2 | 16                                        | 16 | 150 | 70 | 0,13 | 10,0        | 0,8 | 3,0 | XP...1003...                  |       |
| 181171600            | 020E20190-03-05-020090                | 3 | 20                                        | 20 | 90  | 28 | 0,21 | 10,0        | 0,8 | 3,0 | XP...1003...                  |       |
| 181171800            | 020E20190-03-05-020150                | 3 | 20                                        | 20 | 150 | 70 | 0,26 | 10,0        | 0,8 | 3,0 | XP...1003...                  |       |
| 181171400            | 025E20190-04-05-025095                | 4 | 25                                        | 25 | 95  | 30 | 0,33 | 10,0        | 0,8 | 3,0 | XP...1003...                  |       |
| 181172900            | 025E20190-04-05-025150                | 4 | 25                                        | 25 | 150 | 80 | 0,36 | 10,0        | 0,8 | 3,0 | XP...1003...                  |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

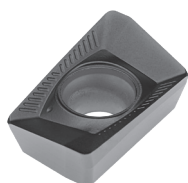




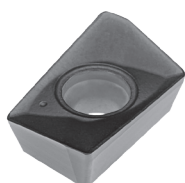
# LINEPRO 20190

XP... 1003... || Inserts | Pastilhas | Plaquitas

XPET-LP  
(PHH-PHP grade)



XPET-MP  
(PHH-PHP grade)



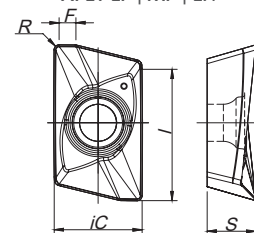
XPET-LN



PHH  
NEW  
GRADE

PHP  
NEW  
GRADE

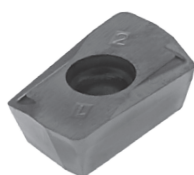
XPET-LP | MP | LN



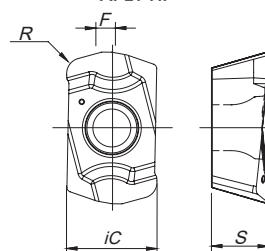
XPET-HF  
(HiFeed geometry)



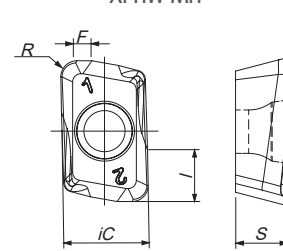
XPHW-MH  
(finishing geometry)



XPET-HF

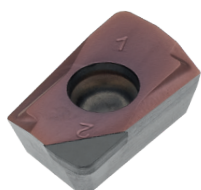


XPHW-MH

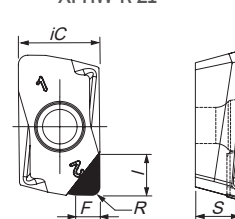


XPHW-R Z1

NEW



XPHW-R Z1



|                         |                     | P              |        |        |        |        | M      | K      |        |        |        |        | N      | S      | H      |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |       |      |      |
|-------------------------|---------------------|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|------|-------|------|------|
|                         |                     | CVD            | PVD    |        |        |        | PVD    | CVD    |        | PVD    |        |        | UNC    | PCD    | PVD    | PVD    |                                                |      |      |       |      |      |
|                         |                     | (2) Grade code | T9     | G1     | X5     | T1     | P4     | X9     | L5     | L9     | X5     | T1     | P4     | 10     | D6     | X9     |                                                |      |      |       |      | X4   |
| (1)<br>Geometry<br>code | ISO<br>Reference    | PH5740         | PH7910 | PHP910 | PHP920 | PHP930 | PHH930 | PH5705 | PH5740 | PHP910 | PHP920 | PHP930 | PH0910 | PDP410 | PHH930 | PHH603 | PHH910                                         | iC   | S    | I     | R    | F    |
| 1113132                 | XPET 100302 PDER-LP |                |        |        |        |        | Ⓢ      |        |        |        |        |        |        |        | Ⓢ      |        |                                                | 6,95 | 3,96 | 10,50 | 0,20 | 1,50 |
| 1111980                 | XPET 100304 PDER-LP |                |        |        | Ⓢ      | Ⓢ      | Ⓢ      |        |        |        | Ⓢ      | Ⓢ      |        |        | Ⓢ      |        |                                                | 6,95 | 3,96 | 10,50 | 0,40 | 1,30 |
| 1111981                 | XPET 100308 PDER-LP | Ⓢ              |        |        | Ⓢ      | Ⓢ      | Ⓢ      |        |        |        | Ⓢ      | Ⓢ      |        |        | Ⓢ      |        |                                                | 6,95 | 3,96 | 10,50 | 0,80 | 1,40 |
| 1112022                 | XPET 100316 PDER-LP |                |        |        | Ⓢ      | Ⓢ      | Ⓢ      |        |        |        | Ⓢ      | Ⓢ      |        |        | Ⓢ      |        |                                                | 6,95 | 3,96 | 10,50 | 1,60 | 0,80 |
| 1111982                 | XPET 100304 PDSR-MP |                | Ⓢ      |        | Ⓢ      | Ⓢ      |        | Ⓢ      | Ⓢ      |        | Ⓢ      | Ⓢ      |        |        |        |        |                                                | 6,95 | 3,96 | 10,50 | 0,40 | 1,10 |
| 1111983                 | XPET 100308 PDSR-MP | Ⓢ              | Ⓢ      |        | Ⓢ      | Ⓢ      |        | Ⓢ      | Ⓢ      |        | Ⓢ      | Ⓢ      |        |        |        |        |                                                | 6,95 | 3,96 | 10,50 | 0,80 | 1,35 |
| 1111984                 | XPET 100304 PDFR-LN |                |        |        |        |        |        |        |        |        |        |        | Ⓢ      |        |        |        |                                                | 6,95 | 3,96 | 10,50 | 0,40 | 0,75 |
| 1112906                 | XPET 100308 PDFR-LN |                |        |        |        |        |        |        |        |        |        |        | Ⓢ      |        |        |        |                                                | 6,95 | 3,96 | 10,50 | 0,80 | 1,05 |
| 1111985                 | XPET 100312 PDFR-LN |                |        |        |        |        |        |        |        |        |        |        | Ⓢ      |        |        |        |                                                | 6,95 | 3,96 | 10,50 | 1,20 | 0,75 |
| 1112376                 | XPET 100312 ZDR-HF  |                |        | Ⓢ      | Ⓢ      | Ⓢ      | Ⓢ      |        |        | Ⓢ      | Ⓢ      | Ⓢ      |        |        | Ⓢ      |        |                                                | 6,95 | 3,96 | -     | 1,20 | 1,50 |
| 1112500                 | XPHW 100308 ZER-MH  |                |        |        |        |        |        |        |        |        |        |        |        |        |        | Ⓢ      | Ⓢ                                              | 6,95 | 3,60 | 3,00  | 0,80 | 1,30 |
| 1112736                 | XPHW 100310 ZER-MH  |                |        |        |        |        |        |        |        |        |        |        |        |        |        | Ⓢ      |                                                | 6,95 | 3,60 | 3,00  | 1,00 | 0,35 |
| 1112735                 | XPHW 100320 ZER-MH  |                |        |        |        |        |        |        |        |        |        |        |        |        |        | Ⓢ      |                                                | 6,95 | 3,60 | 3,00  | 1,20 | 1,10 |
| 1112556                 | XPHW 100308 R Z1    |                |        |        |        |        |        |        |        |        |        |        |        | Ⓢ      |        |        |                                                | 6,95 | 3,60 | 3,80  | 0,80 | 2,30 |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

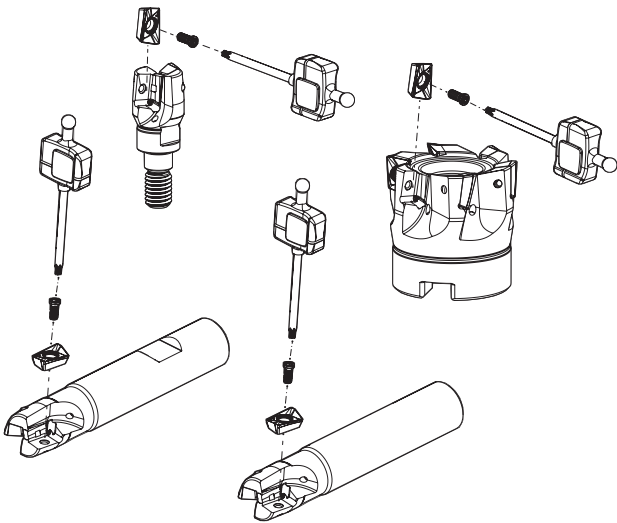
Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

SPARE PARTS | Complementos | Repuestos

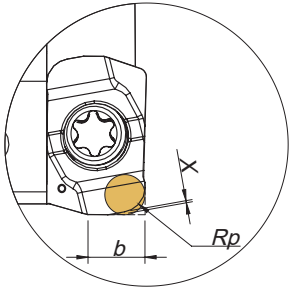
| Cutter<br>ØDc  | Insert Screw | Key (Torx) | Order separately   |              |
|----------------|--------------|------------|--------------------|--------------|
|                |              |            | Key<br>(Torx - Nm) | Torque Value |
| A20190 - 40-63 | P0250704     | XT08       | DT0812             | 1,2          |
| R20190 - 16    | P0250503     | XT08       | DT0812             | 1,2          |
| R20190 - 20-40 | P0250704     | XT08       | DT0812             | 1,2          |
| W20190 - 16-17 | P0250503     | XT08       | DT0812             | 1,2          |
| W20190 - 20-32 | P0250704     | XT08       | DT0812             | 1,2          |
| E20190 - 16    | P0250503     | XT08       | DT0812             | 1,2          |
| E20190 - 20-25 | P0250704     | XT08       | DT0812             | 1,2          |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



PROGRAMMING DATA | Dados para programação | Datos para la programación

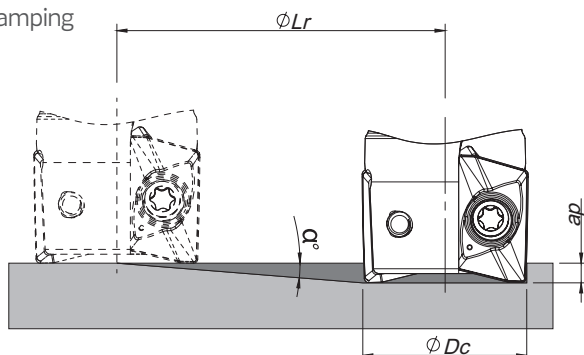
| Insert     | Programming Data |      |      |
|------------|------------------|------|------|
|            | Rp               | X    | b    |
| XPET 10 HF | 1,6              | 0,33 | 3,45 |



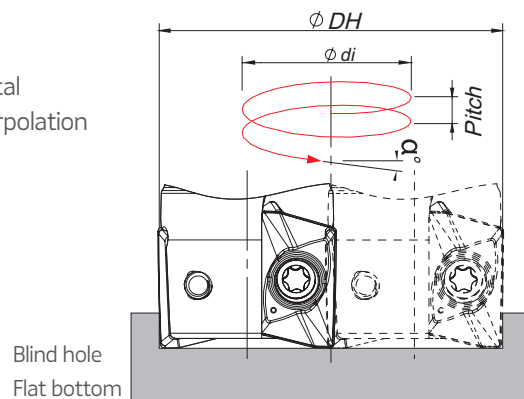
## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular

Ramping



Helical Interpolation



$$\phi di = \phi DH - \phi Dc$$

| $\phi Dc$ | Ramping                 |          |          | Helical Interpolation                         |                 |                |
|-----------|-------------------------|----------|----------|-----------------------------------------------|-----------------|----------------|
|           |                         |          |          | Diameter for Blind Hole, Flat Bottom Face (1) |                 | Max Pitch/Rev. |
|           | Max Ramp $\alpha^\circ$ | Max $ap$ | Min $Lr$ | $\phi DH_{min}$                               | $\phi DH_{max}$ |                |
| 16        | 7,5                     | 10,0     | 76,0     | 27,6<br>-                                     | -<br>30,4       | 4,8<br>6,0     |
| 17        | 7,0                     | 10,0     | 81,4     | 29,6<br>-                                     | -<br>32,4       | 4,9<br>5,9     |
| 20        | 5,0                     | 10,0     | 114,3    | 35,6<br>-                                     | -<br>38,4       | 4,3<br>5,1     |
| 22        | 4,5                     | 10,0     | 127,1    | 39,6<br>-                                     | -<br>42,4       | 4,3<br>5,0     |
| 25        | 3,5                     | 10,0     | 163,5    | 45,6<br>-                                     | -<br>48,4       | 4,0<br>4,5     |
| 27        | 3,0                     | 10,0     | 190,8    | 49,6<br>-                                     | -<br>52,4       | 3,7<br>4,2     |
| 32        | 2,5                     | 10,0     | 229,0    | 59,6<br>-                                     | -<br>62,4       | 3,8<br>4,2     |
| 40        | 1,7                     | 10,0     | 336,9    | 75,6<br>-                                     | -<br>78,4       | 3,3<br>3,6     |
| 50        | 1,3                     | 10,0     | 440,7    | 95,6<br>-                                     | -<br>98,4       | 3,2<br>3,4     |
| 63        | 1,0                     | 10,0     | 572,9    | 121,6<br>-                                    | -<br>124,4      | 3,2<br>3,4     |

(1) using LP insert with radius 0,8 mm

Note: During helical interpolation do not exceed maximum pitch

When using HF insert or other different insert radius to calculate the  $\phi DH_{min}$  and  $\phi DH_{max}$  use the equation below:- Minimum Diameter:  $\phi DH_{min} = 2 \times (\phi Dc - (R \text{ corner radius} + F \text{ width of edge wiper}))$ - Maximum Diameter:  $\phi DH_{max} = 2 \times (\phi Dc - R \text{ corner radius})$

## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra- aparas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | XPET 10 ... LP/HF        | XPET 10 ... MP       |
|     | 2   | Low-Alloyed Steel                 | 220-280         | XPET 10 ... LP/HF        | XPET 10 ... MP       |
|     | 3   | High-Alloyed Steel                | 280-380         | XPET 10 ... MP/HF        | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | XPET 10 ... LP/HF        | -                    |
|     | 5   | SS - Austenitic                   | 200-330         | XPET 10 ... LP/HF        | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | XPET 10 ... LP/HF        | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230         | XPET 10 ... LP/HF        | XPET 10 ... MP       |
|     | 8   | Grey Cast Iron                    | 180-245         | XPET 10 ... MP/HF        | -                    |
|     | 9   | Nodular Cast iron                 | 160-250         | XPET 10 ... MP/HF        | -                    |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | XPET 10 ... LN/R Z1      | -                    |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | XPET 10 ... LP/HF        | -                    |
| H   | 12  | Hardened Steels                   | 40-55 HRC       | XPHW 10 ... MH           | -                    |

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades                                                                                        |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                                |                                                                                                 |                                                                                                 |                                                                                                 | PCD    |
|-----|-----|-----------------------------------|-----------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------|
|     |     |                                   |                 | ← Wear Resistance                                                                             |                                                                                               |                                                                                               |                                                                                               |                                                                                               | Toughness →                                                                                    |                                                                                                 |                                                                                                 |                                                                                                 |        |
|     |     |                                   |                 | PH0910<br> | PH5705<br> | PHH603<br> | PHP910<br> | PHP920<br> | PHP930<br> | PHH930<br> | PH5740<br> | PHS740<br> | PDP410 |
| P   | 1   | Unalloyed Steel                   | 125-220         |                                                                                               |                                                                                               |                                                                                               | ✓                                                                                             | ✓                                                                                             | ✓                                                                                              |                                                                                                 |                                                                                                 | ✓                                                                                               |        |
|     | 2   | Low-Alloyed Steel                 | 220-280         |                                                                                               |                                                                                               |                                                                                               | ✓                                                                                             | ✓                                                                                             | ✓                                                                                              |                                                                                                 |                                                                                                 | ✓                                                                                               |        |
|     | 3   | High-Alloyed Steel                | 280-380         |                                                                                               |                                                                                               | ✓                                                                                             | ✓                                                                                             | ✓                                                                                             | ✓                                                                                              |                                                                                                 |                                                                                                 | ✓                                                                                               |        |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                                | ✓                                                                                               |                                                                                                 |                                                                                                 |        |
|     | 5   | SS - Austenitic                   | 200-330         |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                                | ✓                                                                                               |                                                                                                 |                                                                                                 |        |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                                | ✓                                                                                               |                                                                                                 |                                                                                                 |        |
| K   | 7   | Malleable Cast Iron               | 130-230         |                                                                                               | ✓                                                                                             |                                                                                               | ✓                                                                                             | ✓                                                                                             | ✓                                                                                              |                                                                                                 | ✓                                                                                               |                                                                                                 |        |
|     | 8   | Grey Cast Iron                    | 180-245         |                                                                                               | ✓                                                                                             |                                                                                               | ✓                                                                                             | ✓                                                                                             | ✓                                                                                              |                                                                                                 | ✓                                                                                               |                                                                                                 |        |
|     | 9   | Nodular Cast iron                 | 160-250         |                                                                                               | ✓                                                                                             |                                                                                               | ✓                                                                                             | ✓                                                                                             | ✓                                                                                              |                                                                                                 | ✓                                                                                               |                                                                                                 |        |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | ✓                                                                                             |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                                |                                                                                                 |                                                                                                 |                                                                                                 | ✓      |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                                | ✓                                                                                               |                                                                                                 |                                                                                                 |        |
| H   | 12  | Hardened Steels                   | 40-55 HRC       |                                                                                               |                                                                                               | ✓                                                                                             |                                                                                               |                                                                                               |                                                                                                |                                                                                                 |                                                                                                 |                                                                                                 |        |



Good Conditions



Average Conditions



Difficult Conditions



## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |         |         |         |             |         |         |         | PCD      |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|---------|---------|---------|-------------|---------|---------|---------|----------|
|     |     |                                   |                 | ← Wear Resistance |         |         |         |         | Toughness → |         |         |         |          |
|     |     |                                   |                 | PH0910            | PH5705  | PHH603  | PHP910  | PHP920  | PHP930      | PHH930  | PH5740  | PHS740  | PDP410   |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                 | -       | -       | 180-250 | 180-250 | 160-230     | -       | -       | 140-220 | -        |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                 | -       | -       | 160-240 | 160-230 | 140-210     | -       | -       | 120-200 | -        |
|     | 3   | High-Alloyed Steel                | 280-380         | -                 | -       | 180-310 | 140-230 | 140-220 | 120-200     | -       | -       | 100-190 | -        |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | -       | -       | -       | -           | 140-210 | -       | -       | -        |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | -       | -       | -       | -           | 120-170 | -       | -       | -        |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | -       | -       | -       | -           | 100-150 | -       | -       | -        |
| K   | 7   | Malleable Cast Iron               | 130-230         | -                 | 160-290 | -       | 180-300 | 160-270 | 150-250     | -       | 160-260 | -       | -        |
|     | 8   | Grey Cast Iron                    | 180-245         | -                 | 170-320 | -       | 160-250 | 140-250 | 140-230     | -       | 140-240 | -       | -        |
|     | 9   | Nodular Cast iron                 | 160-250         | -                 | 140-200 | -       | 150-210 | 120-210 | 100-200     | -       | 120-200 | -       | -        |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | 100-2000          | -       | -       | -       | -       | -           | -       | -       | -       | 100-3000 |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       | -       | -       | -       | -           | 30-110  | -       | -       | -        |
| H   | 12  | Hardened Steels                   | 40-55 HRC       | -                 | -       | 70-270  | -       | -       | -           | -       | -       | -       | -        |

(Note 1): Cutting conditions  $a_e/D_c=70\%$ .

(Note 2): PH5... and PHS... can be used wet or dry. PH7... use only air.

(Note 3):

| Operation   | $a_e$ | Vc & fz | $a_p$ (mm) |
|-------------|-------|---------|------------|
| Slotting    | 100%  | <20%    | 2,0-4,0    |
| Shouldering | <50%  | >8%     | 3,0-6,0    |
|             | ≤25%  | >12%    | 7,0-9,0    |

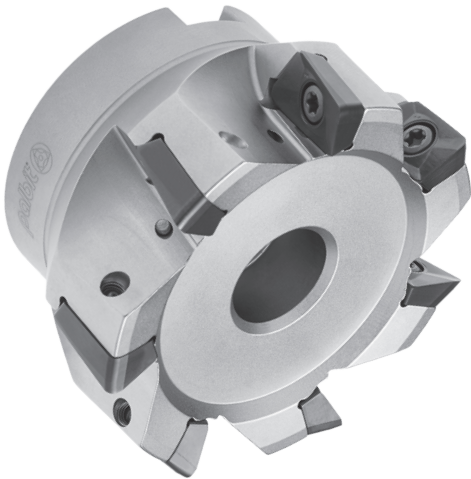
(Note 4):

It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

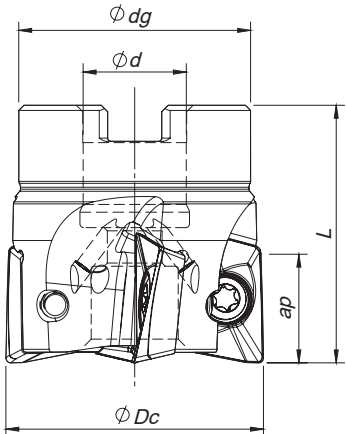
- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

| Feed fz (mm/t) |               |                    |               |               |
|----------------|---------------|--------------------|---------------|---------------|
| XPET 10... LP  | XPET 10... MP | XPET 10... LN/R Z1 | XPET 10... HF | XPHW 10... MH |
| 0,08-0,20      | 0,10-0,25     | -                  | 0,40-0,80     | 0,10-0,25     |
| 0,08-0,20      | 0,10-0,20     | -                  | 0,40-0,80     | 0,10-0,25     |
| 0,08-0,15      | 0,10-0,20     | -                  | 0,40-0,60     | 0,10-0,25     |
| 0,08-0,20      | 0,10-0,20     | -                  | 0,40-0,70     | -             |
| 0,08-0,20      | 0,10-0,20     | -                  | 0,40-0,70     | -             |
| 0,08-0,15      | 0,10-0,20     | -                  | 0,40-0,60     | -             |
| 0,08-0,20      | 0,10-0,25     | -                  | 0,50-0,80     | -             |
| 0,08-0,20      | 0,10-0,25     | -                  | 0,50-0,80     | -             |
| 0,08-0,20      | 0,10-0,20     | -                  | 0,50-0,60     | -             |
| -              | -             | 0,07-0,25          | -             | -             |
| 0,05-0,07      | -             | -                  | 0,40-0,60     | -             |
| -              | -             | -                  | -             | 0,08-0,15     |





Arbor Mounting  
 $K_r=90^\circ$  |  $\gamma_p=+7^\circ \sim +8^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |                 |                  |    | Kg   | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----------------|------------------|----|------|----------------|----------------|-------------------------------|-------|
|                      |                                       |   | $\varnothing Dc$                          | $\varnothing d$ | $\varnothing dg$ | L  |      | Arbor<br>Type  | Ap max<br>(mm) |                               |       |
| 181090900            | 040A20290-04-07-016040                | 4 | 40                                        | 16              | 32               | 40 | 0,18 | A              | 17,0           | XPET 1706...                  |       |
| 181091000            | 050A20290-05-08-022040                | 5 | 50                                        | 22              | 42               | 40 | 0,29 | A              | 17,0           | XPET 1706...                  |       |
| 181091100            | 063A20290-06-08-027040*               | 6 | 63                                        | 27              | 52               | 40 | 0,53 | A              | 17,0           | XPET 1706...                  |       |
| 181091200            | 080A20290-07-08-027050                | 7 | 80                                        | 27              | 60               | 50 | 0,92 | A              | 17,0           | XPET 1706...                  |       |
| 181091300            | 100A20290-08-08-032050                | 8 | 100                                       | 32              | 80               | 50 | 1,68 | A              | 17,0           | XPET 1706...                  |       |
| 181091400            | 125A20290-09-08-040063                | 9 | 125                                       | 40              | 90               | 63 | 3,01 | A              | 17,0           | XPET 1706...                  |       |

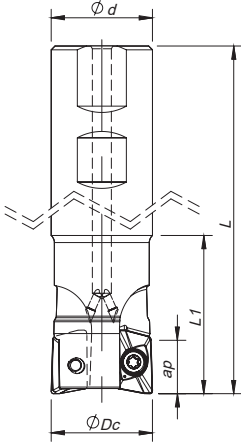
Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

\* For shank assembly a DIN 6920 screw is needed.



Weldon Shank  
 $K_r=90^\circ$  |  $\gamma_p=+6^\circ \sim +7^\circ$

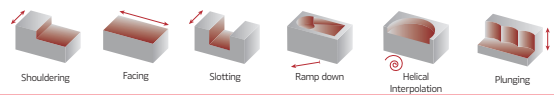


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |                 |     |    | Kg   | Specifications |  | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----------------|-----|----|------|----------------|--|-------------------------------|-------|
|                      |                                       |   | $\varnothing Dc$                          | $\varnothing d$ | L   | L1 |      | Ap max<br>(mm) |  |                               |       |
| 181090500            | 032W20290-02-06-032110                | 2 | 32                                        | 32              | 110 | 50 | 0,56 | 17,0           |  | XPET 1706...                  |       |
| 181090600            | 032W20290-02-06-032200                | 2 | 32                                        | 32              | 200 | 60 | 1,10 | 17,0           |  | XPET 1706...                  |       |
| 181090700            | 040W20290-03-07-032115                | 3 | 40                                        | 32              | 115 | 50 | 0,67 | 17,0           |  | XPET 1706...                  |       |
| 181090800            | 040W20290-03-07-032200                | 3 | 40                                        | 32              | 200 | 60 | 1,19 | 17,0           |  | XPET 1706...                  |       |

Stock item | Produto de stock | Itens de stock

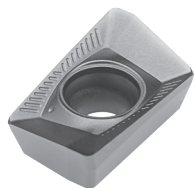
Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)





## XPET 1706... | Inserts | Pastilhas | Plaquetas

XPET-LP



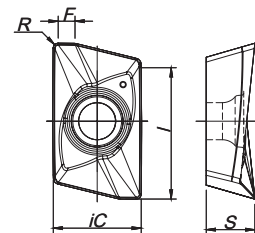
XPET-MP



XPET-LN

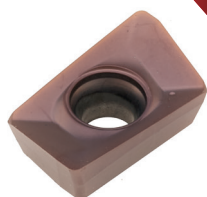


XPET-LP | MP | LN | LS



XPET-LS  
(PHH grade)

NEW



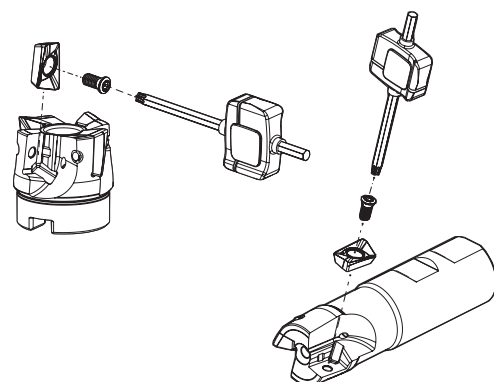
|                                    |                     | P                         |        |        | M      |        | K      |        |        |        | N      | S      |        |       | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |       |      |      |  |
|------------------------------------|---------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|------------------------------------------------|-------|------|------|--|
|                                    |                     | CVD                       | PVD    |        | PVD    |        | CVD    |        | PVD    |        | UNC    | PVD    |        |       |                                                |       |      |      |  |
|                                    |                     | <sup>(2)</sup> Grade code | T9     | T1     | G6     | X9     | G6     | L5     | L9     | T1     | G6     | 10     | X9     | G6    |                                                |       |      |      |  |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference    | PHS740                    | PHP920 | PH7740 | PHH930 | PH7740 | PH5705 | PH5740 | PHP920 | PH7740 | PH0910 | PHH930 | PH7740 | iC    | S                                              | I     | R    | F    |  |
| 1111986                            | XPET 170608 PDER-LP |                           |        |        |        |        |        |        |        |        |        |        |        | 11,30 | 6,35                                           | 17,50 | 0,80 | 1,80 |  |
| 1111987                            | XPET 170616 PDER-LP |                           |        |        |        |        |        |        |        |        |        |        |        | 11,30 | 6,35                                           | 17,50 | 1,60 | 1,20 |  |
| 1111988                            | XPET 170608 PDSR-MP |                           |        |        |        |        |        |        |        |        |        |        |        | 11,30 | 6,35                                           | 17,50 | 0,80 | 1,80 |  |
| 1111989                            | XPET 170616 PDSR-MP |                           |        |        |        |        |        |        |        |        |        |        |        | 11,30 | 6,35                                           | 17,50 | 1,60 | 1,00 |  |
| 1111990                            | XPET 170608 PDFR-LN |                           |        |        |        |        |        |        |        |        |        |        |        | 11,30 | 6,35                                           | 17,50 | 0,80 | 1,20 |  |
| 1111991                            | XPET 170620 PDFR-LN |                           |        |        |        |        |        |        |        |        |        |        |        | 11,30 | 6,35                                           | 17,50 | 2,00 | 1,00 |  |
| 1111992                            | XPET 170632 PDFR-LN |                           |        |        |        |        |        |        |        |        |        |        |        | 11,30 | 6,35                                           | 17,50 | 3,20 | 0,80 |  |
| 1112223                            | XPET 170608 PDER-LS |                           |        |        |        |        |        |        |        |        |        |        |        | 11,3  | 6,35                                           | 17,5  | 0,8  | 1,8  |  |

First choice | Primeira opção | 1ª opción 
 Stock item | Produto de stock | Itens de stock 
 Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9) 
 Insert order code = (1) Geometry Code + (2) Grade Code

## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc  | Order separately |            |                 |              |                 |
|----------------|------------------|------------|-----------------|--------------|-----------------|
|                | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value | Retaining Screw |
| W20290 - 32-40 | P0451001         | XT20       | DT2050          | 5            | -               |
| A20290 - 40-80 | P0451001         | XT20       | DT2050          | 5            | -               |
| A20290 - 100   | P0451001         | PT20       | DT2050          | 5            | D1603500        |
| A20290 - 125   | P0451001         | PT20       | DT2050          | 5            | D2004000        |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



# LINEPRO 20290

A

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB (Brinell) | Grades            |        |        |        |             |        |        |        |
|-----|-----|-----------------------------------|--------------|-------------------|--------|--------|--------|-------------|--------|--------|--------|
|     |     |                                   |              | ← Wear Resistance |        |        |        | Toughness → |        |        |        |
|     |     |                                   |              | PH0910            | PH5705 | PHP920 | PHP930 | PHH930      | PH5740 | PHS740 | PH7740 |
| P   | 1   | Unalloyed Steel                   | 125-220      |                   |        | ✓      | ✓      |             |        | ✓      | ✓      |
|     | 2   | Low-Alloyed Steel                 | 220-280      |                   |        | ✓      | ✓      |             |        | ✓      | ✓      |
|     | 3   | High-Alloyed Steel                | 280-380      |                   |        | ✓      | ✓      |             |        | ✓      | ✓      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      |                   |        |        |        | ✓           |        |        | ✓      |
|     | 5   | SS - Austenitic                   | 200-330      |                   |        |        |        | ✓           |        |        | ✓      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      |                   |        |        |        | ✓           |        |        | ✓      |
| K   | 7   | Malleable Cast Iron               | 130-230      |                   | ✓      | ✓      | ✓      |             | ✓      |        | ✓      |
|     | 8   | Grey Cast Iron                    | 180-245      |                   | ✓      | ✓      | ✓      |             | ✓      |        | ✓      |
|     | 9   | Nodular Cast iron                 | 160-250      |                   | ✓      | ✓      | ✓      |             | ✓      |        | ✓      |
| N   | 10  | Aluminium and Non Ferrous         | 30-130       | ✓                 |        |        |        |             |        |        |        |
| S   | 11  | Heat Resistant Super Alloys       | 200-320      |                   |        |        |        | ✓           |        |        | ✓      |



Good Conditions



Average Conditions



Difficult Conditions

## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra-apanas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB (Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|--------------|--------------------------|----------------------|
|     |     |                                   |              | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220      | XPET 17... LP            | XPET 17... MP        |
|     | 2   | Low-Alloyed Steel                 | 220-280      | XPET 17... LP            | XPET 17... MP        |
|     | 3   | High-Alloyed Steel                | 280-380      | XPET 17... MP            | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      | XPET 17... LS            | XPET 17... LP        |
|     | 5   | SS - Austenitic                   | 200-330      | XPET 17... LS            | XPET 17... LP        |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      | XPET 17... LS            | XPET 17... LP        |
| K   | 7   | Malleable Cast Iron               | 130-230      | XPET 17... LP            | XPET 17... MP        |
|     | 8   | Grey Cast Iron                    | 180-245      | XPET 17... MP            | -                    |
|     | 9   | Nodular Cast iron                 | 160-250      | XPET 17... MP            | -                    |
| N   | 10  | Aluminium and Non Ferrous         | 30-130       | XPET 17... LN            | -                    |
| S   | 11  | Heat Resistant Super Alloys       | 200-320      | XPET 17... LS            | XPET 17... LP        |

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB (Brinell) | Vc (m/min)        |         |         |         |         |
|-----|-----|-----------------------------------|--------------|-------------------|---------|---------|---------|---------|
|     |     |                                   |              | ← Wear Resistance |         |         |         |         |
|     |     |                                   |              | PH0910            | PH5705  | PHP920  | PHP930  | PHH930  |
| P   | 1   | Unalloyed Steel                   | 125-220      | -                 | -       | 180-250 | 160-230 | -       |
|     | 2   | Low-Alloyed Steel                 | 220-280      | -                 | -       | 160-230 | 140-210 | -       |
|     | 3   | High-Alloyed Steel                | 280-380      | -                 | -       | 140-220 | 120-200 | -       |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      | -                 | -       | -       | -       | 140-210 |
|     | 5   | SS - Austenitic                   | 200-330      | -                 | -       | -       | -       | 120-170 |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      | -                 | -       | -       | -       | 100-150 |
| K   | 7   | Malleable Cast Iron               | 130-230      | -                 | 160-290 | 160-270 | -       | -       |
|     | 8   | Grey Cast Iron                    | 180-245      | -                 | 170-320 | 140-250 | -       | -       |
|     | 9   | Nodular Cast iron                 | 160-250      | -                 | 140-200 | 120-210 | -       | -       |
| N   | 10  | Aluminium and Non Ferrous         | 30-130       | 100-2000          | -       | -       | -       | -       |
| S   | 11  | Heat Resistant Super Alloys       | 200-320      | -                 | -       | -       | -       | 30-110  |

(Note 1) Cutting conditions ae/DC=70%

(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 3):

| Operation   | ae   | Vc & fz | ap (mm)   |
|-------------|------|---------|-----------|
| Slotting    | 100% | <20%    | 2,0-6,0   |
| Shouldering | <50% | >8%     | 7,0-13,0  |
|             | ≤25% | >12%    | 13,0-16,0 |

(Note 4) It's possible to occur vibrations in certain cases.

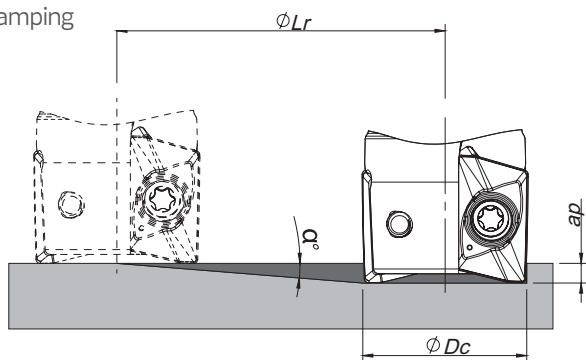
Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

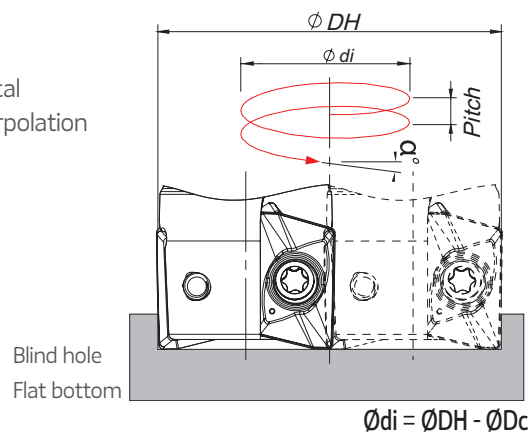
## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular

Ramping



Helical Interpolation



$$\phi di = \phi DH - \phi Dc$$

| $\phi Dc$ | Ramping                 |           |          | Helical Interpolation                         |                 |                |
|-----------|-------------------------|-----------|----------|-----------------------------------------------|-----------------|----------------|
|           |                         |           |          | Diameter for Blind Hole, Flat Bottom Face (1) |                 | Max Pitch/Rev. |
|           | Max Ramp $\alpha^\circ$ | Max $a_p$ | Min $Lr$ | $\phi DH_{min}$                               | $\phi DH_{max}$ |                |
| 32        | 3,8                     | 17,0      | 255,9    | 58,8<br>-                                     | -<br>62,4       | 5,6<br>6,3     |
| 40        | 2,7                     | 17,0      | 360,5    | 74,8<br>-                                     | -<br>78,4       | 5,2<br>5,7     |
| 50        | 2,0                     | 17,0      | 486,8    | 94,8<br>-                                     | -<br>98,4       | 4,9<br>5,3     |
| 63        | 1,5                     | 17,0      | 649,2    | 120,8<br>-                                    | -<br>124,4      | 4,8<br>5,0     |
| 80        | 1,0                     | 17,0      | 973,9    | 154,8<br>-                                    | -<br>158,4      | 4,1<br>4,3     |
| 100       | 0,8                     | 17,0      | 1217,5   | 194,8<br>-                                    | -<br>198,4      | 4,2<br>4,3     |
| 125       | 0,7                     | 17,0      | 1498,4   | 244,8<br>-                                    | -<br>248,4      | 4,3<br>4,4     |

(1) using LP insert with radius 0,8 mm

Note: During helical interpolation do not exceed maximum pitch

When using HF insert or other different insert radius to calculate the  $\phi DH_{min}$  and  $\phi DH_{max}$  use the equation below:

- Minimum Diameter:  $\phi DH_{min} = 2 \times (\phi Dc - (R \text{ corner radius} + F \text{ width of edge wiper}))$

- Maximum Diameter:  $\phi DH_{max} = 2 \times (\phi Dc - R \text{ corner radius})$

| Vc (m/min) |         |         | Feed fz (mm/t) |               |               |               |
|------------|---------|---------|----------------|---------------|---------------|---------------|
|            |         |         | Toughness →    |               |               |               |
| PH5740     | PHS740  | PH7740  | XPET 17... LP  | XPET 17... MP | XPET 17... LN | XPET 17... LS |
| -          | 140-220 | 140-200 | 0,10-0,35      | 0,10-0,35     | -             | -             |
| -          | 120-200 | 130-180 | 0,10-0,35      | 0,10-0,35     | -             | -             |
| -          | 100-190 | 100-170 | 0,10-0,30      | 0,10-0,30     | -             | -             |
| -          | -       | 130-180 | 0,10-0,30      | -             | -             | 0,10-0,35     |
| -          | -       | 110-160 | 0,10-0,30      | -             | -             | 0,10-0,30     |
| -          | -       | 90-150  | 0,10-0,25      | -             | -             | 0,10-0,25     |
| 160-260    | -       | 140-220 | 0,10-0,35      | 0,10-0,35     | -             | -             |
| 140-240    | -       | 120-210 | 0,10-0,35      | 0,10-0,35     | -             | -             |
| 120-200    | -       | 100-190 | 0,10-0,30      | 0,10-0,30     | -             | -             |
| -          | -       | -       | -              | -             | 0,10-0,35     | -             |
| -          | -       | 30-100  | 0,10-0,20      | -             | -             | 0,10-0,20     |



PDF

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

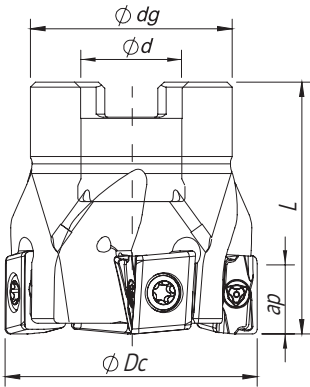
Spare Parts

Technical Data

End Mills



Arbor Mounting  
 $K_r=90^\circ$  |  $\gamma_p=-4^\circ$



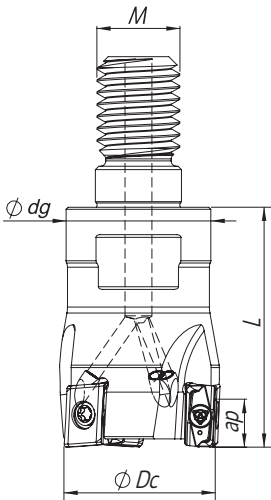
| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg   | Specifications |            | Insert       | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|----------|-----------|----|------|----------------|------------|--------------|-------|
|                      |                                       |    | $\phi Dc$                                 | $\phi d$ | $\phi Dg$ | L  |      | Ap max (mm)    | Arbor Type |              |       |
| 181144400            | 040A90090-04-04-016040                | 4  | 40                                        | 16       | 36        | 40 | 0,24 | 7,0            | A          | LNXT 0904... |       |
| 181144500            | 050A90090-05-04-022040                | 5  | 50                                        | 22       | 40        | 40 | 0,32 | 7,0            | A          | LNXT 0904... |       |
| 181144600            | 063A90090-07-04-022040                | 7  | 63                                        | 22       | 48        | 40 | 0,54 | 7,0            | A          | LNXT 0904... |       |
| 181146600            | 063A90090-10-04-022040                | 10 | 63                                        | 22       | 48        | 40 | 0,54 | 7,0            | A          | LNXT 0904... |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



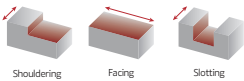
Threaded Coupling  
 $K_r=90^\circ$  |  $\gamma_p=-4^\circ$



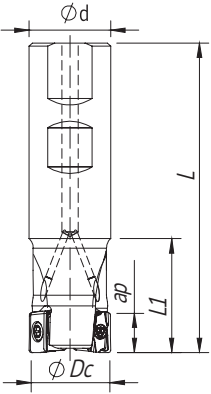
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg   | Specifications |  | Insert       | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----------|----|------|----------------|--|--------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi M$ | $\phi dg$ | L  |      | Ap max (mm)    |  |              |       |
| 181144200            | 025R90090-03-04-M12035                | 3 | 25                                        | 12       | 21        | 35 | 0,10 | 7,0            |  | LNXT 0904... |       |
| 181144300            | 032R90090-04-04-M16040                | 4 | 32                                        | 16       | 29        | 40 | 0,21 | 7,0            |  | LNXT 0904... |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



**Weldon Shank**  
 $K_r = 90^\circ$  |  $\gamma_p = -4^\circ \sim -6^\circ$



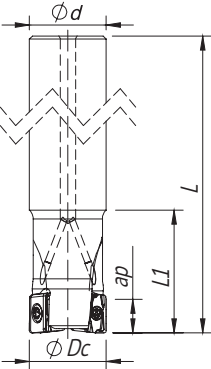
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |     |    | Kg   | Specifications | Insert       | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----|----|------|----------------|--------------|-------|
|                      |                                       |   | $\phi D_c$                                | $\phi d$ | L   | L1 |      | Ap max (mm)    |              |       |
| 181109400            | 016W90090-02-06-016090                | 2 | 16                                        | 16       | 90  | 25 | 0,12 | 7,0            | LNXT 0904... |       |
| 181109500            | 025W90090-03-04-025095                | 3 | 25                                        | 25       | 95  | 30 | 0,31 | 7,0            | LNXT 0904... |       |
| 181144100            | 032W90090-04-04-032110                | 4 | 32                                        | 32       | 110 | 30 | 0,61 | 7,0            | LNXT 0904... |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



**Cylindrical Shank**  
 $K_r = 90^\circ$  |  $\gamma_p = -4^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |     |    | Kg   | Specifications | Insert       | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----|----|------|----------------|--------------|-------|
|                      |                                       |   | $\phi D_c$                                | $\phi d$ | L   | L1 |      | Ap max (mm)    |              |       |
| 181158800            | 020E90090-02-04-020150                | 2 | 20                                        | 20       | 150 | 30 | 0,15 | 7,0            | LNXT 0904... |       |
| 181148100            | 025E90090-03-04-025200                | 3 | 25                                        | 25       | 200 | 30 | 0,31 | 7,0            | LNXT 0904... |       |
| 181148200            | 032E90090-04-04-032250                | 4 | 32                                        | 32       | 250 | 30 | 0,78 | 7,0            | LNXT 0904... |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

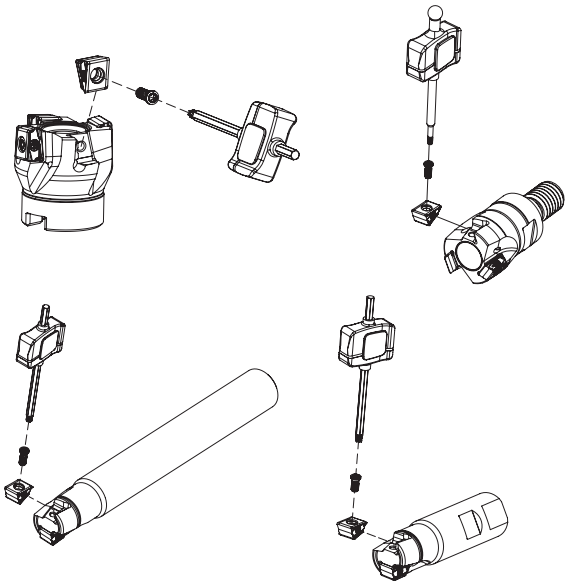
NEW



SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc  | Order separately                                                                  |                                                                                   |                                                                                   |                                                                                   |
|----------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                | Insert Screw                                                                      | Key (Torx)                                                                        | Key<br>(Torx - Nm)                                                                | Torque Value                                                                      |
|                |  |  |  |  |
| E90090 - 25-32 | P0250700                                                                          | XT07                                                                              | DT0709                                                                            | 1,2                                                                               |
| W90090 - 16-32 | P0250700                                                                          | XT07                                                                              | DT0709                                                                            | 1,2                                                                               |
| A90090 - 40-63 | P0250700                                                                          | XT07                                                                              | DT0709                                                                            | 1,2                                                                               |
| R90090 - 25-32 | P0250700                                                                          | XT07                                                                              | DT0709                                                                            | 1,2                                                                               |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



LNXT 0904... | Inserts | Pastilhas | Plaquitas

LNXT-MP



LNXT-LS  
(PHH grade)

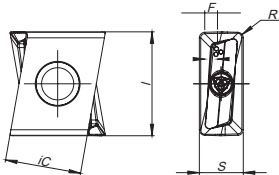
NEW



PHH  
NEW  
GRADE



LNXT-MP | LS



|                |                           | P                                                                                   |                                                                                     |                                                                                     | M                                                                                   | K                                                                                   |                                                                                     |                                                                                       | S                                                                                     | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |     |     |     |   |
|----------------|---------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------|-----|-----|-----|---|
|                |                           | CVD                                                                                 | PVD                                                                                 |                                                                                     | PVD                                                                                 | CVD                                                                                 | PVD                                                                                 |                                                                                       | PVD                                                                                   |                                                |     |     |     |   |
|                | <sup>(2)</sup> Grade code | T9                                                                                  | T1                                                                                  | G6                                                                                  | X9                                                                                  | L6                                                                                  | T1                                                                                  | G6                                                                                    | X9                                                                                    |                                                |     |     |     |   |
| <sup>(1)</sup> | ISO Reference             | PHS740                                                                              | PHP920                                                                              | PH7740                                                                              | PHH930                                                                              | PH5320                                                                              | PHP920                                                                              | PH7740                                                                                | PHH930                                                                                |                                                |     |     |     |   |
| Geometry code  |                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       | iC                                             | S   | I   | R   | F |
| 1112225        | LNXT 090404 PNER-MP       |  |  |  |                                                                                     |  |  |  |                                                                                       | 9,4                                            | 4,5 | 9,0 | 0,4 | - |
| 1112226        | LNXT 090408 PNER-MP       |  |  |  |                                                                                     |  |  |  |                                                                                       | 9,4                                            | 4,5 | 9,0 | 0,8 | - |
| NEW 1112868    | LNXT 090404 PNER-LS       |                                                                                     |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |                                                                                       |  | 9,4                                            | 4,5 | 9,0 | 0,8 | - |

 First choice | Primeira opção | 1ª opción    Stock item | Produto de stock | Itens de stock    Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades                                                                                      |                                                                                             |                                                                                               |                                                                                               |                                                                                               |
|-----|-----|-----------------------------------|-----------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
|     |     |                                   |                 | ← Wear Resistance                                                                           |                                                                                             |                                                                                               |                                                                                               | Toughness →                                                                                   |
|     |     |                                   |                 | PH5320<br> | PHP920<br> | PHH930<br> | PHS740<br> | PH7740<br> |
| P   | 1   | Unalloyed Steel                   | 125-220         |                                                                                             | ✓                                                                                           |                                                                                               | ✓                                                                                             | ✓                                                                                             |
|     | 2   | Low-Alloyed Steel                 | 220-280         |                                                                                             | ✓                                                                                           |                                                                                               | ✓                                                                                             | ✓                                                                                             |
|     | 3   | High-Alloyed Steel                | 280-380         |                                                                                             | ✓                                                                                           |                                                                                               | ✓                                                                                             | ✓                                                                                             |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                                                                                             |                                                                                             | ✓                                                                                             |                                                                                               |                                                                                               |
|     | 5   | SS - Austenitic                   | 200-330         |                                                                                             |                                                                                             | ✓                                                                                             |                                                                                               |                                                                                               |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                                                                                             |                                                                                             | ✓                                                                                             |                                                                                               |                                                                                               |
| K   | 7   | Malleable Cast Iron               | 130-230         | ✓                                                                                           | ✓                                                                                           |                                                                                               |                                                                                               | ✓                                                                                             |
|     | 8   | Grey Cast Iron                    | 180-245         | ✓                                                                                           | ✓                                                                                           |                                                                                               |                                                                                               | ✓                                                                                             |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓                                                                                           | ✓                                                                                           |                                                                                               |                                                                                               | ✓                                                                                             |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                                                                                             |                                                                                             | ✓                                                                                             |                                                                                               |                                                                                               |



Good Conditions



Average Conditions



Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |         |         |         | Feed fz (mm/t) |               |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|---------|---------|---------|----------------|---------------|
|     |     |                                   |                 | ← Wear Resistance |         |         |         |         | Toughness →    |               |
|     |     |                                   |                 | PH5320            | PHP920  | PHH930  | PHS740  | PH7740  | LNXT 09... MP  | LNXT 09... LS |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                 | 180-250 | -       | 140-220 | 140-200 | 0,08-0,25      | -             |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                 | 160-230 | -       | 120-200 | 130-180 | 0,08-0,25      | -             |
|     | 3   | High-Alloyed Steel                | 280-380         | -                 | 140-220 | -       | 100-190 | 100-170 | 0,08-0,15      | -             |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | 140-210 | -       | -       | 0,08-0,25      | 0,08-0,25     |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | 120-170 | -       | -       | 0,08-0,20      | 0,08-0,20     |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | 100-150 | -       | -       | 0,08-0,15      | 0,08-0,20     |
| K   | 7   | Malleable Cast Iron               | 130-230         | 150-280           | 160-270 | -       | -       | 140-220 | 0,08-0,30      | -             |
|     | 8   | Grey Cast Iron                    | 180-245         | 160-320           | 140-250 | -       | -       | 120-210 | 0,08-0,25      | -             |
|     | 9   | Nodular Cast iron                 | 160-250         | 100-190           | 120-210 | -       | -       | 100-190 | 0,08-0,20      | -             |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       | 30-110  | -       | -       | -              | -             |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.



PDF



VIDEO



A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

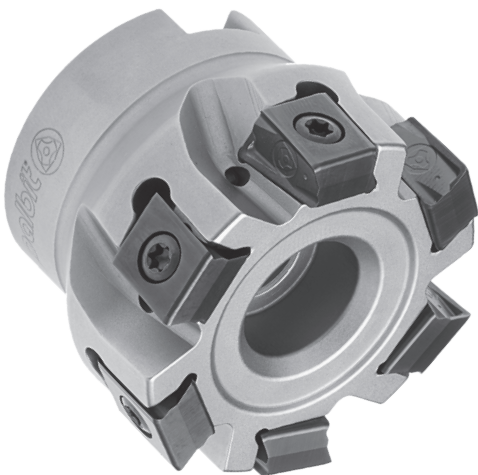
Center & Chamfer

Spot face

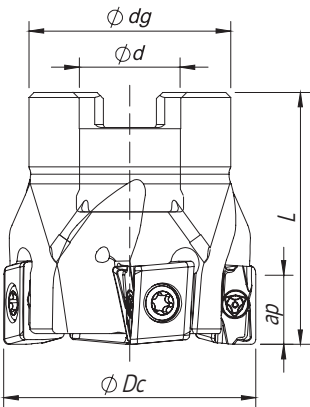
Spare Parts

Technical Data

End Mills



Arbor Mounting  
 $K_r=90^\circ$  |  $\gamma_p=-4^\circ$



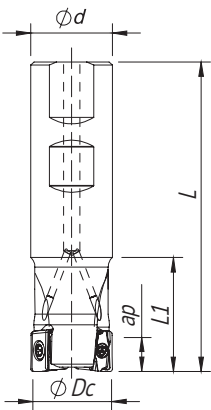
| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg   | Specifications |            | Insert       | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|----------|-----------|----|------|----------------|------------|--------------|-------|
|                      |                                       |    | $\phi Dc$                                 | $\phi d$ | $\phi dg$ | L  |      | Ap max (mm)    | Arbor Type |              |       |
| 181118800            | 040A90190-04-04-016040                | 4  | 40                                        | 16       | 32        | 40 | 0,17 | 11             | A          | LNXT 1306... |       |
| 181118900            | 040A90190-05-04-016040                | 5  | 40                                        | 16       | 32        | 40 | 0,18 | 11             | A          | LNXT 1306... |       |
| 181111200            | 050A90190-05-04-022040                | 5  | 50                                        | 22       | 42        | 40 | 0,27 | 11             | A          | LNXT 1306... |       |
| 181111300            | 050A90190-06-04-022040                | 6  | 50                                        | 22       | 42        | 40 | 0,28 | 11             | A          | LNXT 1306... |       |
| 181119000            | 063A90190-06-04-022040                | 6  | 63                                        | 22       | 52        | 40 | 0,52 | 11             | A          | LNXT 1306... |       |
| 181119100            | 063A90190-08-04-022040                | 8  | 63                                        | 22       | 52        | 40 | 0,52 | 11             | A          | LNXT 1306... |       |
| 181119200            | 080A90190-07-04-027050                | 7  | 80                                        | 27       | 60        | 50 | 0,88 | 11             | B          | LNXT 1306... |       |
| 181119300            | 080A90190-10-04-027050                | 10 | 80                                        | 27       | 60        | 50 | 0,86 | 11             | B          | LNXT 1306... |       |
| 181119400            | 100A90190-09-04-032050                | 9  | 100                                       | 32       | 80        | 50 | 1,56 | 11             | B          | LNXT 1306... |       |
| 181119500            | 100A90190-13-04-032050                | 13 | 100                                       | 32       | 80        | 50 | 1,56 | 11             | B          | LNXT 1306... |       |
| 181119600            | 125A90190-11-04-040063                | 11 | 125                                       | 40       | 90        | 63 | 2,87 | 11             | B          | LNXT 1306... |       |
| 181119700            | 125A90190-16-04-040063                | 16 | 125                                       | 40       | 90        | 63 | 2,86 | 11             | B          | LNXT 1306... |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire página A-8)



Weldon Shank  
 $K_r=90^\circ$  |  $\gamma_p=-4^\circ$

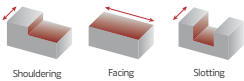


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |     |    | Kg   | Specifications |  | Insert       | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----|----|------|----------------|--|--------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi d$ | L   | L1 |      | Ap max (mm)    |  |              |       |
| 181118300            | 025W90190-02-04-025095                | 2 | 25                                        | 25       | 95  | 45 | 0,29 | 11             |  | LNXT 1306... |       |
| 181109800            | 032W90190-03-04-032110                | 3 | 32                                        | 32       | 110 | 50 | 0,55 | 11             |  | LNXT 1306... |       |
| 181118400            | 040W90190-04-04-032110                | 4 | 40                                        | 32       | 110 | 50 | 0,60 | 11             |  | LNXT 1306... |       |

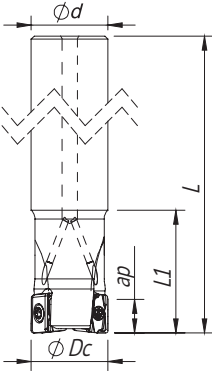
Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire página A-8)





Cylindrical Shank  
 $K_r = 90^\circ$  |  $\gamma_p = -4^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg   | Specifications | Insert       | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|------|----------------|--------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1 |      | Ap max (mm)    |              |       |
| 181118500            | 025E90190-02-04-025200                | 2 | 25                                        | 25 | 200 | 40 | 0,66 | 11             | LNXT 1306... |       |
| 181118600            | 032E90190-03-04-032250                | 3 | 32                                        | 32 | 250 | 50 | 1,37 | 11             | LNXT 1306... |       |
| 181118700            | 040E90190-04-04-032250                | 4 | 40                                        | 32 | 250 | 50 | 1,42 | 11             | LNXT 1306... |       |

Stock item | Produto de stock | Itens de stock

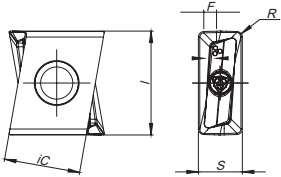
Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

LNXT 1306... | Inserts | Pastilhas | Plaquitas

LNXT-MP



LNXT-MP



|                                    |                     | P                                                                                   |                                                                                     |                                                                                     | M                                                                                   | K                                                                                     |                                                                                       |                                                                                       | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |     |      |     |     |
|------------------------------------|---------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------|-----|------|-----|-----|
|                                    |                     | CVD                                                                                 | PVD                                                                                 |                                                                                     | PVD                                                                                 | CVD                                                                                   | PVD                                                                                   |                                                                                       |                                                |     |      |     |     |
|                                    |                     | <sup>(2)</sup> Grade code                                                           | T9                                                                                  | T1                                                                                  | G6                                                                                  | G6                                                                                    | L6                                                                                    | T1                                                                                    |                                                |     |      |     |     |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference    | PH5740                                                                              | PHP920                                                                              | PH7740                                                                              | PH7740                                                                              | PH5320                                                                                | PHP920                                                                                | PH7740                                                                                | iC                                             | S   | I    | R   | F   |
| 1112242                            | LNXT 130604 PNER-MP |                                                                                     |  |  |  |  |  |  | 9,8                                            | 6,8 | 13,0 | 0,4 | 0,9 |
| 1112243                            | LNXT 130608 PNER-MP |  |  |  |  |   |  |  | 9,8                                            | 6,8 | 13,0 | 0,8 | 0,9 |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

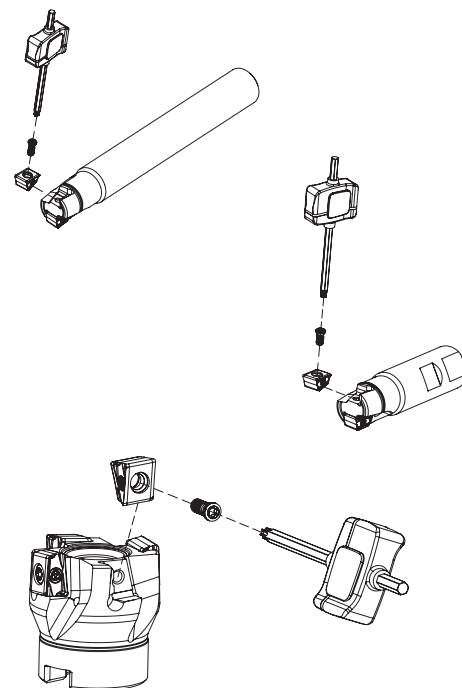
Insert order code = (1) Geometry Code + (2) Grade Code

# TGPLUS 90190

## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc  | Insert Screw | Key (Torx) | Order separately |              | Torque Value | Order separately |                 |
|----------------|--------------|------------|------------------|--------------|--------------|------------------|-----------------|
|                |              |            | Key (Torx - Nm)  | Torque Value |              | Screw            | DIN 6368 Wrench |
| E90190 - 25    | PO400900     | XT15       | DT1530           | 3,0          | -            | -                | -               |
| E90190 - 32-40 | PO401200     | XT15       | DT1530           | 3,0          | -            | -                | -               |
| W90190 - 25    | PO400900     | XT15       | DT1530           | 3,0          | -            | -                | -               |
| W90190 - 32-40 | PO401200     | XT15       | DT1530           | 3,0          | -            | -                | -               |
| A90190 - 40-63 | PO401200     | XT15       | DT1530           | 3,0          | -            | -                | -               |
| A90190 - 80    | PO401200     | XT15       | DT1530           | 3,0          | J0123510     | SD6368-12        |                 |
| A90190 - 100   | PO401200     | XT15       | DT1530           | 3,0          | J0164110     | SD6368-16        |                 |
| A90190 -125    | PO401200     | XT15       | DT1530           | 3,0          | J0204610     | SD6368-20        |                 |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades            |        |             |        |
|-----|-----|-----------------------------------|-----------------|-------------------|--------|-------------|--------|
|     |     |                                   |                 | ← Wear Resistance |        | Toughness → |        |
|     |     |                                   |                 | PH5320            | PHP920 | PHS740      | PH7740 |
| P   | 1   | Unalloyed Steel                   | 125-220         |                   | ✓      | ✓           | ✓      |
|     | 2   | Low-Alloyed Steel                 | 220-280         |                   | ✓      | ✓           | ✓      |
|     | 3   | High-Alloyed Steel                | 280-380         |                   | ✓      | ✓           | ✓      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                   |        |             | ✓      |
|     | 5   | SS - Austenitic                   | 200-330         |                   |        |             | ✓      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                   |        |             | ✓      |
| K   | 7   | Malleable Cast Iron               | 130-230         | ✓                 | ✓      |             | ✓      |
|     | 8   | Grey Cast Iron                    | 180-245         | ✓                 | ✓      |             | ✓      |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓                 | ✓      |             | ✓      |



## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |             |         | Feed fz (mm/t) |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|-------------|---------|----------------|
|     |     |                                   |                 | ← Wear Resistance |         | Toughness → |         |                |
|     |     |                                   |                 | PH5320            | PHP920  | PHS740      | PH7740  | LNXT 13... MP  |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                 | 180-250 | 140-220     | 140-200 | 0,10-0,35      |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                 | 160-230 | 120-200     | 130-180 | 0,10-0,30      |
|     | 3   | High-Alloyed Steel                | 280-380         | -                 | 140-220 | 100-190     | 100-170 | 0,10-0,20      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | -           | -       | 0,10-0,30      |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | -           | -       | 0,10-0,25      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | -           | -       | 0,10-0,20      |
| K   | 7   | Malleable Cast Iron               | 130-230         | 150-280           | 170-300 | -           | 140-220 | 0,10-0,35      |
|     | 8   | Grey Cast Iron                    | 180-245         | 160-320           | 150-250 | -           | 120-210 | 0,10-0,30      |
|     | 9   | Nodular Cast iron                 | 160-250         | 100-190           | 90-210  | -           | 100-190 | 0,10-0,25      |

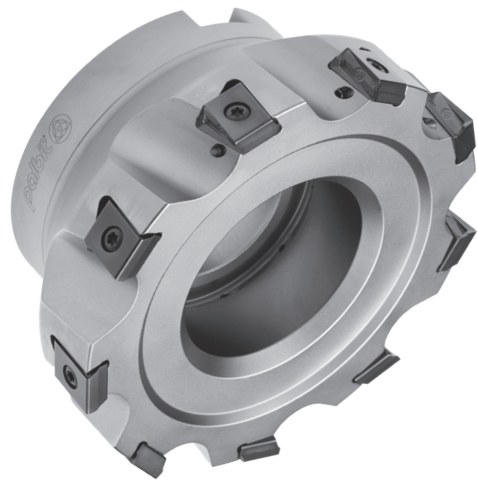
(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

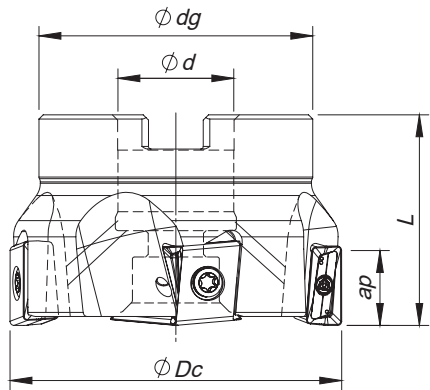
- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.



PDF



Arbor Mounting  
K<sub>r</sub>=90° | γ<sub>p</sub>=-5°



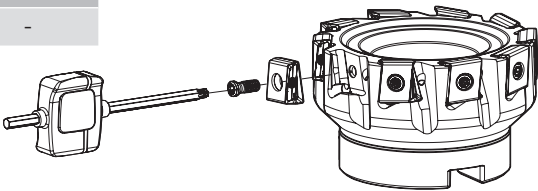
| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg    | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|----|-----|----|-------|----------------|----------------|-------------------------------|-------|
|                      |                                       |    | ØDc                                       | Ød | Ødg | L  |       | Arbor<br>Type  | Ap max<br>(mm) |                               |       |
| 181069200            | 050A90390-05-05-022040                | 5  | 50                                        | 22 | 42  | 40 | 0,315 | A              | 14,0           | LNXT 1506...                  |       |
| 181066400            | 063A90390-05-05-022040                | 5  | 63                                        | 22 | 52  | 40 | 0,524 | A              | 14,0           | LNXT 1506...                  |       |
| 181051000            | 063A90390-08-05-022040                | 8  | 63                                        | 22 | 52  | 40 | 0,550 | A              | 14,0           | LNXT 1506...                  |       |
| 181066500            | 080A90390-07-05-027050                | 7  | 80                                        | 27 | 60  | 50 | 0,936 | B              | 14,0           | LNXT 1506...                  |       |
| 181052000            | 080A90390-10-05-027050                | 10 | 80                                        | 27 | 60  | 50 | 0,939 | B              | 14,0           | LNXT 1506...                  |       |
| 181066600            | 100A90390-08-05-032050                | 8  | 100                                       | 32 | 80  | 50 | 1,586 | B              | 14,0           | LNXT 1506...                  |       |
| 181051100            | 100A90390-12-05-032050                | 12 | 100                                       | 32 | 80  | 50 | 1,690 | B              | 14,0           | LNXT 1506...                  |       |
| 181066700            | 125A90390-09-05-040063                | 9  | 125                                       | 40 | 90  | 63 | 3,001 | B              | 14,0           | LNXT 1506...                  |       |
| 181051200            | 125A90390-15-05-040063                | 15 | 125                                       | 40 | 90  | 63 | 3,113 | B              | 14,0           | LNXT 1506...                  |       |
| 181051300            | 160A90390-10-05-U040063               | 10 | 160                                       | 40 | 110 | 63 | 4,470 | C              | 14,0           | LNXT 1506...                  |       |
| 181066800            | 160A90390-20-05-U040063               | 20 | 160                                       | 40 | 110 | 63 | 4,580 | C              | 14,0           | LNXT 1506...                  |       |

Stock item | Produto de stock | Itens de stock      Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc    | Insert Screw | Order separately |                    |              | Order separately |                 |
|------------------|--------------|------------------|--------------------|--------------|------------------|-----------------|
|                  |              | Key (Torx)       | Key<br>(Torx - Nm) | Torque Value | Screw            | DIN 6368 Wrench |
| A90390 – 50 - 63 | P0401200     | XT15             | DT1530             | 3,0          | -                | -               |
| A90390 – 80      | P0401200     | XT15             | DT1530             | 3,0          | J0123510         | SD6368-12       |
| A90390 – 100     | P0401200     | XT15             | DT1530             | 3,0          | J0164110         | SD6368-16       |
| A90390 – 125     | P0401200     | XT15             | DT1530             | 3,0          | J0204610         | SD6368-20       |
| A90390 – 160     | P0401200     | XT15             | DT1530             | 3,0          | -                | -               |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.





## LNXT 1506... | Inserts | Pastilhas | Plaquetas

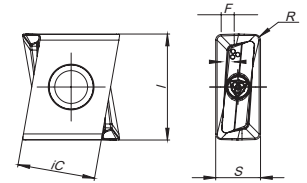
LNXT-HP



LNXT-MP  
(PHP grade)



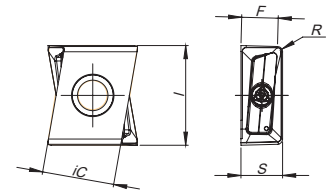
LNXT - MP | HP



LNXT-W



LNXT-W



|                                    |                           | P                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | K                                                                                   |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                                                                                       | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |     |     |
|------------------------------------|---------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------|------|------|-----|-----|
|                                    |                           | CVD                                                                                 | PVD                                                                                 |                                                                                     |                                                                                     |                                                                                     | CVD                                                                                 |                                                                                     | PVD                                                                                   |                                                                                       |                                                                                       |                                                                                       |                                                |      |      |     |     |
|                                    | <sup>(2)</sup> Grade code | T9                                                                                  | G1                                                                                  | G4                                                                                  | T1                                                                                  | G6                                                                                  | L5                                                                                  | L9                                                                                  | G1                                                                                    | G4                                                                                    | T1                                                                                    | G6                                                                                    |                                                |      |      |     |     |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference          | PHS740                                                                              | PH7910                                                                              | PH7920                                                                              | PHP920                                                                              | PH7740                                                                              | PH5705                                                                              | PH5740                                                                              | PH7910                                                                                | PH7920                                                                                | PHP920                                                                                | PH7740                                                                                | iC                                             | S    | I    | R   | F   |
| 1111313                            | LNXT 150608 PNER-MP       |  |  |  |  |  |  |  |  |  |  |  | 11,0                                           | 6,35 | 15,0 | 0,8 | 1,8 |
| 1111590                            | LNXT 150612 PNER-MP       |                                                                                     |                                                                                     |  |  |  |  |  |                                                                                       |  |  |  | 11,0                                           | 6,35 | 15,0 | 1,2 | 1,8 |
| 1111591                            | LNXT 150608 PNSR-HP       |                                                                                     |                                                                                     |  |                                                                                     |  |                                                                                     |                                                                                     |                                                                                       |  |                                                                                       |  | 11,0                                           | 6,35 | 15,0 | 0,8 | 1,8 |
| 1111524                            | LNXT 150608 PNER-W        |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |  |                                                                                     |  |                                                                                       |                                                                                       |                                                                                       | 11,0                                           | 6,35 | 15,2 | 0,8 | 5,5 |

☑ First choice | Primeira opção | 1ª opción    ☑ Stock item | Produto de stock | Itens de stock    ○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)    Insert order code = (1) Geometry Code + (2) Grade Code

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material            | HB<br>(Brinell) | Grades            |        |        |        |             |        |        |
|-----|-----|---------------------|-----------------|-------------------|--------|--------|--------|-------------|--------|--------|
|     |     |                     |                 | ← Wear Resistance |        |        |        | Toughness → |        |        |
|     |     |                     |                 | PH5705            | PH7910 | PHP920 | PH7920 | PH5740      | PHS740 | PH7740 |
| P   | 1   | Unalloyed Steel     | 125-220         | ●                 | ●      | ●      | ●      | ●           | ●      | ●      |
|     | 2   | Low-Alloyed Steel   | 220-280         |                   | ●      | ●      | ●      |             | ●      | ●      |
|     | 3   | High-Alloyed Steel  | 280-380         |                   | ●      | ●      | ●      |             | ●      | ●      |
| K   | 7   | Malleable Cast Iron | 130-230         | ●                 | ●      | ●      | ●      | ●           |        | ●      |
|     | 8   | Grey Cast Iron      | 180-245         | ●                 | ●      | ●      | ●      | ●           |        | ●      |
|     | 9   | Nodular Cast iron   | 160-250         | ●                 | ●      | ●      | ●      | ●           |        | ●      |

● Good Conditions    ● Average Conditions    ● Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material            | HB<br>(Brinell) | Vc (m/min)        |         |         |         |             |         |         |
|-----|-----|---------------------|-----------------|-------------------|---------|---------|---------|-------------|---------|---------|
|     |     |                     |                 | ← Wear Resistance |         |         |         | Toughness → |         |         |
|     |     |                     |                 | PH5705            | PH7910  | PHP920  | PH7920  | PH5740      | PHS740  | PH7740  |
| P   | 1   | Unalloyed Steel     | 125-220         | -                 | 180-250 | 180-250 | 180-240 | -           | 140-220 | 140-200 |
|     | 2   | Low-Alloyed Steel   | 220-280         | -                 | 160-230 | 160-230 | 160-220 | -           | 120-200 | 130-180 |
|     | 3   | High-Alloyed Steel  | 280-380         | -                 | 140-220 | 140-220 | 140-210 | -           | 100-190 | 100-170 |
| K   | 7   | Malleable Cast Iron | 130-230         | 160-290           | 180-300 | 160-270 | 160-260 | 160-260     | -       | 140-220 |
|     | 8   | Grey Cast Iron      | 180-245         | 170-320           | 160-250 | 140-250 | 140-240 | 140-240     | -       | 120-210 |
|     | 9   | Nodular Cast iron   | 160-250         | 140-200           | 150-200 | 120-210 | 120-200 | 120-200     | -       | 100-190 |

| ISO | PSM | Material            | HB<br>(Brinell) | Feed fz (mm/t) |               |              |
|-----|-----|---------------------|-----------------|----------------|---------------|--------------|
|     |     |                     |                 | LNXT 15... MP  | LNXT 15... HP | LNXT 15... W |
| P   | 1   | Unalloyed Steel     | 125-220         | 0,10-0,30      | 0,10-0,30     | 0,10-0,35    |
|     | 2   | Low-Alloyed Steel   | 220-280         | 0,10-0,30      | 0,10-0,30     | 0,10-0,35    |
|     | 3   | High-Alloyed Steel  | 280-380         | 0,10-0,25      | 0,10-0,25     | 0,10-0,35    |
| K   | 7   | Malleable Cast Iron | 130-230         | 0,10-0,40      | 0,10-0,40     | 0,10-0,50    |
|     | 8   | Grey Cast Iron      | 180-245         | 0,10-0,35      | 0,10-0,35     | 0,10-0,50    |
|     | 9   | Nodular Cast iron   | 160-250         | 0,10-0,30      | 0,10-0,30     | 0,10-0,50    |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

## CHIP-BREAKER SELECTION GUIDE || Guia para aplicações do quebra-aparas | Guía para aplicación del rompevirutas

| ISO | PSM | Material            | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|---------------------|-----------------|--------------------------|----------------------|
|     |     |                     |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel     | 125-220         | LNXT 15... MP            | LNXT 15... HP        |
|     | 2   | Low-Alloyed Steel   | 220-280         | LNXT 15... MP            | LNXT 15... HP        |
|     | 3   | High-Alloyed Steel  | 280-380         | LNXT 15... MP            | LNXT 15... HP        |
| K   | 7   | Malleable Cast Iron | 130-230         | LNXT 15... MP            | LNXT 15... HP        |
|     | 8   | Grey Cast Iron      | 180-245         | LNXT 15... MP            | LNXT 15... HP        |
|     | 9   | Nodular Cast iron   | 160-250         | LNXT 15... MP            | LNXT 15... HP        |

## WIPER INSERTS

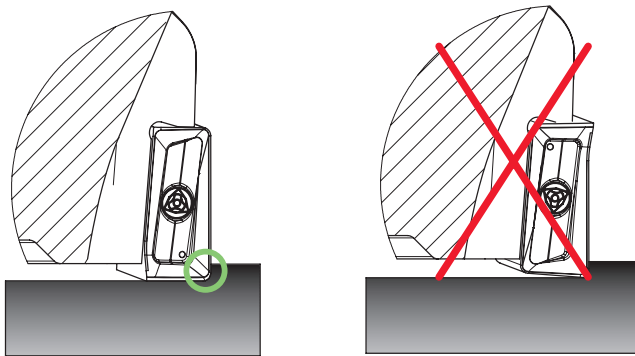
### Rec. Cutting Conditions

- $F_w$  at least 40% larger than  $f_n$  ( $f_n - f_2 \times Z$ );
- Axial depth of cut is 0,5 - 0,8mm.

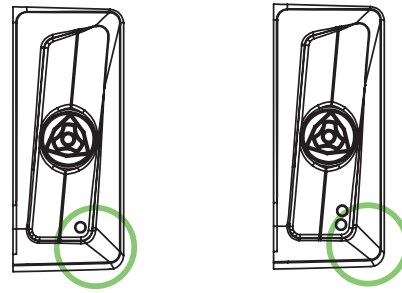
### Example:

- The width of the parallel land (F) of the insert is 1,8mm
- With a cutter of 10 inserts and using a feed per tooth ( $f_z$ ) of 0,3mm, the feed per revolution ( $f_n$ ) will be 3mm, i.e. 40% bigger than the parallel land.
- To obtain a good surface finish, the feed per revolution should be a maximum of 80% of 1,8mm = 1,44mm.
- The wiper insert will have a parallel land ( $F_w$ ) with a width of approximately 5,5mm.
- Result: Feed per revolution ( $f_n$ ) could be increased from 0,8mm to 60% of 5,5mm = 3,3mm.

Note: Other limitations, such as machine power, must be taken into consideration.



The points on the insert indicates the side that should be parallel to the workspace material.



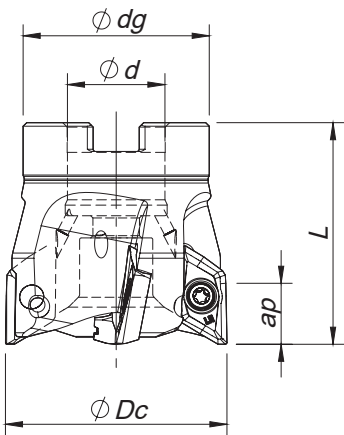
Wiper insert with 2 Right-hand cutting edges.  
The side work of the insert it's indicated by points.







Arbor Mounting  
 $K_r=90^\circ$  |  $\gamma_p=+11^\circ$



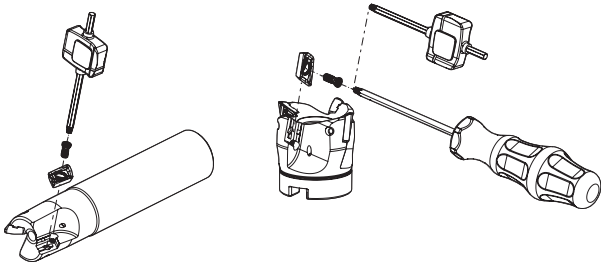
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg  | Specifications |             |         | Insert radius<br>Raio da pastilha<br>Rayo del Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----------|----|-----|----------------|-------------|---------|-------------------------------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi d$ | $\phi dg$ | L  |     | Cutter Type    | Max ap (mm) | rpm max |                                                       |       |
| 181094200            | 040A76090-03-11-016050-A              | 3 | 40                                        | 16       | 32        | 50 | 0,3 | A              | 14,0        | 29 000  | 0,4~3,2                                               |       |
| 181083400            | 050A76090-04-11-022050-A              | 4 | 50                                        | 22       | 42        | 50 | 0,4 | A              | 14,0        | 24 000  | 0,4~3,2                                               |       |
| 181085300            | 063A76090-05-11-022050-A              | 5 | 63                                        | 22       | 48        | 50 | 0,7 | A              | 14,0        | 21 000  | 0,4~3,2                                               |       |
| 181094300            | 080A76090-05-11-027050-A              | 5 | 80                                        | 27       | 60        | 50 | 1,1 | A              | 14,0        | 19 000  | 0,4~3,2                                               |       |
| 181094400            | 100A76090-06-11-032063-A              | 6 | 100                                       | 32       | 73        | 63 | 2,0 | A              | 14,0        | 16 000  | 0,4~3,2                                               |       |
| 181094500            | 040A76090-03-11-016050-B              | 3 | 40                                        | 16       | 32        | 50 | 0,3 | B              | 14,0        | 29 000  | 4,0~5,0                                               |       |
| 181094600            | 050A76090-04-11-022050-B              | 4 | 50                                        | 22       | 42        | 50 | 0,4 | B              | 14,0        | 24 000  | 4,0~5,0                                               |       |
| 181094700            | 063A76090-05-11-022050-B              | 5 | 63                                        | 22       | 48        | 50 | 0,7 | B              | 14,0        | 21 000  | 4,0~5,0                                               |       |
| 181094800            | 080A76090-05-11-027050-B              | 5 | 80                                        | 27       | 60        | 50 | 1,1 | B              | 14,0        | 19 000  | 4,0~5,0                                               |       |
| 181094900            | 100A76090-06-11-032063-B              | 6 | 100                                       | 32       | 73        | 63 | 2,0 | B              | 14,0        | 16 000  | 4,0~5,0                                               |       |

Stock item | Produto de stock | Itens de stock      Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

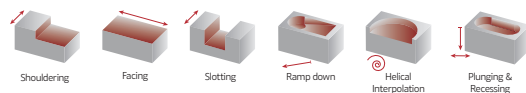
Note: Type A cutters can only assemble inserts with a radius between 0,4 and 3,2. Type B cutters can only assemble inserts with a radius between 4,0 and 5,0.

SPARE PARTS | Complementos | Repuestos

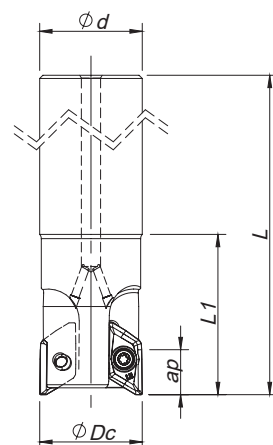
| Cutter<br>$\phi Dc$ | Insert Screw | Key (Torx) | Order separately |              |
|---------------------|--------------|------------|------------------|--------------|
|                     |              |            | Key (Torx - Nm)  | Torque Value |
| A76090- 40-80       | P0400900     | XT15       | DT1530           | 3,0          |
| A76090 - 100        | P0400900     | PT15       | DT1530           | 3,0          |
| E76090 - 20-25      | P0400803     | XT15       | DT1530           | 3,0          |
| E76090 - 32-40      | P0400900     | XT15       | DT1530           | 3,0          |



Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## Cylindrical Shank

 $K_r=90^\circ$  |  $\gamma_p=+6^\circ \sim +11^\circ$ 

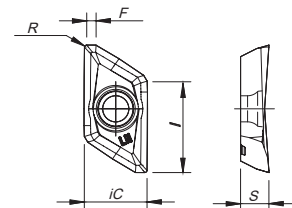
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |     | Kg  | Specifications |             |         | Insert radius<br>Raio da pastilha<br>Rayo del Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|-----|-----|----------------|-------------|---------|-------------------------------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1  |     | Cutter Type    | Max ap (mm) | rpm max |                                                       |       |
| 181095000            | 020E76090-01-06-020150-A              | 1 | 20                                        | 20 | 150 | 60  | 0,2 | A              | 15,0        | 40 000  | 0,4~3,2                                               |       |
| 181095100            | 025E76090-02-09-025180-A              | 2 | 25                                        | 25 | 180 | 90  | 0,4 | A              | 15,0        | 38 000  | 0,4~3,2                                               |       |
| 181095200            | 032E76090-02-09-032200-A              | 2 | 32                                        | 32 | 200 | 120 | 0,7 | A              | 15,0        | 33 000  | 0,4~3,2                                               |       |
| 181095300            | 040E76090-03-11-032250-A              | 3 | 40                                        | 32 | 250 | 65  | 1,4 | A              | 15,0        | 29 000  | 0,4~3,2                                               |       |
| 181095400            | 020E76090-01-06-020150-B              | 1 | 20                                        | 20 | 150 | 60  | 0,2 | B              | 15,0        | 40 000  | 4,0~5,0                                               |       |
| 181095500            | 025E76090-02-09-025180-B              | 2 | 25                                        | 25 | 180 | 90  | 0,4 | B              | 15,0        | 38 000  | 4,0~5,0                                               |       |
| 181095600            | 032E76090-02-09-032200-B              | 2 | 32                                        | 32 | 200 | 120 | 0,7 | B              | 15,0        | 33 000  | 4,0~5,0                                               |       |
| 181095700            | 040E76090-03-11-032250-B              | 3 | 40                                        | 32 | 250 | 65  | 1,4 | B              | 15,0        | 29 000  | 4,0~5,0                                               |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire página A-8)

Note: Type A cutters can only assemble inserts with a radius between 0,4 and 3,2. Type B cutters can only assemble inserts with a radius between 4,0 and 5,0.

## XDGX 15M5... || Inserts | Pastilhas | Plaquetas



| (1)<br>Geometry<br>code | (2) Grade code<br>ISO Reference | N   | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |      |      | Cutter Type |
|-------------------------|---------------------------------|-----|------------------------------------------------|------|------|------|------|-------------|
|                         |                                 | UNC |                                                |      |      |      |      |             |
|                         |                                 | 10  |                                                |      |      |      |      |             |
| PH0910                  |                                 |     | iC                                             | S    | I    | R    | F    |             |
|                         |                                 |     |                                                |      |      |      |      |             |
| 1111624                 | XDGX 15M504 PDRF-LN             |     | 11,20                                          | 5,00 | 16,0 | 0,40 | 1,50 | A           |
| 1111625                 | XDGX 15M508 PDRF-LN             |     | 11,20                                          | 5,00 | 16,0 | 0,80 | 1,10 | A           |
| 1111626                 | XDGX 15M512 PDRF-LN             |     | 11,20                                          | 5,00 | 16,0 | 1,20 | 0,70 | A           |
| 1111627                 | XDGX 15M516 PDRF-LN             |     | 11,20                                          | 5,00 | 16,0 | 1,60 | 0,40 | A           |
| 1111628                 | XDGX 15M520 PDRF-LN             |     | 11,20                                          | 5,00 | 16,0 | 2,00 | 0,20 | A           |
| 1112154                 | XDGX 15M530 PDRF-LN             |     | 11,20                                          | 5,00 | 16,0 | 3,00 | 0,60 | A           |
| 1111629                 | XDGX 15M532 PDRF-LN             |     | 11,20                                          | 5,00 | 16,0 | 3,20 | 0,60 | A           |
| 1111630                 | XDGX 15M540 PDRF-LN             |     | 11,20                                          | 5,00 | 16,0 | 4,00 | 0,50 | B           |
| 1111631                 | XDGX 15M550 PDRF-LN             |     | 11,20                                          | 5,00 | 16,0 | 5,00 | 0,40 | B           |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

## SHOULDERING

| ISO | PSM | Material                  | HB<br>(Brinell) | Vc (m/min) | Width of Cut ae (mm) | Depth of Cut ap (mm) | Feed fz(mm/t) |
|-----|-----|---------------------------|-----------------|------------|----------------------|----------------------|---------------|
|     |     |                           |                 | PH0910     |                      |                      |               |
| N   | 10  | Aluminium and Non Ferrous | 30-130          | 350-3000   | ≤ 25% ØDc            | ≤5,0                 | 0,35 - 0,40   |
|     |     |                           |                 |            |                      | 5,0 - 10,0           | 0,30 - 0,35   |
|     |     |                           |                 |            |                      | 10,0 - 15,0          | 0,25 - 0,30   |
|     |     |                           |                 |            | < 50% ØDc            | ≤5,0                 | 0,35 - 0,40   |
|     |     |                           |                 |            |                      | 5,0 - 10,0           | 0,30 - 0,35   |
|     |     |                           |                 |            |                      | 10,0 - 15,0          | 0,25 - 0,30   |
|     |     |                           |                 |            | ≤ 75% ØDc            | ≤5,0                 | 0,30 - 0,35   |
|     |     |                           |                 |            |                      | 5,0 - 10,0           | 0,25 - 0,30   |
|     |     |                           |                 |            |                      | 10,0 - 15,0          | 0,20 - 0,25   |

## SLOTING

| ISO | PSM | Material                  | HB<br>(Brinell) | Vc (m/min) | Width of Cut ae (mm) | Depth of Cut ap (mm) | Feed fz(mm/t) |
|-----|-----|---------------------------|-----------------|------------|----------------------|----------------------|---------------|
|     |     |                           |                 | PH0910     |                      |                      |               |
| N   | 10  | Aluminium and Non Ferrous | 30-130          | 350-3000   | 100% ØDc             | ≤5,0                 | 0,25 - 0,35   |
|     |     |                           |                 |            |                      | 5,0 - 10,0           | 0,20 - 0,30   |
|     |     |                           |                 |            |                      | 10,0 - 15,0          | 0,15 - 0,25   |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) Use internal coolant supply

## OPERATIONAL GUIDE || Guia operacional | Guía operativa

- The maximum allowable revolutions are shown in Table 1. Ensure that the cutter operates under the maximum allowable revolutions. The maximum allowable revolutions for safety purposes are determined in accordance with ISO 15641 (Milling Cutters for high speed machining-Safety requirements).

Table 1 - Maximum allowable revolutions:

| ØDc                      | Ø20   | Ø25   | Ø32   | Ø40   | Ø50   | Ø63   | Ø80   | Ø100  |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| RPM (min <sup>-1</sup> ) | 40000 | 38000 | 33000 | 29000 | 24000 | 21000 | 19000 | 16000 |

- Even when operating under the maximum allowable spindle speed, if the spindle speed is equal or higher than the values shown in Table 2., it is recommended that the balance quality (with the arbor or chuck) according ISO 1940.

Table 2 - Maximum revolutions when balancing with the arbor or chuck has not been achieved:

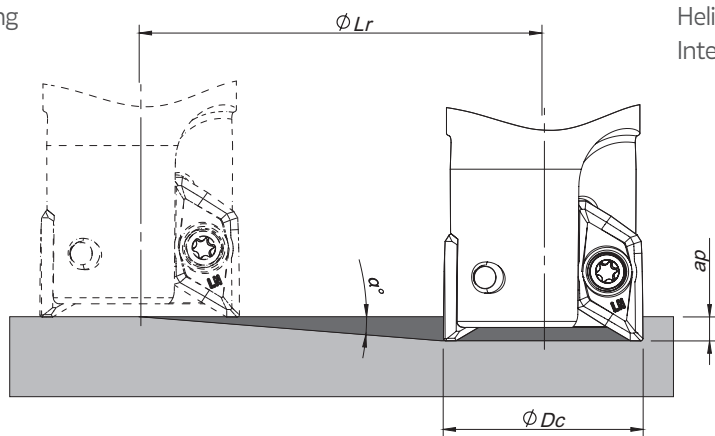
| ØDc                      | Ø20   | Ø25   | Ø32  | Ø40  | Ø50  | Ø63  | Ø80  | Ø100 |
|--------------------------|-------|-------|------|------|------|------|------|------|
| RPM (min <sup>-1</sup> ) | 15000 | 12000 | 9500 | 8500 | 7600 | 6800 | 6000 | 5400 |

- When setting the spindle speed, take into consideration the maximum allowable revolutions of arbor or chuck.
- Use the specified set bolt when using the arbor type with internal coolant supply.

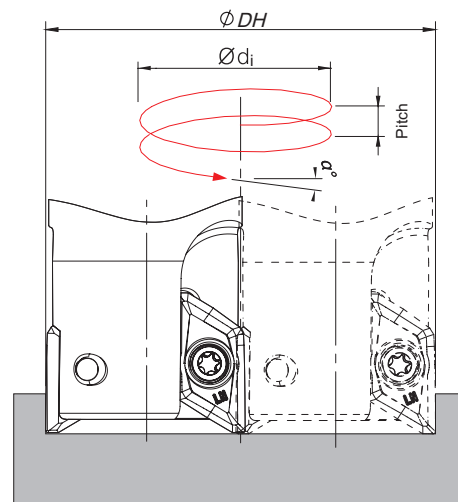
## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular

Ramping



Helical Interpolation



$$\phi di = \phi DH - \phi Dc$$

| Cutter Type | $\phi Dc$ | Ramping            |           |        | Helical Interpolation                         |                 |                |
|-------------|-----------|--------------------|-----------|--------|-----------------------------------------------|-----------------|----------------|
|             |           | Max Ramp $a^\circ$ | Max $a_p$ | Min Lr | Diameter for Blind Hole, Flat Bottom Face (1) |                 | Max Pitch/Rev. |
|             |           |                    |           |        | $\phi DH_{min}$                               | $\phi DH_{max}$ |                |
| A           | 20        | 23                 | 15,0      | 35,3   | 36,2<br>-                                     | -<br>38,4       | 21,6<br>24,5   |
|             | 25        | 21                 | 15,0      | 39,1   | 46,2<br>-                                     | -<br>48,4       | 25,6<br>28,2   |
|             | 32        | 15                 | 15,0      | 56,0   | 60,2<br>-                                     | -<br>62,4       | 23,7<br>25,6   |
|             | 40        | 10                 | 15,0      | 85,1   | 76,2<br>-                                     | -<br>78,4       | 20,0<br>21,3   |
|             | 50        | 8                  | 15,0      | 106,7  | 96,2<br>-                                     | -<br>98,4       | 20,4<br>21,4   |
|             | 63        | 6                  | 15,0      | 142,7  | 122,2<br>-                                    | -<br>124,4      | 19,5<br>20,3   |
|             | 80        | 4                  | 15,0      | 214,5  | 156,2<br>-                                    | -<br>158,4      | 16,7<br>17,2   |
|             | 100       | 2,5                | 15,0      | 343,6  | 196,2<br>-                                    | -<br>198,4      | 13,2<br>13,5   |
| B           | 20        | 20                 | 13,5      | 37,1   | 36,2<br>-                                     | -<br>38,4       | 18,5<br>21,0   |
|             | 25        | 18,5               | 13,5      | 40,3   | 46,2<br>-                                     | -<br>48,4       | 22,3<br>24,6   |
|             | 32        | 13,5               | 13,5      | 56,2   | 60,2<br>-                                     | -<br>62,4       | 21,3<br>22,9   |
|             | 40        | 8,5                | 13,5      | 90,3   | 76,2<br>-                                     | -<br>78,4       | 17,0<br>18,0   |
|             | 50        | 7                  | 13,5      | 109,9  | 96,2<br>-                                     | -<br>98,4       | 17,8<br>18,7   |
|             | 63        | 5,5                | 13,5      | 140,2  | 122,2<br>-                                    | -<br>124,4      | 17,9<br>18,6   |
|             | 80        | 3,5                | 13,5      | 220,7  | 156,2<br>-                                    | -<br>158,4      | 14,6<br>15,1   |
|             | 100       | 2,5                | 13,5      | 309,2  | 196,2<br>-                                    | -<br>198,4      | 13,2<br>13,5   |

(1) using insert radius 0,8 mm

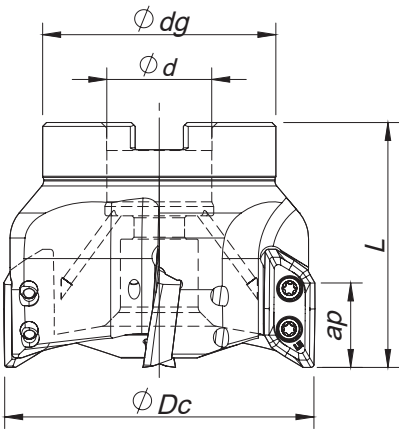
Note: During helical interpolation do not exceed maximum pitch.  
When using different insert radius to calculate the  $\phi DH_{min}$  and  $\phi DH_{max}$  use the equation below:  
- Minimum Diameter:  $\phi DH_{min} = 2 \times (\phi Dc - (R \text{ corner radius} + F \text{ width of edge wiper}))$   
- Maximum Diameter:  $\phi DH_{max} = 2 \times (\phi Dc - R \text{ corner radius})$



PDF



Arbor Mounting  
 $K_r=90^\circ$  |  $\gamma_p=+7^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg  | Specifications |             |         | Insert radius<br>Raio da pastilha<br>Rayo del Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----------|----|-----|----------------|-------------|---------|-------------------------------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi d$ | $\phi dg$ | L  |     | Cutter Type    | Max ap (mm) | rpm max |                                                       |       |
| 181093000            | 050A77090-03-07-022050-A              | 3 | 50                                        | 22       | 42        | 50 | 0,4 | A              | 21,5        | 30 000  | 0,8~3,2                                               |       |
| 181093100            | 063A77090-03-07-022050-A              | 3 | 63                                        | 22       | 42        | 50 | 0,5 | A              | 21,5        | 25 000  | 0,8~3,2                                               |       |
| 181071600            | 080A77090-04-07-027063-A              | 4 | 80                                        | 27       | 60        | 63 | 1,2 | A              | 21,5        | 23 000  | 0,8~3,2                                               |       |
| 181093200            | 100A77090-05-07-032063-A              | 5 | 100                                       | 32       | 70        | 63 | 1,8 | A              | 21,5        | 19 000  | 0,8~3,2                                               |       |
| 181093300            | 125A77090-06-07-040063-A              | 6 | 125                                       | 40       | 100       | 63 | 2,7 | A              | 21,5        | 16 000  | 0,8~3,2                                               |       |
| 181093400            | 050A77090-03-07-022050-B              | 3 | 50                                        | 22       | 42        | 50 | 0,4 | B              | 21,0        | 30 000  | 4,0~5,0                                               |       |
| 181093500            | 063A77090-03-07-022050-B              | 3 | 63                                        | 22       | 42        | 50 | 0,5 | B              | 21,0        | 25 000  | 4,0~5,0                                               |       |
| 181093600            | 080A77090-04-07-027063-B              | 4 | 80                                        | 27       | 60        | 63 | 1,2 | B              | 21,0        | 23 000  | 4,0~5,0                                               |       |
| 181093700            | 100A77090-05-07-032063-B              | 5 | 100                                       | 32       | 70        | 63 | 1,8 | B              | 21,0        | 19 000  | 4,0~5,0                                               |       |
| 181093800            | 125A77090-06-07-040063-B              | 6 | 125                                       | 40       | 100       | 63 | 2,7 | B              | 21,0        | 16 000  | 4,0~5,0                                               |       |

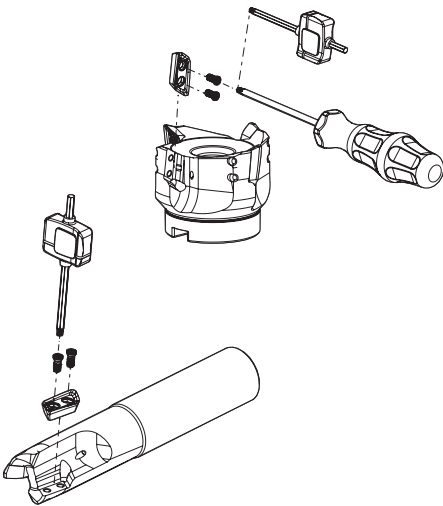
Stock item | Produto de stock | Itens de stock      Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

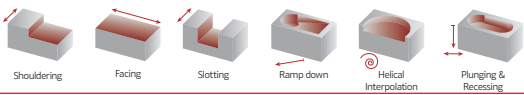
Note: Type A cutters can only assemble inserts with a radius between 0,4 and 3,2. Type B cutters can only assemble inserts with a radius between 4,0 and 5,0.

SPARE PARTS | Complementos | Repuestos

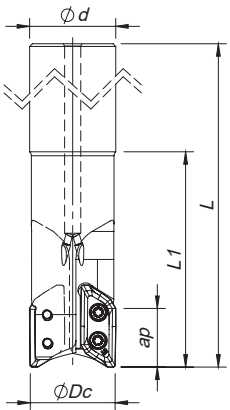
| Cutter<br>$\phi Dc$ | Order separately |            |                 |              | Order separately |                 |
|---------------------|------------------|------------|-----------------|--------------|------------------|-----------------|
|                     | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value | Screw            | DIN 6368 Wrench |
| A77090 - 50-80      | P0401200         | XT15       | DT1530          | 3,0          | -                | -               |
| A77090 - 100        | P0401200         | PT15       | DT1530          | 3,0          | J0164110         | SD6368-16       |
| A77090 - 125        | P0401200         | PT15       | DT1530          | 3,0          | J0204610         | SD6368-20       |
| E77090 - 32-40      | P0401200         | XT15       | DT1530          | 3,0          | -                | -               |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.





Cylindrical Shank  
 $K_r=90^\circ$  |  $\gamma_p=+6^\circ$

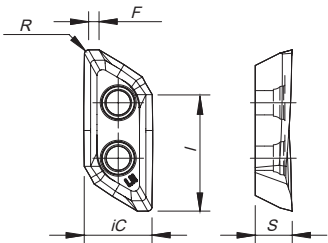


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg  | Specifications |             |         | Insert radius<br>Raio da pastilha<br>Rayo del Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|-----|----------------|-------------|---------|-------------------------------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1 |     | Cutter Type    | Max ap (mm) | rpm max |                                                       |       |
| 181069800            | 032E77090-02-06-032170-A              | 2 | 32                                        | 32 | 170 | 80 | 0,8 | A              | 21.5        | 41 000  | 0,8~3,2                                               |       |
| 181093900            | 040E77090-02-06-040170-A              | 2 | 40                                        | 40 | 170 | 80 | 0,9 | A              | 21.5        | 36 000  | 0,8~3,2                                               |       |
| 181094000            | 032E77090-02-06-032170-B              | 2 | 32                                        | 32 | 170 | 80 | 0,8 | B              | 21.0        | 41 000  | 4,0~5,0                                               | ○     |
| 181094100            | 040E77090-02-06-040170-B              | 2 | 40                                        | 40 | 170 | 80 | 0,9 | B              | 21.0        | 36 000  | 4,0~5,0                                               |       |

Stock item | Produto de stock | Itens de stock      ○ Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

Note: Type A cutters can only assemble inserts with a radius between 0,4 and 3,2. Type B cutters can only assemble inserts with a radius between 4,0 and 5,0.

XDGX 22M7... | Inserts | Pastilhas | Plaquitas



| (1)<br>Geometry<br>code | (2) Grade code<br>ISO<br>Reference | N   | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |      |      | Cutter<br>Type |
|-------------------------|------------------------------------|-----|------------------------------------------------|------|------|------|------|----------------|
|                         |                                    | UNC |                                                |      |      |      |      |                |
|                         |                                    | 10  |                                                |      |      |      |      |                |
| PH0910                  | PH0910                             |     | iC                                             | S    | I    | R    | F    | A              |
|                         |                                    |     | 13,00                                          | 7,00 | 22,0 | 0,80 | 2,00 |                |
|                         |                                    |     | 13,00                                          | 7,00 | 22,0 | 1,60 | 1,20 |                |
|                         |                                    |     | 13,00                                          | 7,00 | 22,0 | 2,00 | 0,80 |                |
|                         |                                    |     | 13,00                                          | 7,00 | 22,0 | 3,20 | 0,60 |                |
|                         |                                    |     | 13,00                                          | 7,00 | 22,0 | 4,00 | 0,90 | B              |
|                         |                                    |     | 13,00                                          | 7,00 | 22,0 | 5,00 | 0,40 |                |

First choice | Primeira opção | 1ª opción      Stock item | Produto de stock | Itens de stock      ○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

## SHOULDERING

| ISO | PSM | Material                  | HB<br>(Brinell) | Vc (m/min) | Width of Cut ae (mm) | Depth of Cut ap (mm) | Feed fz(mm/t) |
|-----|-----|---------------------------|-----------------|------------|----------------------|----------------------|---------------|
|     |     |                           |                 | PH0910     |                      |                      |               |
| N   | 10  | Aluminium and Non Ferrous | 30-130          | 350-3000   | ≤ 25% ØDc            | ≤5,0                 | 0,35 - 0,40   |
|     |     |                           |                 |            |                      | 5,0 - 10,0           | 0,30 - 0,35   |
|     |     |                           |                 |            |                      | 10,0 - 15,0          | 0,25 - 0,30   |
|     |     |                           |                 |            |                      | 15,0 - 20,0          | 0,20 - 0,25   |
|     |     |                           |                 |            | < 50% ØDc            | ≤5,0                 | 0,35 - 0,40   |
|     |     |                           |                 |            |                      | 5,0 - 10,0           | 0,30 - 0,35   |
|     |     |                           |                 |            |                      | 10,0 - 15,0          | 0,25 - 0,30   |
|     |     |                           |                 |            |                      | 15,0 - 20,0          | 0,20 - 0,25   |
|     |     |                           |                 |            | ≤ 75% ØDc            | ≤5,0                 | 0,30 - 0,35   |
|     |     |                           |                 |            |                      | 5,0 - 10,0           | 0,25 - 0,30   |
|     |     |                           |                 |            |                      | 10,0 - 15,0          | 0,20 - 0,25   |
|     |     |                           |                 |            |                      | 15,0 - 20,0          | 0,15 - 0,20   |

## SLOTING

| ISO | PSM | Material                  | HB<br>(Brinell) | Vc (m/min) | Width of Cut ae (mm) | Depth of Cut ap (mm) | Feed fz(mm/t) |
|-----|-----|---------------------------|-----------------|------------|----------------------|----------------------|---------------|
|     |     |                           |                 | PH0910     |                      |                      |               |
| N   | 10  | Aluminium and Non Ferrous | 30-130          | 350-3000   | 100% ØDc             | ≤5,0                 | 0,25 - 0,35   |
|     |     |                           |                 |            |                      | 5,0 - 10,0           | 0,20 - 0,30   |
|     |     |                           |                 |            |                      | 10,0 - 15,0          | 0,15 - 0,25   |
|     |     |                           |                 |            |                      | 15,0 - 20,0          | 0,10 - 0,20   |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) Use internal coolant supply.

## OPERATIONAL GUIDE | Guia operacional | Guía operativa

- Only use the inserts and parts provided by Palbit with this tool. Use of the correct insert clamp screws is especially important to ensure overall tool safety. Do not use damaged or worn clamp screws.

- When tightening the clamp screws, follow the order in Figure 1. The recommended torque value is 3.5Nm.

- The maximum allowable revolutions are shown in Table 1. Ensure that the cutter operates under the maximum allowable revolutions.

The maximum allowable revolutions for safety purposes are determined in accordance with ISO 15641

(Milling Cutters for high speed machining-Safety requirements).

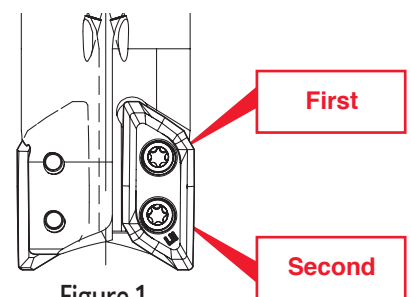


Figure 1

Table 1 - Maximum allowable revolutions:

| ØDc                      | Ø32   | Ø40   | Ø50   | Ø63   | Ø80   | Ø100  | Ø125  |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|
| RPM (min <sup>-1</sup> ) | 41000 | 36000 | 30000 | 25000 | 23000 | 19000 | 16000 |

- Even when operating under the maximum allowable spindle speed, if the spindle speed is equal or higher than the values shown in Table 2., it is recommended that the balance quality (with the arbor or chuck) according ISO 1940.

Table 2 - Maximum revolutions when balancing with the arbor or chuck has not been achieved:

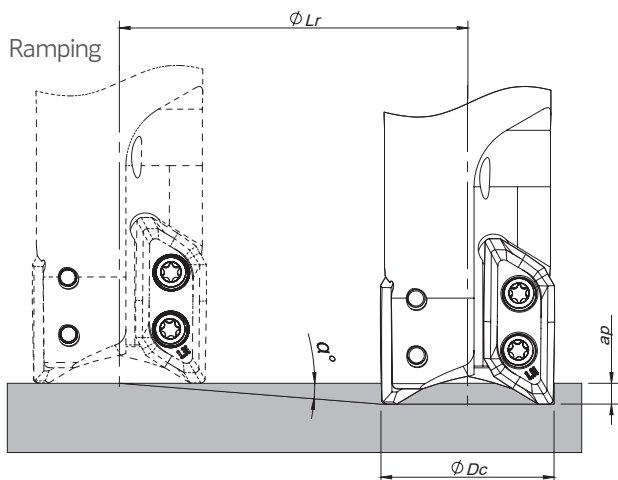
| ØDc                      | Ø32  | Ø40  | Ø50  | Ø63  | Ø80  | Ø100 | Ø125 |
|--------------------------|------|------|------|------|------|------|------|
| RPM (min <sup>-1</sup> ) | 9500 | 7600 | 6000 | 4800 | 3800 | 3000 | 2400 |

- When setting the spindle speed, take into consideration the maximum allowable revolutions of arbor or chuck.
- Use the specified set bolt when using the arbor type with internal coolant supply.

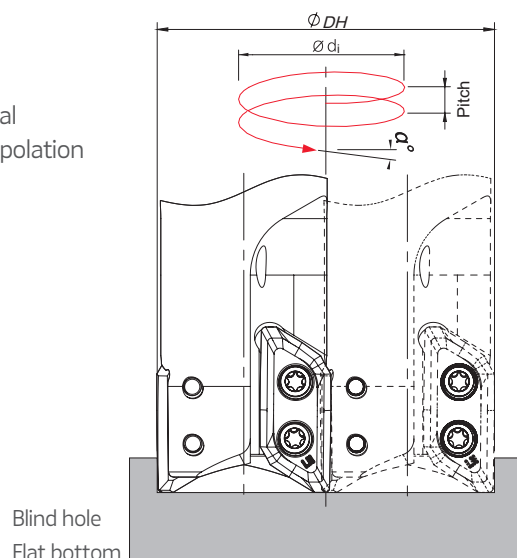


## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular



Helical Interpolation



$$\phi di = \phi DH - \phi Dc$$

| Cutter Type | ØDc | Ramping     |        |        | Helical Interpolation                         |            |                |
|-------------|-----|-------------|--------|--------|-----------------------------------------------|------------|----------------|
|             |     |             |        |        | Diameter for Blind Hole, Flat Bottom Face (1) |            | Max Pitch/Rev. |
|             |     | Max Ramp a° | Max ap | Min Lr | ØDHmin                                        | ØDHmax     |                |
| A           | 32  | 19          | 21,5   | 62,4   | 60,0<br>-                                     | -<br>62,4  | 30,3<br>32,9   |
|             | 40  | 13          | 21,5   | 93,1   | 76,0<br>-                                     | -<br>78,4  | 26,1<br>27,8   |
|             | 50  | 9           | 21,5   | 135,7  | 96,0<br>-                                     | -<br>98,4  | 22,9<br>24,1   |
|             | 63  | 7           | 21,5   | 175,1  | 122,0<br>-                                    | -<br>124,4 | 22,7<br>23,7   |
|             | 80  | 5           | 21,5   | 245,7  | 156,0<br>-                                    | -<br>158,4 | 20,9<br>21,5   |
|             | 100 | 4           | 21,5   | 307,5  | 196,0<br>-                                    | -<br>198,4 | 21,1<br>21,6   |
|             | 125 | 3           | 21,5   | 410,2  | 246,0<br>-                                    | -<br>248,4 | 19,9<br>20,3   |
| B           | 32  | 18          | 21,0   | 64,6   | 60,0<br>-                                     | -<br>62,4  | 28,6<br>31,0   |
|             | 40  | 11          | 21,0   | 108,0  | 76,0<br>-                                     | -<br>78,4  | 22,0<br>23,4   |
|             | 50  | 8           | 21,0   | 149,4  | 96,0<br>-                                     | -<br>98,4  | 20,3<br>21,4   |
|             | 63  | 6           | 21,0   | 199,8  | 122,0<br>-                                    | -<br>124,4 | 19,5<br>20,3   |
|             | 80  | 4           | 21,0   | 300,3  | 156,0<br>-                                    | -<br>158,4 | 16,7<br>17,2   |
|             | 100 | 3           | 21,0   | 400,7  | 196,0<br>-                                    | -<br>198,4 | 15,8<br>16,2   |
|             | 125 | 2           | 21,0   | 601,4  | 246,0<br>-                                    | -<br>248,4 | 13,3<br>13,5   |

(1) using insert radius 0,8 mm

Note: During helical interpolation do not exceed maximum pitch.

When using different insert radius to calculate the ØDHmin and ØDHmax use the equation below:

- Minimum Diameter: ØDHmin = 2 x (ØDc - (R corner radius + F width of edge wiper))

- Maximum Diameter: ØDHmax = 2 x (ØDc - R corner radius)



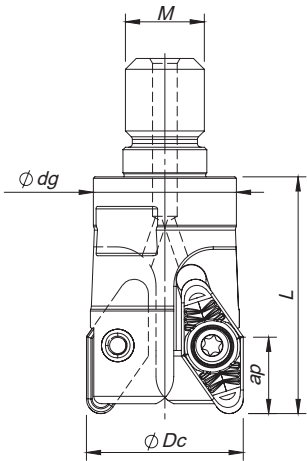
PDF



ALUPRO 08390



Threaded Coupling  
 $K_r=90^\circ$  |  $\gamma_p=0^\circ$

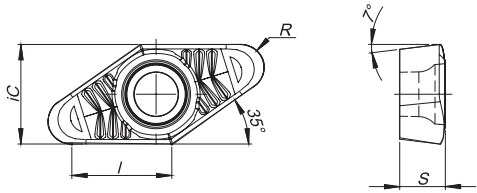


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |         |    | Kg   | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|---------|----|------|----------------|-------------------------------|-------|
|                      |                                       |   | \phi Dc                                   | \phi d/M | \phi dg | L  |      | Ap max<br>(mm) |                               |       |
| 181019900            | 032R08390-02-M16048                   | 2 | 32                                        | M16      | 29      | 48 | 0,19 | 15,00          | VCGX 22...                    |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire página A-8)

VCGX 220530 | Inserts | Pastilhas | Plaquetas



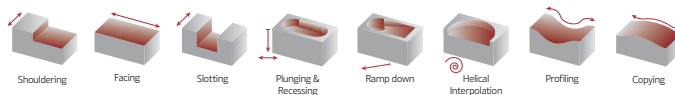
|                                    |                  | N                                                                                   | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |      |
|------------------------------------|------------------|-------------------------------------------------------------------------------------|------------------------------------------------|------|------|------|
|                                    |                  | UNC                                                                                 |                                                |      |      |      |
|                                    |                  | <sup>(2)</sup> Grade code                                                           |                                                |      |      |      |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference | PH0910                                                                              | iC                                             | S    | I    | R    |
| 1121907                            | VCGX 220530 LN   |  | 12,70                                          | 5,60 | 12,7 | 3,00 |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire página A-8)

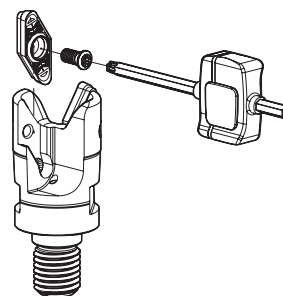
Insert order code = (1) Geometry Code + (2) Grade Code



## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc | Order separately |            |                 |              |
|---------------|------------------|------------|-----------------|--------------|
|               | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value |
| R08390 - 32   | P0451001         | XT20       | DT2050          | 5,00         |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                  | HB<br>(Brinell) | Vc (m/min) | Feed fz (mm/t) |
|-----|-----|---------------------------|-----------------|------------|----------------|
|     |     |                           |                 | PH0910     | VCGX 22...     |
| N   | 10  | Aluminium and Non Ferrous | 30-130          | 350-1400   | 0,20-0,50      |

|                          |      |
|--------------------------|------|
| ØDc                      | Ø32  |
| RPM (min <sup>-1</sup> ) | 9500 |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

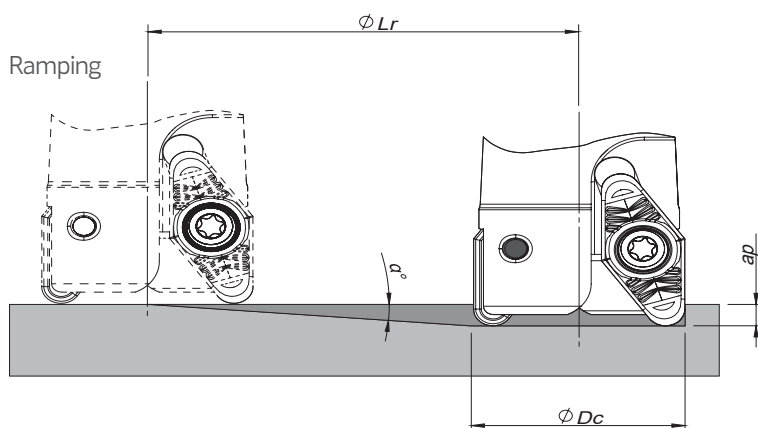
(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) Use internal coolant supply

## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular



Helical  
Interpolation

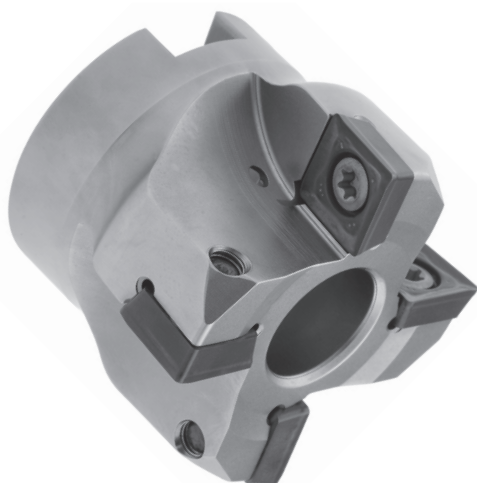
Blind hole  
Flat bottom

$$\text{Ødi} = \text{ØDH} - \text{ØDc}$$

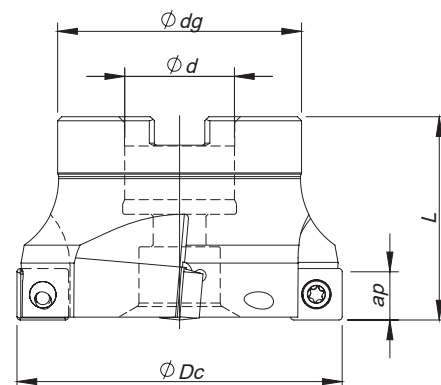
| ØDc | Ramping     |        |        | Helical Interpolation |           |                |
|-----|-------------|--------|--------|-----------------------|-----------|----------------|
|     | Max Ramp a° | Max ap | Min Lr | ØDHmin                | ØDHmax    | Max Pitch/Rev. |
| 32  | 6,8         | 15,0   | 25,4   | 53,0<br>-             | -<br>62,0 | 7,0<br>11,0    |

Note: During helical interpolation do not exceed max Pitch.





## Arbor Mounting

 $\kappa_r = 90^\circ$  |  $\gamma_p = +6^\circ$ 


| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg   | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|----------|-----------|----|------|----------------|----------------|-------------------------------|-------|
|                      |                                       |    | $\phi Dc$                                 | $\phi d$ | $\phi dg$ | L  |      | Arbor<br>Type  | Ap max<br>(mm) |                               |       |
| 181167700            | 040A06290-03-06-016040                | 3  | 40                                        | 16       | 39        | 40 | 0,2  | A              | 11             | SP... 1204                    |       |
| 181167800            | 050A06290-04-06-022040                | 4  | 50                                        | 22       | 49        | 40 | 0,35 | A              | 11             | SP... 1204                    |       |
| 181167900            | 063A06290-05-06-027050                | 5  | 63                                        | 27       | 60        | 50 | 0,7  | A              | 11             | SP... 1204                    |       |
| 181168000            | 080A06290-06-06-027050                | 6  | 80                                        | 27       | 60        | 50 | 1,15 | A              | 11             | SP... 1204                    |       |
| 181168100            | 100A06290-08-06-032050                | 8  | 100                                       | 32       | 80        | 50 | 1,75 | A              | 11             | SP... 1204                    |       |
| 181168200            | 125A06290-08-06-040063                | 8  | 125                                       | 40       | 96        | 63 | 3,05 | B              | 11             | SP... 1204                    |       |
| 181065600            | 160A06290-10-06-U040063               | 10 | 160                                       | 40       | 100       | 63 | 4,2  | C              | 11             | SP... 1204                    |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

## SP... 1204... || Inserts | Pastilhas | Plaquetas

SPMX - MP

NEW

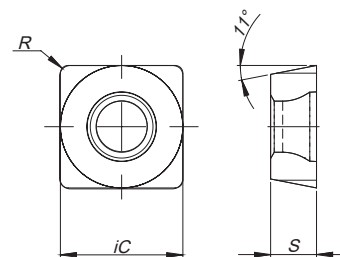


SPGX-MS

NEW

PHH  
NEW  
GRADEPHP  
NEW  
GRADE

SPGX-MP | SPMW-MS



|                                 |                     | P                         | M      | K      | S      | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |     |     |
|---------------------------------|---------------------|---------------------------|--------|--------|--------|------------------------------------------------|-----|-----|
|                                 |                     | PVD                       | PVD    | PVD    | PVD    |                                                |     |     |
|                                 |                     | <sup>(2)</sup> Grade code | T1     | X9     | T1     |                                                |     |     |
| <sup>(1)</sup><br>Geometry code | ISO<br>Reference    | PHP920                    | PHH930 | PHP920 | PHH930 | iC                                             | S   | R   |
| 1113002                         | SPGX 120408 PDSR-MP |                           |        |        |        | 12,73                                          | 4,8 | 0,8 |
| 1113003                         | SPGX 120408 PDSR-MS |                           |        |        |        | 12,73                                          | 4,8 | 0,8 |
| 1112916                         | SPMX 120408 PDSR-MP |                           |        |        |        | 12,73                                          | 4,8 | 0,8 |
| 1112999                         | SPMX 120408 PDSR-MS |                           |        |        |        | 12,73                                          | 4,8 | 0,8 |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

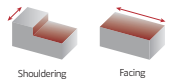
SPMT 120408-MP

SPMW 120408



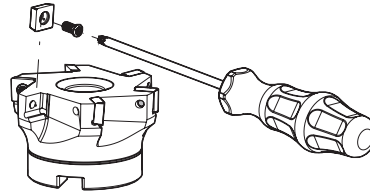
Page A - 50

Note: It is possible to use other inserts - Page A - 50



## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc     | Insert Screw | Key (Torx) | Order separately   |              |
|-------------------|--------------|------------|--------------------|--------------|
|                   |              |            | Key<br>(Torx - Nm) | Torque Value |
| A06290 - 40 - 160 | P0501100     | PT20       | DT2050             | 5,00         |



Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |             | Feed fz (mm/t) |              |
|-----|-----|-----------------------------------|-----------------|-------------------|-------------|----------------|--------------|
|     |     |                                   |                 | ← Wear Resistance | Toughness → |                |              |
|     |     |                                   |                 | PHP920            | PHH930      | SPG(M)X...MP   | SPM(M)X...MS |
| P   | 1   | Unalloyed Steel                   | 125-220         | 180-250           | -           | 0,08-0,20      | -            |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 170-210           | -           | 0,08-0,20      | -            |
|     | 3   | High-Alloyed Steel                | 280-380         | 160-200           | -           | 0,08-0,20      | -            |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | 120-180     | -              | 0,08-0,20    |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | 100-160     | -              | 0,08-0,20    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | 70-140      | -              | 0,08-0,20    |
| K   | 7   | Malleable Cast Iron               | 130-230         | 170-300           | -           | 0,10-0,30      | -            |
|     | 8   | Grey Cast Iron                    | 180-245         | 150-250           | -           | 0,10-0,30      | -            |
|     | 9   | Nodular Cast iron                 | 160-250         | 90-210            | -           | 0,10-0,30      | -            |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | 30-75       | -              | 0,08-0,15    |

(Note 1) Cutting conditions ae/DC=70%

(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 3) If chattering occurs, reduce ap and Vc by 30% and keep the same fz per tooth.

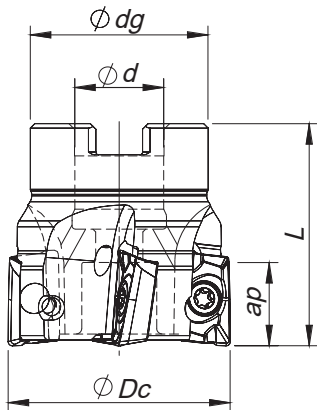
## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra-apanas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | ... MS                   | ... MP               |
|     | 2   | Low-Alloyed Steel                 | 220-280         | ... MS                   | ... MP               |
|     | 3   | High-Alloyed Steel                | 280-380         | ... MP                   | ... MP               |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | ... MS                   | ... MP               |
|     | 5   | SS - Austenitic                   | 200-330         | ... MS                   | ... MS               |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | ... MS                   | ... MS               |
| K   | 7   | Malleable Cast Iron               | 130-230         | ... MP                   | ... MP               |
|     | 8   | Grey Cast Iron                    | 180-245         | ... MP                   | ... MP               |
|     | 9   | Nodular Cast iron                 | 160-250         | ... MP                   | ... MP               |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | ... MS                   | ... MS               |

# LINEPRO 17090



Arbor Mounting  
 $K_r=90^\circ$  |  $\gamma_p=+9^\circ$



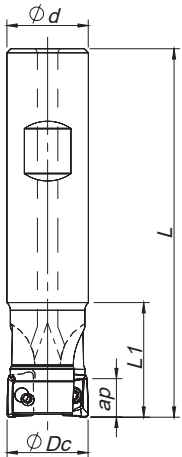
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg    | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|-------|----------------|----------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | Ødg | L  |       | Arbor<br>Type  | Ap max<br>(mm) |                               |       |
| 181010200            | 040A17090-06-09-022040                | 6 | 40                                        | 22 | 39  | 40 | 0,210 | A              | 9,0            | AP... 1003...                 |       |
| 181010300            | 050A17090-07-09-022040                | 7 | 50                                        | 22 | 40  | 40 | 0,320 | A              | 9,0            | AP... 1003...                 |       |
| 181014300            | 063A17090-08-09-022040                | 8 | 63                                        | 22 | 48  | 40 | 0,560 | A              | 9,0            | AP... 1003...                 |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



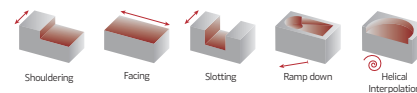
Weldon Shank  
 $K_r=90^\circ$  |  $\gamma_p=+7^\circ \sim +9^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg    | Specifications |  | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|-----|----|-------|----------------|--|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | L   | L1 |       | Ap max<br>(mm) |  |                               |       |
| 181041300            | 016W17090-02-07-016085                | 2 | 16                                        | 16 | 85  | 26 | 0,110 | 9,0            |  | AP... 1003...                 |       |
| 181031700            | 016W17090-02-07-016150                | 2 | 16                                        | 16 | 150 | 26 | 0,210 | 9,0            |  | AP... 1003...                 |       |
| 181041400            | 020W17090-03-09-020090                | 3 | 20                                        | 20 | 90  | 28 | 0,190 | 9,0            |  | AP... 1003...                 |       |
| 181041600            | 020W17090-03-09-020150                | 3 | 20                                        | 20 | 150 | 28 | 0,320 | 9,0            |  | AP... 1003...                 |       |
| 181041700            | 025W17090-04-09-020150                | 4 | 25                                        | 20 | 150 | 26 | 0,340 | 9,0            |  | AP... 1003...                 |       |
| 181041500            | 025W17090-04-09-025095                | 4 | 25                                        | 25 | 95  | 30 | 0,310 | 9,0            |  | AP... 1003...                 |       |

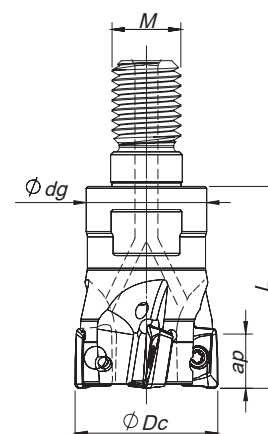
Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



### Threaded Coupling

$K_r = 90^\circ$  |  $\gamma_p = +7^\circ \sim +9^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |     |     |    | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----|-----|----|-------|----------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | ØM  | Ødg | L  |       | Ap max (mm)    |                               |       |
| 181015100            | 016R17090-02-07-M08025                | 2 | 16                                        | M8  | 13  | 25 | 0,030 | 9,0            | AP... 1003...                 |       |
| 181015200            | 020R17090-03-09-M10030                | 3 | 20                                        | M10 | 18  | 30 | 0,058 | 9,0            | AP... 1003...                 |       |
| 181015300            | 025R17090-04-09-M12035                | 4 | 25                                        | M12 | 21  | 35 | 0,110 | 9,0            | AP... 1003...                 |       |

Stock item | Produto de stock | Itens de stock

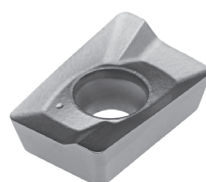
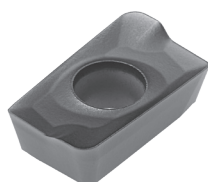
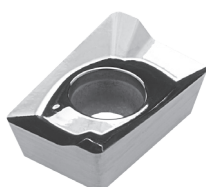
Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

## AP... 1003... || Inserts | Pastilhas | Plaquetas

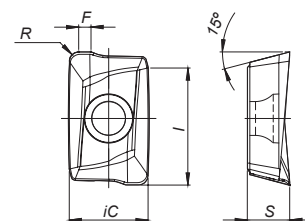
APET - LN

APKT - X

APKT - X1



APET-LN | APKT-X | APKT-X1



|                   |                     | P              |        | M      | K      |        | N      | Dimensions<br>Dimensões<br>Dimensiones (mm) |      |       |      |      |
|-------------------|---------------------|----------------|--------|--------|--------|--------|--------|---------------------------------------------|------|-------|------|------|
|                   |                     | PVD            |        | PVD    | PVD    |        | UNC    |                                             |      |       |      |      |
|                   |                     | (2) Grade code |        |        |        |        |        |                                             |      |       |      |      |
| (1) Geometry code | ISO Reference       | PH6920         | PH6930 | PH6930 | PH6920 | PH6930 | PH0910 | iC                                          | S    | I     | R    | F    |
| 1112043           | APET 100305 PDFR-LN |                |        |        |        |        |        | 6,70                                        | 3,50 | 10,00 | 0,50 | 1,20 |
| 1112168           | APKT 100305 PDER-X1 |                |        |        |        |        |        | 6,70                                        | 3,50 | 10,00 | 0,50 | 1,20 |
| 1112167           | APKT 100305 PDSR-X1 |                |        |        |        |        |        | 6,70                                        | 3,50 | 10,00 | 0,50 | 1,20 |
| 1111071           | APKT 100308 PDER-X  |                |        |        |        |        |        | 6,70                                        | 3,50 | 10,00 | 0,80 | 0,90 |
| 1111044           | APKT 100308 PDSR-X  |                |        |        |        |        |        | 6,70                                        | 3,50 | 10,00 | 0,80 | 0,90 |
| 1111042           | APKT 100308 PDTR-X  |                |        |        |        |        |        | 6,70                                        | 3,50 | 10,00 | 0,80 | 0,90 |
| 1111072           | APKT 100312 PDER-X  |                |        |        |        |        |        | 6,70                                        | 3,50 | 10,00 | 1,20 | -    |
| 1110987           | APKT 100312 PDSR-X  |                |        |        |        |        |        | 6,70                                        | 3,50 | 10,00 | 1,20 | -    |
| 1111045           | APKT 100312 PDTR-X  |                |        |        |        |        |        | 6,70                                        | 3,50 | 10,00 | 1,20 | -    |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

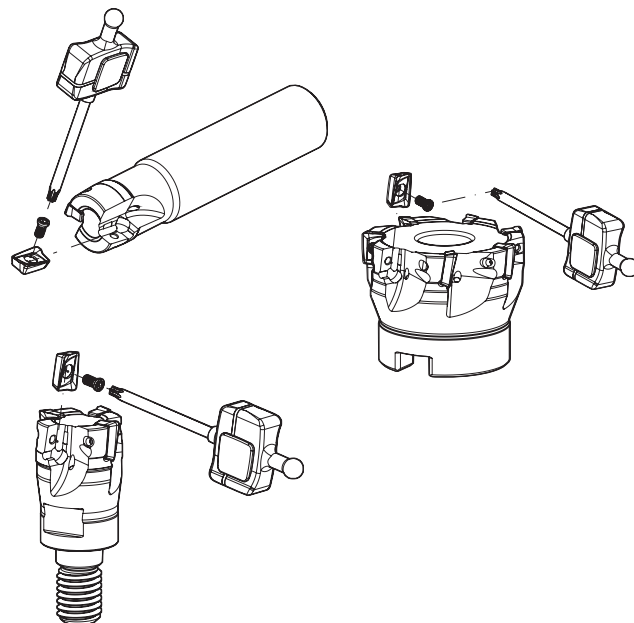
Insert order code = (1) Geometry Code + (2) Grade Code

# LINEPRO 17090

## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc  | Order separately |            |                    |              |
|----------------|------------------|------------|--------------------|--------------|
|                | Insert Screw     | Key (Torx) | Key<br>(Torx - Nm) | Torque Value |
| W17090 - 16-25 | P0250503         | XT08       | DT0812             | 1,2          |
| R17090 - 16-25 | P0250503         | XT08       | DT0812             | 1,2          |
| A17090 - 40-63 | P0250503         | XT08       | DT0812             | 1,2          |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades            |        |             |
|-----|-----|-----------------------------------|-----------------|-------------------|--------|-------------|
|     |     |                                   |                 | ← Wear Resistance |        | Toughness → |
|     |     |                                   |                 | PH0910            | PH6920 | PH6930      |
| P   | 1   | Unalloyed Steel                   | 125-220         | ●                 | ✓      | ✓           |
|     | 2   | Low-Alloyed Steel                 | 220-280         |                   | ✓      | ✓           |
|     | 3   | High-Alloyed Steel                | 280-380         |                   | ✓      | ✓           |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                   |        | ✓           |
|     | 5   | SS - Austenitic                   | 200-330         |                   |        | ✓           |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                   |        | ✓           |
| K   | 7   | Malleable Cast Iron               | 130-230         |                   | ✓      | ✓           |
|     | 8   | Grey Cast Iron                    | 180-245         |                   | ✓      | ✓           |
|     | 9   | Nodular Cast iron                 | 160-250         |                   | ✓      | ✓           |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | ✓                 |        |             |

- Good Conditions
- Average Conditions
- Difficult Conditions



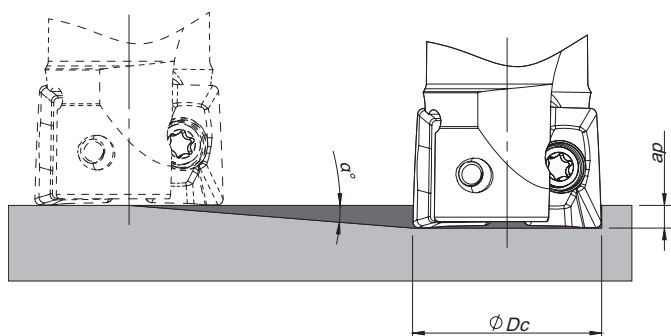
## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra-apanas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | APKT 10... PDER-X        | APKT 10... PDTR-X    |
|     | 2   | Low-Alloyed Steel                 | 220-280         | APKT 10... PDSR-X        | APKT 10... PDSR-X    |
|     | 3   | High-Alloyed Steel                | 280-380         | APKT 10... PDSR-X        | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | APKT 10... PDER-X        | -                    |
|     | 5   | SS - Austenitic                   | 200-330         | APKT 10... PDER-X        | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | APKT 10... PDER-X        | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230         | APKT 10... PDER-X        | APKT 10... PDSR-X    |
|     | 8   | Grey Cast Iron                    | 180-245         | APKT 10... PDSR-X        | -                    |
|     | 9   | Nodular Cast iron                 | 160-250         | APKT 10... PDSR-X        | -                    |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | APET 10... PDPR-LN       | -                    |

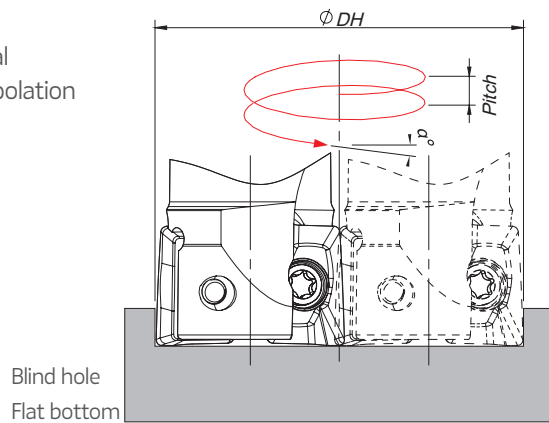
## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular

Ramping



Helical Interpolation



$$\text{Ødi} = \text{ØDH} - \text{ØDc}$$

| ØDc | Ramping     |        |        | Helical Interpolation                         |        |                |
|-----|-------------|--------|--------|-----------------------------------------------|--------|----------------|
|     |             |        |        | Diameter for Blind Hole, Flat Bottom Face (1) |        | Max Pitch/Rev. |
|     | Max Ramp a° | Max ap | Min Lr | ØDHmin                                        | ØDHmax |                |
| 16  | 1,3         | 9,0    | 396,6  | 29,2                                          | -      | 0,9            |
|     |             |        |        | -                                             | 31,0   | 1,1            |
| 20  | 0,9         | 9,0    | 572,9  | 37,2                                          | -      | 0,8            |
|     |             |        |        | -                                             | 39,0   | 0,9            |
| 25  | 0,6         | 9,0    | 859,4  | 47,2                                          | -      | 0,7            |
|     |             |        |        | -                                             | 49,0   | 0,8            |
| 40  | 0,4         | 9,0    | 1289,1 | 77,2                                          | -      | 0,8            |
|     |             |        |        | -                                             | 79,0   | 0,9            |
| 50  | 0,25        | 9,0    | 2062,6 | 97,2                                          | -      | 0,6            |
|     |             |        |        | -                                             | 99,0   | 0,7            |
| 63  | 0,2         | 9,0    | 2578,3 | 123,2                                         | -      | 0,7            |
|     |             |        |        | -                                             | 125,0  | 0,7            |

(1) using LP insert with radius 0,8 mm

Note: During helical interpolation do not exceed maximum pitch

When using HF insert or other different insert radius to calculate the ØDHmin and ØDHmax use the equation below:

- Minimum Diameter: ØDHmin = 2 x (ØDc - (R corner radius + F width of edge wiper))

- Maximum Diameter: ØDHmax = 2 x (ØDc - R corner radius)

# LINEPRO 17090

A

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)                  |         |                       |
|-----|-----|-----------------------------------|-----------------|-----------------------------|---------|-----------------------|
|     |     |                                   |                 | ← Wear Resistance<br>PH0910 | PH6920  | Toughness →<br>PH6930 |
| P   | 1   | Unalloyed Steel                   | 125-220         | -                           | 180-240 | 160-220               |
|     | 2   | Low-Alloyed Steel                 | 220-280         | -                           | 160-220 | 140-200               |
|     | 3   | High-Alloyed Steel                | 280-380         | -                           | 140-210 | 120-190               |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                           | 140-220 | 140-200               |
|     | 5   | SS - Austenitic                   | 200-330         | -                           | 130-180 | 120-160               |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                           | 120-160 | 100-140               |
| K   | 7   | Malleable Cast Iron               | 130-230         | -                           | 160-260 | 150-240               |
|     | 8   | Grey Cast Iron                    | 180-245         | -                           | 140-240 | 140-230               |
|     | 9   | Nodular Cast iron                 | 160-250         | -                           | 120-200 | 100-190               |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | 100-2000                    | -       | -                     |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) Cutting conditions for slotting and shouldering operations:

| Operation   | $a_e$ | Vc & fz | $a_p$ (mm) |
|-------------|-------|---------|------------|
| Slotting    | 100%  | <20%    | 3,0-4,0    |
| Shouldering | <50%  | >8%     | 5,0-6,0    |
|             | ≤25%  | >12%    | 7,0-8,0    |

(Note 3) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 4) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 5) If chattering occurs, reduce  $a_p$  and Vc by 30% and keep the same fz per tooth.

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

Technical Data

End Mills

| Feed fz (mm/t)       |                         |                    |
|----------------------|-------------------------|--------------------|
| APKT 10... PDER-X/X1 | APKT 10... PDS(T)R-X/X1 | APET 10... PDFR-LN |
| 0,07-0,15            | 0,10-0,25               | -                  |
| 0,07-0,10            | 0,10-0,20               | -                  |
| 0,07-0,10            | 0,10-0,20               | -                  |
| 0,07-0,10            | -                       | -                  |
| 0,07-0,10            | -                       | -                  |
| 0,07-0,10            | -                       | -                  |
| 0,07-0,15            | 0,10-0,25               | -                  |
| 0,07-0,15            | 0,10-0,25               | -                  |
| -                    | 0,10-0,20               | -                  |
| -                    | -                       | 0,07-0,20          |

|                  |
|------------------|
| A                |
| MILLING          |
| Overview         |
| Face milling     |
| Hifeed milling   |
| Shoulder milling |
| Profile milling  |
| Hardmill         |
| Center & Chamfer |
| Spot face        |
| Spare Parts      |
| Technical Data   |
| End Mills        |

LINEPRO 18090

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

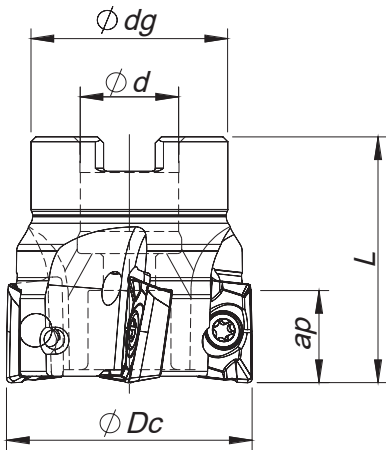
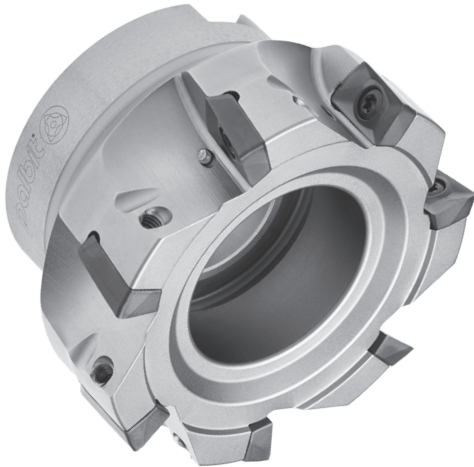
Center & Chamfer

Spot face

Spare Parts

Technical Data

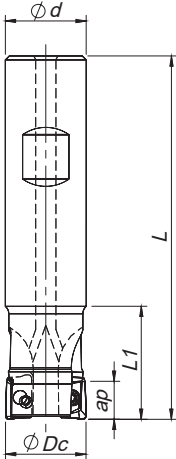
End Mills



Arbor Mounting  
 $K_r=90^\circ$  |  $\gamma_p=+8^\circ \sim +10^\circ$

| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg    | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----------|----|-------|----------------|----------------|-------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi d$ | $\phi dg$ | L  |       | Arbor<br>Type  | Ap max<br>(mm) |                               |       |
| 181031200            | 040A18090-04-08-016040                | 4 | 40                                        | 16       | 32        | 40 | 0,180 | A              | 14,5           | AP... 1604                    |       |
| 181030900            | 050A18090-05-08-022040                | 5 | 50                                        | 22       | 42        | 40 | 0,290 | A              | 14,5           | AP... 1604                    |       |
| 181031300            | 063A18090-06-09-022040                | 6 | 63                                        | 22       | 52        | 40 | 0,530 | A              | 14,5           | AP... 1604                    |       |
| 181031400            | 080A18090-07-10-027050                | 7 | 80                                        | 27       | 60        | 50 | 0,920 | B              | 14,5           | AP... 1604                    |       |
| 181031500            | 100A18090-08-10-032050                | 8 | 100                                       | 32       | 80        | 50 | 1,680 | B              | 14,5           | AP... 1604                    |       |
| 181031600            | 125A18090-09-10-040063                | 9 | 125                                       | 40       | 90        | 63 | 3,010 | B              | 14,5           | AP... 1604                    |       |

Stock item | Produto de stock | Itens de stock      Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



Weldon Shank  
 $K_r=90^\circ$  |  $\gamma_p=+6^\circ \sim +8^\circ$

| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |     |    | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----|----|-------|----------------|-------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi d$ | L   | L1 |       | Ap max<br>(mm) |                               |       |
| 181041800            | 025W18090-02-06-025100                | 2 | 25                                        | 25       | 100 | 44 | 0,310 | 14,5           | AP... 1604                    |       |
| 181042100            | 025W18090-02-06-025200                | 2 | 25                                        | 25       | 200 | 60 | 0,670 | 14,5           | AP... 1604                    |       |
| 181041900            | 032W18090-03-07-032110                | 3 | 32                                        | 32       | 110 | 50 | 0,560 | 14,5           | AP... 1604                    |       |
| 181042200            | 032W18090-03-07-032200                | 3 | 32                                        | 32       | 200 | 60 | 1,100 | 14,5           | AP... 1604                    |       |
| 181042000            | 040W18090-04-08-032115                | 4 | 40                                        | 32       | 115 | 40 | 0,670 | 14,5           | AP... 1604                    |       |
| 181042300            | 040W18090-04-08-032200                | 4 | 40                                        | 32       | 200 | 40 | 1,190 | 14,5           | AP... 1604                    |       |

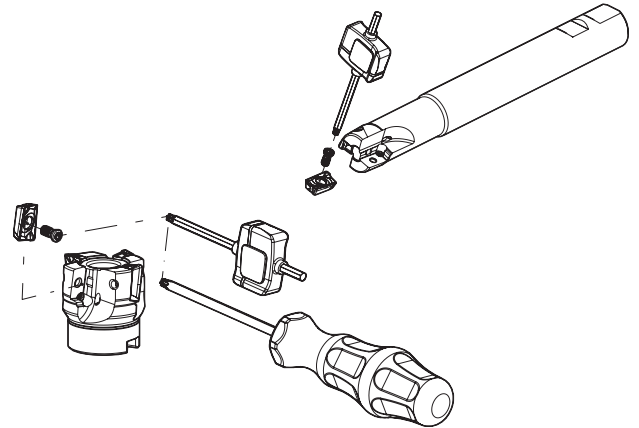
Stock item | Produto de stock | Itens de stock      Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



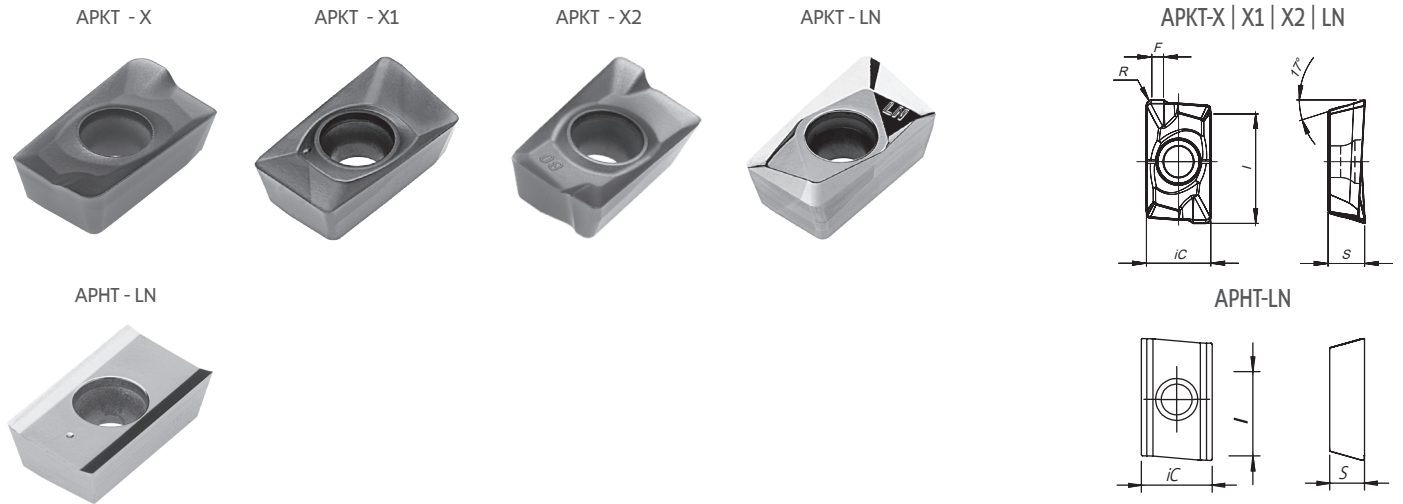
## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc    | Insert Screw | Key (Torx) | Order separately   |              |
|------------------|--------------|------------|--------------------|--------------|
|                  |              |            | Key<br>(Torx - Nm) | Torque Value |
| W18090 - 25-40   | P0400900     | XT15       | DT1530             | 3,0          |
| A18090 - 40-80   | P0400900     | XT15       | DT1530             | 3,0          |
| A18090 - 100-125 | P0400900     | PT15       | DT1530             | 3,0          |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## AP... 1604... | Inserts | Pastilhas | Plaquitas



|                                    |                           | P      |        |        |        | M      |        | K      |        |        |        | N      | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |       |      |      |
|------------------------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|-------|------|------|
|                                    |                           | PVD    |        |        |        | PVD    |        | PVD    |        |        |        | UNC    |                                                |      |       |      |      |
|                                    | <sup>(2)</sup> Grade code | 68     | G4     | 66     | P3     | 66     | P3     | 68     | G4     | 66     | P3     | 10     |                                                |      |       |      |      |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference          | PH6920 | PH7920 | PH6930 | PH7930 | PH6930 | PH7930 | PH6920 | PH7920 | PH6930 | PH7930 | PH0910 | iC                                             | S    | I     | R    | F    |
| 1112159                            | APKT 160408 PDER-X1       | Ⓢ      |        | Ⓢ      |        | Ⓢ      |        | Ⓢ      |        | Ⓢ      |        |        | 9,45                                           | 5,35 | 16,00 | 0,80 | 1,80 |
| 1112464                            | APKT 160408 PDER-X2       |        | Ⓢ      |        | Ⓢ      |        | Ⓢ      |        | Ⓢ      |        | Ⓢ      |        | 9,45                                           | 5,35 | 16,00 | 0,80 | 1,80 |
| 1112158                            | APKT 160408 PDSR-X1       | Ⓢ      |        | Ⓢ      |        |        |        | Ⓢ      |        | Ⓢ      |        |        | 9,45                                           | 5,35 | 16,00 | 0,80 | 1,80 |
| 1112367                            | APKT 160408 PDSR-X2       |        | Ⓢ      |        | Ⓢ      |        |        |        | Ⓢ      |        | Ⓢ      |        | 9,45                                           | 5,35 | 16,00 | 0,80 | 1,80 |
| 1111923                            | APKT 160408 PDFR-LN       |        |        |        |        |        |        |        |        |        |        | Ⓢ      | 9,45                                           | 5,35 | 16,00 | 0,80 | 0,80 |
| 1111074                            | APKT 160416 PDER-X        | Ⓢ      |        |        |        |        |        | Ⓢ      |        |        |        |        | 9,45                                           | 5,35 | 16,00 | 1,60 | 1,20 |
| 1111050                            | APKT 160416 PDSR-X        | Ⓢ      |        | Ⓢ      |        |        |        | Ⓢ      |        | Ⓢ      |        |        | 9,45                                           | 5,35 | 16,00 | 1,60 | 1,20 |
| 1111075                            | APKT 160432 PDER-X        | Ⓢ      |        |        |        |        |        | Ⓢ      |        |        |        |        | 9,45                                           | 5,35 | 16,00 | 3,20 | -    |
| 1111052                            | APKT 160432 PDSR-X        | Ⓢ      |        |        |        |        |        | Ⓢ      |        |        |        |        | 9,45                                           | 5,35 | 16,00 | 3,20 | -    |
| 1111924                            | APHT 1604 PDFR-LN         |        |        |        |        |        |        |        |        |        |        | Ⓢ      | 9,45                                           | 5,35 | 16,00 | -    | -    |

Ⓢ First choice | Primeira opção | 1ª opción Ⓢ Stock item | Produto de stock | Ítems de stock

○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

\*For inserts with radius above 2.0 mm, the cutter must be adjusted

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB (Brinell) | Grades                                                                            |           |             |
|-----|-----|-----------------------------------|--------------|-----------------------------------------------------------------------------------|-----------|-------------|
|     |     |                                   |              | ← Wear Resistance                                                                 |           | Toughness → |
|     |     |                                   |              | PH0910                                                                            | PH7(6)920 | PH7 (6)30   |
| P   | 1   | Unalloyed Steel                   | 125-220      |  | ✓         | ✓           |
|     | 2   | Low-Alloyed Steel                 | 220-280      |                                                                                   | ✓         | ✓           |
|     | 3   | High-Alloyed Steel                | 280-380      |                                                                                   | ✓         | ✓           |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      |                                                                                   |           | ✓           |
|     | 5   | SS - Austenitic                   | 200-330      |                                                                                   |           | ✓           |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      |                                                                                   |           | ✓           |
| K   | 7   | Malleable Cast Iron               | 130-230      |                                                                                   | ✓         | ✓           |
|     | 8   | Grey Cast Iron                    | 180-245      |                                                                                   | ✓         | ✓           |
|     | 9   | Nodular Cast iron                 | 160-250      |                                                                                   | ✓         | ✓           |
| N   | 10  | Aluminium and Non Ferrous         | 30-130       | ✓                                                                                 |           |             |

 Good Conditions  
 Average Conditions  
 Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB (Brinell) | Vc (m/min)        |           |             |
|-----|-----|-----------------------------------|--------------|-------------------|-----------|-------------|
|     |     |                                   |              | ← Wear Resistance |           | Toughness → |
|     |     |                                   |              | PH0910            | PH7(6)920 | PH7(6)930   |
| P   | 1   | Unalloyed Steel                   | 125-220      | -                 | 180-240   | 160-220     |
|     | 2   | Low-Alloyed Steel                 | 220-280      | -                 | 160-220   | 140-200     |
|     | 3   | High-Alloyed Steel                | 280-380      | -                 | 140-210   | 120-190     |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      | -                 | -         | 140-200     |
|     | 5   | SS - Austenitic                   | 200-330      | -                 | -         | 120-160     |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      | -                 | -         | 100-140     |
| K   | 7   | Malleable Cast Iron               | 130-230      | -                 | 160-260   | 150-240     |
|     | 8   | Grey Cast Iron                    | 180-245      | -                 | 140-240   | 140-230     |
|     | 9   | Nodular Cast iron                 | 160-250      | -                 | 120-200   | 100-190     |
| N   | 10  | Aluminium and Non Ferrous         | 30-130       | 100-2000          | -         | -           |

| ISO | PSM | Material                          | HB (Brinell) | Feed fz (mm/t)       |                         |                      |
|-----|-----|-----------------------------------|--------------|----------------------|-------------------------|----------------------|
|     |     |                                   |              | ← Wear Resistance    |                         | Toughness →          |
|     |     |                                   |              | APKT 16... PDER-X/X2 | APKT 16... PDS(T)R-X/X2 | AP...T 16... PDFR-LN |
| P   | 1   | Unalloyed Steel                   | 125-220      | 0,07-0,15            | 0,10-0,25               | -                    |
|     | 2   | Low-Alloyed Steel                 | 220-280      | 0,07-0,10            | 0,10-0,20               | -                    |
|     | 3   | High-Alloyed Steel                | 280-380      | 0,07-0,10            | 0,10-0,20               | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      | 0,07-0,10            | -                       | -                    |
|     | 5   | SS - Austenitic                   | 200-330      | 0,07-0,10            | -                       | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      | 0,07-0,10            | -                       | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230      | 0,07-0,15            | 0,10-0,25               | -                    |
|     | 8   | Grey Cast Iron                    | 180-245      | 0,07-0,15            | 0,10-0,25               | -                    |
|     | 9   | Nodular Cast iron                 | 160-250      | -                    | 0,10-0,20               | -                    |
| N   | 10  | Aluminium and Non Ferrous         | 30-130       | -                    | -                       | 0,07-0,20            |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

(Note 2) Cutting conditions for slotting and shouldering operations:

| Operation   | $a_e$ | Vc & fz | $a_p$ (mm) |
|-------------|-------|---------|------------|
| Slotting    | 100%  | <20%    | 5,0-6,0    |
| Shouldering | <50%  | >8%     | 6,0-9,0    |
|             | ≤25%  | >12%    | 10,0-12,5  |

(Note 3) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 4) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

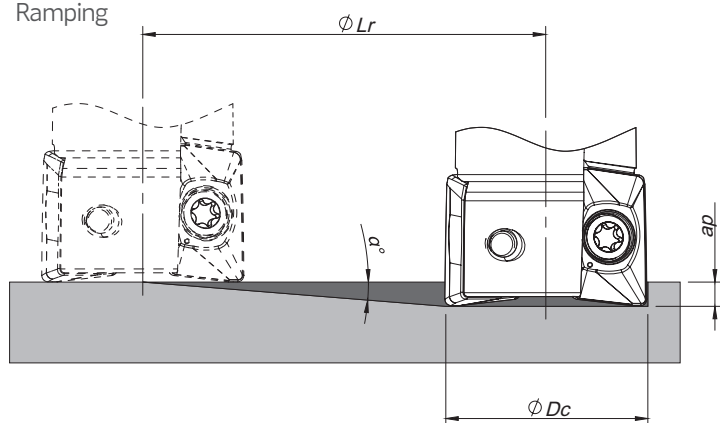
## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra-apanas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                       |
|-----|-----|-----------------------------------|-----------------|--------------------------|-----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations  |
| P   | 1   | Unalloyed Steel                   | 125-220         | APKT 16... PDER-X(X2)    | APKT 16... PDSR-X(X2) |
|     | 2   | Low-Alloyed Steel                 | 220-280         | APKT 16... PDSR-X(X2)    | -                     |
|     | 3   | High-Alloyed Steel                | 280-380         | APKT 16... PDSR-X(X2)    | -                     |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | APKT 16... PDER-X(X2)    | -                     |
|     | 5   | SS - Austenitic                   | 200-330         | APKT 16... PDER-X(X2)    | -                     |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | APKT 16... PDSR-X(X2)    | -                     |
| K   | 7   | Malleable Cast Iron               | 130-230         | APKT 16... PDSR-X(X2)    | APKT 16... PDSR-X(X2) |
|     | 8   | Grey Cast Iron                    | 180-245         | APKT 16... PDSR-X(X2)    | -                     |
|     | 9   | Nodular Cast iron                 | 160-250         | APKT 16... PDSR-X(X2)    | -                     |
| N   | 10  | Aluminium and Non Ferrous         | 30-130          | AP...T 16... PDFR-LN     | APHT 16... PDFR-LN    |

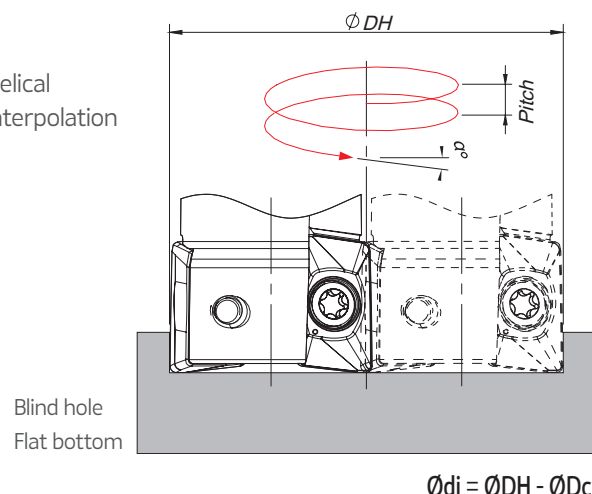
## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular

Ramping



Helical Interpolation



$$\varnothing di = \varnothing DH - \varnothing Dc$$

| ØDc | Ramping     |        |        | Helical Interpolation                         |            |                |
|-----|-------------|--------|--------|-----------------------------------------------|------------|----------------|
|     |             |        |        | Diameter for Blind Hole, Flat Bottom Face (1) |            | Max Pitch/Rev. |
|     | Max Ramp α° | Max ap | Min Lr | ØDHmin                                        | ØDHmax     |                |
| 25  | 3           | 14,5   | 276,7  | 46,1<br>-                                     | -<br>48,4  | 3,5<br>3,9     |
| 32  | 2           | 14,5   | 415,2  | 60,1<br>-                                     | -<br>62,4  | 3,1<br>3,3     |
| 40  | 1,5         | 14,5   | 553,7  | 76,1<br>-                                     | -<br>78,4  | 3,0<br>3,2     |
| 50  | 1,1         | 14,5   | 755,2  | 96,1<br>-                                     | -<br>98,4  | 2,8<br>2,9     |
| 63  | 0,85        | 14,5   | 977,3  | 122,1<br>-                                    | -<br>124,4 | 2,8<br>2,9     |
| 80  | 0,64        | 14,5   | 1298,1 | 156,1<br>-                                    | -<br>158,4 | 2,7<br>2,7     |
| 100 | 0,5         | 14,5   | 1661,5 | 196,1<br>-                                    | -<br>198,4 | 2,6<br>2,7     |
| 125 | 0,38        | 14,5   | 2186,3 | 246,1<br>-                                    | -<br>248,4 | 2,5<br>2,6     |

(1) Using insert radius 0,8 mm

Note: During helical interpolation do not exceed maximum pitch

When using different insert radius to calculate the ØDHmin and ØDHmax use the equation below:

- Minimum Diameter:  $\varnothing DH_{min} = 2 \times (\varnothing Dc - (R \text{ corner radius} + F \text{ width of edge wiper}))$

- Maximum Diameter:  $\varnothing DH_{max} = 2 \times (\varnothing Dc - R \text{ corner radius})$

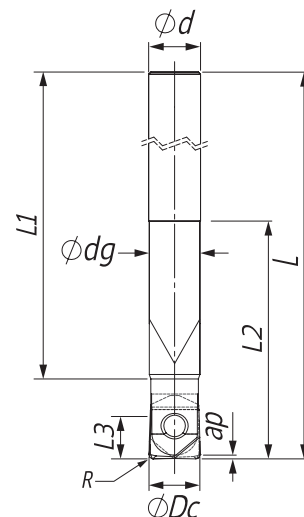






## Cylindrical Carbide Shank

| Tolerance R | Runout Tolerance |
|-------------|------------------|
| $\pm 0,015$ | R 0,02           |



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |    |      |     |     |    | Kg   | Specifications             |     |                            |     | Insert             | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----|------|-----|-----|----|------|----------------------------|-----|----------------------------|-----|--------------------|-------|
|                      |                                       |   | ØDc                                       | Ød | Ødg  | L   | L1  | L2 |      | A <sub>D</sub> max<br>(mm) |     | A <sub>E</sub> max<br>(mm) |     |                    |       |
| 181156600            | 008E62090-02-U008140                  | 2 | 8                                         | 8  | 7,7  | 140 | 128 | 35 | 0,09 | 4,0                        | 2,5 | 0,8                        | 0,8 | WCR 08../WCL 08... |       |
| 181156700            | 010E62090-02-U010150                  | 2 | 10                                        | 10 | 9,7  | 150 | 136 | 45 | 0,15 | 5,0                        | 3,0 | 1,0                        | 1,0 | WCR 10../WCL 10... |       |
| 181156800            | 010E62090-02-U010180                  | 2 | 10                                        | 10 | 9,7  | 180 | 166 | 45 | 0,18 | 5,0                        | 3,0 | 1,0                        | 1,0 | WCR 10../WCL 10... |       |
| 181155700            | 012E62090-02-U012165                  | 2 | 12                                        | 12 | 11,7 | 165 | 147 | 55 | 0,24 | 6,0                        | 4,0 | 1,2                        | 1,2 | WCR 12../WCL 12... |       |
| 181156900            | 012E62090-02-U012200                  | 2 | 12                                        | 12 | 11,7 | 200 | 182 | 55 | 0,29 | 6,0                        | 4,0 | 1,2                        | 1,2 | WCR 12../WCL 12... |       |
| 181157000            | 016E62090-02-U016200                  | 2 | 16                                        | 16 | 15,7 | 200 | 180 | 65 | 0,51 | 8,0                        | 5,0 | 1,6                        | 1,6 | WCR 16../WCL 16... |       |
| 181157100            | 016E62090-02-U016250                  | 2 | 16                                        | 16 | 15,7 | 250 | 230 | 65 | 0,67 | 8,0                        | 5,0 | 1,6                        | 1,6 | WCR 16../WCL 16... |       |
| 181157200            | 020E62090-02-U020220                  | 2 | 20                                        | 20 | 19,7 | 220 | 193 | 70 | 0,87 | 10,0                       | 6,0 | 2,0                        | 2,0 | WCR 20../WCL 20... |       |
| 181157300            | 020E62090-02-U020250                  | 2 | 20                                        | 20 | 19,7 | 250 | 223 | 70 | 1,00 | 10,0                       | 6,0 | 2,0                        | 2,0 | WCR 20../WCL 20... |       |
| 181157400            | 020E62090-02-U020300                  | 2 | 20                                        | 20 | 19,7 | 300 | 273 | 70 | 1,23 | 10,0                       | 6,0 | 2,0                        | 2,0 | WCR 20../WCL 20... |       |

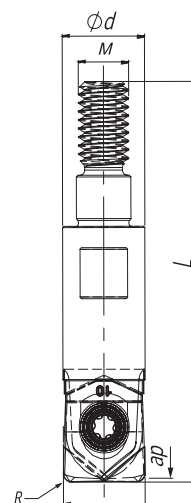
Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire página A-8)



## Threaded Steel Shank

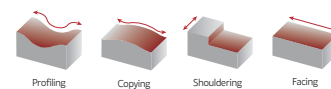
| Tolerance R | Runout Tolerance |
|-------------|------------------|
| $\pm 0,015$ | R 0,02           |



| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |    |      |    |     | Kg    | Specifications |     |                |     | Insert              | Stock                                                                                 |
|----------------------|---------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------|----|------|----|-----|-------|----------------|-----|----------------|-----|---------------------|---------------------------------------------------------------------------------------|
|                      |                                       |                                                                                     | ØDc                                       | R  | Ød   | L  | M   |       | Ap max<br>(mm) |     | Ae max<br>(mm) |     |                     |                                                                                       |
| 181167000            | 010R62090-02-UM06030                  | 2                                                                                   | 10                                        | 5  | 6,5  | 30 | M6  | 0,011 | 5              | 3,0 | 1,0            | 1,0 | WCR 10.../WCL 10... |  |
| 181167100            | 012R62090-02-UM06030                  | 2                                                                                   | 12                                        | 6  | 6,5  | 30 | M6  | 0,016 | 6              | 4,0 | 1,2            | 1,2 | WCR 12.../WCL 12... |  |
| 181167200            | 016R62090-02-UM08030                  | 2                                                                                   | 16                                        | 8  | 8,5  | 30 | M8  | 0,028 | 8              | 5,0 | 1,6            | 1,6 | WCR 16.../WCL 16... |  |
| 181167300            | 020R62090-02-UM10035                  | 2                                                                                   | 20                                        | 10 | 10,5 | 35 | M10 | 0,058 | 10             | 6,0 | 2,0            | 2,0 | WCR 20.../WCL 20... |  |

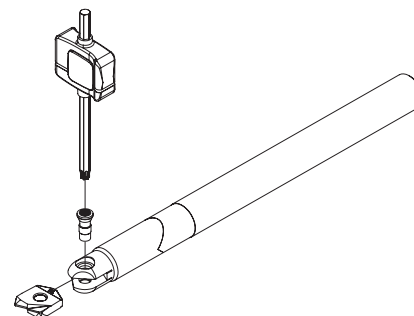
Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire página A-8)



## SPARE PARTS Complementos | Repuestos

| Cutter<br>ØDc | Insert Screw | Key (Torx) | Order separately |              |
|---------------|--------------|------------|------------------|--------------|
|               |              |            | Key (Torx - Nm)  | Torque Value |
| 8             | P0300726     | XT08       | DT0812           | 1,2          |
| 10            | P0350825     | XT10       | DT1020           | 2,0          |
| 12            | P0501025     | XT20       | DT2050           | 5,0          |
| 16            | P0501326     | XT20       | DT2050           | 5,0          |
| 20            | P0601725     | XT25       | -                | 6,9          |



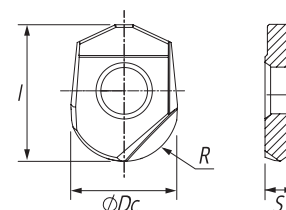
## WCR | Inserts | Pastilhas | Plaquetas

WCR

NEW



WCR



|                      |                  | P                                                                                   |                                                                                     | M                                                                                   |                                                                                     | K                                                                                   |                                                                                     | H                                                                                   |                                                                                      | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |     |      |
|----------------------|------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------|------|-----|------|
|                      |                  | PVD                                                                                 |                                                                                     | PVD                                                                                 |                                                                                     | PVD                                                                                 |                                                                                     | PVD                                                                                 |                                                                                      |                                                |      |     |      |
|                      |                  | (2) Grade code                                                                      | X4                                                                                  | X6                                                                                  | X4                                                                                  | X6                                                                                  | X4                                                                                  | X6                                                                                  | X4                                                                                   |                                                |      |     |      |
| (1)<br>Geometry code | ISO<br>Reference | PHH603                                                                              | PHH910                                                                              | PHH603                                                                              | PHH910                                                                              | PHH603                                                                              | PHH910                                                                              | PHH603                                                                              | PHH910                                                                               | I                                              | R    | S   | Dc   |
| 1112900              | WCR 08           |  |  |  |  |  |  |  |  | 9,7                                            | 4,0  | 2,1 | 8,0  |
| 1111914              | WCR 10           |  |  |  |  |  |  |  |  | 12,0                                           | 5,0  | 2,7 | 10,0 |
| 1112099              | WCR 12           |  |  |  |  |  |  |  |  | 14,6                                           | 6,0  | 3,2 | 12,0 |
| 1112100              | WCR 16           |  |  |  |  |  |  |  |  | 16,6                                           | 8,0  | 4,2 | 16,0 |
| 1112101              | WCR 20           |  |  |  |  |  |  |  |  | 20,0                                           | 10,0 | 5,2 | 20,0 |

Ⓢ First choice | Primeira opção | 1ª opción

Ⓢ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

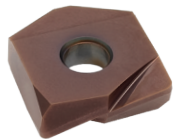
Insert order code = (1) Geometry Code + (2) Grade Code



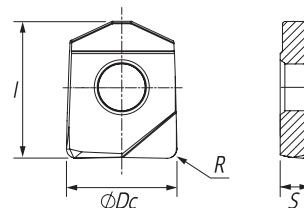
## WCL | Inserts | Pastilhas | Plaquetas

WCL

NEW



WCL

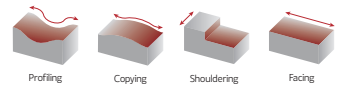


|               |             | P      |        | M      |        | K      |        | H      |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |     |     |    |
|---------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|-----|-----|----|
|               |             | PVD    |        | PVD    |        | PVD    |        | PVD    |        |                                                |     |     |    |
|               |             | X4     | X6     | X4     | X6     | X4     | X6     | X4     | X6     |                                                |     |     |    |
| (1)           | ISO         | PHH603 | PHH910 | PHH603 | PHH910 | PHH603 | PHH910 | PHH603 | PHH910 | I                                              | R   | S   | Dc |
| Geometry code | Reference   |        |        |        |        |        |        |        |        |                                                |     |     |    |
| 1112879       | WCL-08 R0.3 |        |        |        |        |        |        |        |        | 9,7                                            | 0,3 | 2,1 | 8  |
| 1112880       | WCL-08 R0.5 |        |        |        |        |        |        |        |        | 9,7                                            | 0.5 | 2,1 | 08 |
| 1112853       | WCL-08 R1.0 |        |        |        |        |        |        |        |        | 9,7                                            | 1.0 | 2,1 | 08 |
| 1112881       | WCL-10 R0.3 |        |        |        |        |        |        |        |        | 12,0                                           | 0.3 | 2,7 | 10 |
| 1112882       | WCL-10 R0.5 |        |        |        |        |        |        |        |        | 12,0                                           | 0.5 | 2,7 | 10 |
| 1112848       | WCL-10 R1.0 |        |        |        |        |        |        |        |        | 12,0                                           | 1.0 | 2,7 | 10 |
| 1112883       | WCL-10 R1.5 |        |        |        |        |        |        |        |        | 12,0                                           | 1.5 | 2,7 | 10 |
| 1112884       | WCL-10 R2.0 |        |        |        |        |        |        |        |        | 12,0                                           | 2.0 | 2,7 | 10 |
| 1112885       | WCL-12 R0.3 |        |        |        |        |        |        |        |        | 14,6                                           | 0.3 | 3,2 | 12 |
| 1112886       | WCL-12 R0.5 |        |        |        |        |        |        |        |        | 14,6                                           | 0.5 | 3,2 | 12 |
| 1112096       | WCL-12 R1.0 |        |        |        |        |        |        |        |        | 14,6                                           | 1.0 | 3,2 | 12 |
| 1112887       | WCL-12 R1.5 |        |        |        |        |        |        |        |        | 14,6                                           | 1.5 | 3,2 | 12 |
| 1112888       | WCL-12 R2.0 |        |        |        |        |        |        |        |        | 14,6                                           | 2.0 | 3,2 | 12 |
| 1112889       | WCL-12 R3.0 |        |        |        |        |        |        |        |        | 14,6                                           | 3.0 | 3,2 | 12 |
| 1112890       | WCL-16 R0.3 |        |        |        |        |        |        |        |        | 16,6                                           | 0.3 | 4,2 | 16 |
| 1112891       | WCL-16 R0.5 |        |        |        |        |        |        |        |        | 16,6                                           | 0.5 | 4,2 | 16 |
| 1112097       | WCL-16 R1.0 |        |        |        |        |        |        |        |        | 16,6                                           | 1.0 | 4,2 | 16 |
| 1112892       | WCL-16 R1.5 |        |        |        |        |        |        |        |        | 16,6                                           | 1.5 | 4,2 | 16 |
| 1112893       | WCL-16 R2.0 |        |        |        |        |        |        |        |        | 16,6                                           | 2.0 | 4,2 | 16 |
| 1112894       | WCL-16 R3.0 |        |        |        |        |        |        |        |        | 16,6                                           | 3.0 | 4,2 | 16 |
| 1112895       | WCL-20 R0.3 |        |        |        |        |        |        |        |        | 20,0                                           | 0.3 | 5,2 | 20 |
| 1112896       | WCL-20 R0.5 |        |        |        |        |        |        |        |        | 20,0                                           | 0.5 | 5,2 | 20 |
| 1112098       | WCL-20 R1.0 |        |        |        |        |        |        |        |        | 20,0                                           | 1.0 | 5,2 | 20 |
| 1112897       | WCL-20 R1.5 |        |        |        |        |        |        |        |        | 20,0                                           | 1.5 | 5,2 | 20 |
| 1112898       | WCL-20 R2.0 |        |        |        |        |        |        |        |        | 20,0                                           | 2.0 | 5,2 | 20 |
| 1112899       | WCL-20 R3.0 |        |        |        |        |        |        |        |        | 20,0                                           | 3.0 | 5,2 | 20 |

⊗ First choice | Primeira opção | 1ª opción    ⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code



## GRADES SELECTION GUIDE || Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades                      |                       |
|-----|-----|-----------------------------------|-----------------|-----------------------------|-----------------------|
|     |     |                                   |                 | ← Wear Resistance<br>PHH603 | Toughness →<br>PHH910 |
| P   | 1   | Unalloyed Steel                   | 125-220         | ✓                           | ✓                     |
|     | 2   | Low-Alloyed Steel                 | 220-280         | ✓                           | ✓                     |
|     | 3   | High-Alloyed Steel                | 280-380         | ✓                           | ✓                     |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | ✓                           | ✓                     |
|     | 5   | SS - Austenitic                   | 200-330         | ✓                           | ✓                     |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | ✓                           | ✓                     |
| K   | 7   | Malleable Cast Iron               | 130-230         | ✓                           | ✓                     |
|     | 8   | Grey Cast Iron                    | 180-245         | ✓                           | ✓                     |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓                           | ✓                     |
| H   | 12  | Hardened Steels                   | 40-55 HRC       | ✓                           | ✓                     |

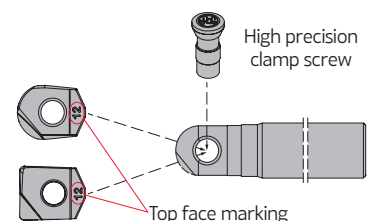
Good Conditions  
 Average Conditions  
 Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)                  |                       | Feed fz (mm/t) |           |
|-----|-----|-----------------------------------|-----------------|-----------------------------|-----------------------|----------------|-----------|
|     |     |                                   |                 | ← Wear Resistance<br>PHH603 | Toughness →<br>PHH910 | WCR            | WCL       |
| P   | 1   | Unalloyed Steel                   | 125-220         | 180-310                     | 140-270               | 0,15-0,45      | 0,10-0,30 |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 180-300                     | 140-260               | 0,15-0,40      | 0,10-0,25 |
|     | 3   | High-Alloyed Steel                | 280-380         | 180-280                     | 140-220               | 0,10-0,40      | 0,10-0,25 |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | 170-300                     | 130-260               | 0,15-0,35      | 0,10-0,25 |
|     | 5   | SS - Austenitic                   | 200-330         | 160-290                     | 120-250               | 0,15-0,35      | 0,10-0,25 |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | 150-270                     | 110-230               | 0,15-0,30      | 0,08-0,20 |
| K   | 7   | Malleable Cast Iron               | 130-230         | 200-380                     | 180-370               | 0,10-0,50      | 0,10-0,35 |
|     | 8   | Grey Cast Iron                    | 180-245         | 180-360                     | 180-350               | 0,10-0,45      | 0,10-0,30 |
|     | 9   | Nodular Cast iron                 | 160-250         | 160-310                     | 160-290               | 0,10-0,40      | 0,10-0,30 |
| H   | 12  | Hardened Steels                   | 46-54 HRC       | 90-270                      | 80-260                | 0,05-0,20      | 0,05-0,15 |
|     | 13  | Hardened Steels                   | 55-62 HRC       | 80-200                      | 70-180                | 0,05-0,15      | 0,04-0,12 |
|     | 14  | Hardened Steels                   | 63-70 HRC       | 70-180                      | 70-160                | 0,04-0,12      | 0,04-0,10 |

## PROCEDURES FOR CLAMPING SCREWS || Procedimientos para parafusos de aperto | Procedimientos para sujetar tornillos

- Check the insert seat.**  
Before assembly cutter it is important to ensure that the insert seat has not been damaged during machining or handling.
- Clean the insert seat.**  
Make sure that the insert seat is free from dust or chips from previous machining. If necessary, clean the insert seat with pressurised air.
- Position the insert.**  
Position the insert with the top face marking in the direction of screw placement and couple the insert into the cutter.
- Lubricate the insert screw.**  
Apply sufficient screw lubrication to prevent seizure. Lubricant should be applied in small quantity to the screw threads.



- Always use a torque wrench to ensure that screws are correctly tightened ( please confirm torque data ).** Excessive torque will negatively affect the performance of the tool and can cause screw and insert breakage. Uninsufficient torque leads to insert movement, vibration and degrade the cutting result. Dedicated adjustable torque wrench can be ordered separately. Please do not press down the insert during tightening process.

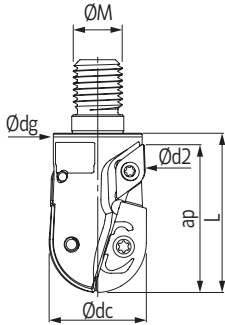
**Note:** Always replace worn or damaged screws.

BALLPRO 93090

NEW



Threaded Coupling

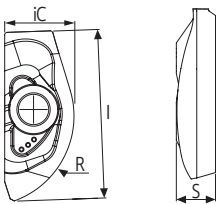


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |      |      |     |    | Specifications<br>Ap max (mm) | Kg    | Insert    | Insert 2  | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|------|------|-----|----|-------------------------------|-------|-----------|-----------|-------|
|                      |                                       |   | ØDc                                       | ØDc2 | Ød/M | Ødg | L  |                               |       |           |           |       |
| 181125000            | 032R63090-02-M16052                   | 2 | 32                                        | 31,9 | M16  | 29  | 52 | 48                            | 0,168 | XPGT 3206 | DCMW 11T3 |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

XPGT 3206



|                              | <sup>(2)</sup> Grade code | P M K S |        |        |        |        | Dimensions (mm) |   |      |    |
|------------------------------|---------------------------|---------|--------|--------|--------|--------|-----------------|---|------|----|
|                              |                           | G4      | G6     | G6     | G4     | G6     |                 |   |      |    |
| <sup>(1)</sup> Geometry code | ISO Reference             | PH7920  | PH7740 | PH7740 | PH7920 | PH7740 | iC              | S | I    | R  |
| 1112485                      | XPGT 3206-MP              |         |        |        |        |        | 12,576          | 7 | 30,6 | 16 |

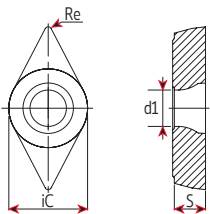
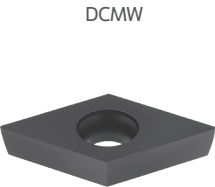
First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

DCMW 11T3



|                              | <sup>(2)</sup> Grade code | L5     | Dimensions (mm) |      |     |     |
|------------------------------|---------------------------|--------|-----------------|------|-----|-----|
|                              |                           |        |                 |      |     |     |
| <sup>(1)</sup> Geometry code | ISO Reference             | PH5705 | iC              | S    | Re  | d1  |
| 1120305                      | DCMW 11T304               |        | 9,525           | 3,97 | 0,4 | 4,4 |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

## SPARE PARTS | Complementos | Repuestos

Order separately

| Insert | Insert Screw                                                                      | Key (Torx)                                                                        | Key (Torx - Nm)                                                                   | Torque Value                                                                      |
|--------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|        |  |  |  |  |
| XPGT   | P0501302                                                                          | PT20                                                                              | DT2050                                                                            | 5.0 Nm                                                                            |
| DCMW   | P0400900                                                                          | XT15                                                                              | DT1530                                                                            | 3.0 Nm                                                                            |

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB (Brinell) | Grades                                                                                      |                                                                                               |
|-----|-----|-----------------------------------|--------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
|     |     |                                   |              | ← Wear Resistance                                                                           | Toughness →                                                                                   |
|     |     |                                   |              | PH7920<br> | PH7740<br> |
| P   | 1   | Unalloyed Steel                   | 125-220      | ✓                                                                                           | ✓                                                                                             |
|     | 2   | Low-Alloyed Steel                 | 220-280      | ✓                                                                                           | ✓                                                                                             |
|     | 3   | High-Alloyed Steel                | 280-380      | ✓                                                                                           | ✓                                                                                             |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      |                                                                                             | ✓                                                                                             |
|     | 5   | SS - Austenitic                   | 200-330      |                                                                                             | ✓                                                                                             |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      |                                                                                             | ✓                                                                                             |
| K   | 7   | Malleable Cast Iron               | 130-230      | ✓                                                                                           |                                                                                               |
|     | 8   | Grey Cast Iron                    | 180-245      | ✓                                                                                           |                                                                                               |
|     | 9   | Nodular Cast iron                 | 160-250      | ✓                                                                                           |                                                                                               |
| S   | 11  | Heat Resistant Super Alloys       | 200-320      |                                                                                             | ✓                                                                                             |

-  Good Conditions
-  Average Conditions
-  Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendadas

| ISO | PSM | Material                          | HB (Brinell) | Vc (m/min)        |             | Feed fz (mm/t) |
|-----|-----|-----------------------------------|--------------|-------------------|-------------|----------------|
|     |     |                                   |              | ← Wear Resistance | Toughness → |                |
|     |     |                                   |              | PH7920            | PH7740      |                |
| P   | 1   | Unalloyed Steel                   | 125-220      | 190-350           | 140-300     | 0,10-0,90      |
|     | 2   | Low-Alloyed Steel                 | 220-280      | 180-280           | 130-230     | 0,10-0,85      |
|     | 3   | High-Alloyed Steel                | 280-380      | 150-220           | 100-180     | 0,05-0,80      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      | -                 | 120-260     | 0,05-0,80      |
|     | 5   | SS - Austenitic                   | 200-330      | -                 | 100-200     | 0,05-0,80      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      | -                 | 60-120      | 0,05-0,60      |
| K   | 7   | Malleable Cast Iron               | 130-230      | 240-380           | -           | 0,15-0,90      |
|     | 8   | Grey Cast Iron                    | 180-245      | 220-320           | -           | 0,15-0,90      |
|     | 9   | Nodular Cast iron                 | 160-250      | 180-280           | -           | 0,10-0,80      |
| S   | 11  | Heat Resistant Super Alloys       | 200-320      | -                 | 30-110      | 0,10-0,80      |



A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

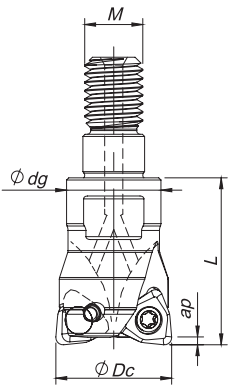
Spare Parts

Technical Data

End Mills



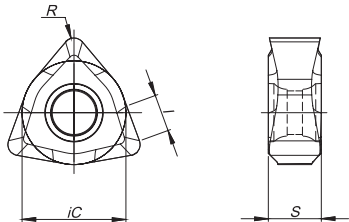
Threaded Coupling  
 $K_r = 95^\circ$  |  $\gamma_p = -7^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |     |     |    | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----|-----|----|-------|----------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | M   | Ødg | L  |       | Ap max (mm)    |                               |       |
| 181030400            | 016R49095-02-07-M08023                | 2 | 16                                        | M8  | 13  | 23 | 0,024 | 0,30           | WNHU 04T310                   |       |
| 181028600            | 020R49095-03-07-M10028                | 3 | 20                                        | M10 | 18  | 28 | 0,052 | 0,30           | WNHU 04T310                   |       |
| 181030500            | 025R49095-04-07-M12030                | 4 | 25                                        | M12 | 21  | 30 | 0,082 | 0,30           | WNHU 04T310                   |       |
| 181030600            | 035R49095-05-07-M16035                | 5 | 35                                        | M16 | 29  | 35 | 0,190 | 0,30           | WNHU 04T310                   |       |

Stock item | Produto de stock | Itens de stock      Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

WNHU 04T310 | Inserts | Pastilhas | Plaquetas

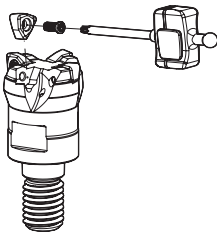


|                                 |                  | P                         |        |        | K      |        | H      |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |      |
|---------------------------------|------------------|---------------------------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|------|------|
|                                 |                  | PVD                       |        |        | PVD    |        | PVD    |        |                                                |      |      |      |
|                                 |                  | <sup>(2)</sup> Grade code | X5     | T1     | P4     | X5     | T1     | X4     |                                                |      |      |      |
| <sup>(1)</sup><br>Geometry code | ISO<br>Reference | PHP910                    | PHP920 | PHP930 | PHP910 | PHP920 | PHH603 | PHP910 | iC                                             | S    | I    | R    |
| 1110783                         | WNHU 04T310      |                           |        |        |        |        |        |        | 6,35                                           | 3,50 | 2,80 | 1,00 |

First choice | Primeira opção | 1ª opción      Stock item | Produto de stock | Itens de stock      Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)      Insert order code = (1) Geometry Code + (2) Grade Code

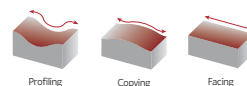
SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc  | Order separately |            |                 |              |
|----------------|------------------|------------|-----------------|--------------|
|                | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value |
| R49095 - 16-35 | P0250704         | XT08       | DT0812          | 1,2          |



Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.





## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material            | HB<br>(Brinell) | Grades            |        |             |
|-----|-----|---------------------|-----------------|-------------------|--------|-------------|
|     |     |                     |                 | ← Wear Resistance |        | Toughness → |
|     |     |                     |                 | PHH603            | PHP910 | PH7920      |
| P   | 1   | Unalloyed Steel     | 125-220         |                   | ✓      | ✓           |
|     | 2   | Low-Alloyed Steel   | 220-280         |                   | ✓      | ✓           |
|     | 3   | High-Alloyed Steel  | 280-380         | ✓                 | ✓      | ✓           |
| K   | 7   | Malleable Cast Iron | 130-230         |                   | ✓      | ✓           |
|     | 8   | Grey Cast Iron      | 180-245         |                   | ✓      | ✓           |
|     | 9   | Nodular Cast iron   | 160-250         |                   | ✓      | ✓           |
| H   | 12  | Hardened Steels     | 40-55 HRC       | ✓                 |        |             |

- Good conditions  
 Average Conditions  
 Difficult Conditions

(Note 1) Grade PHH603 must be used only on finishing operations.

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material            | HB<br>(Brinell) | Vc (m/min)        |         |             |
|-----|-----|---------------------|-----------------|-------------------|---------|-------------|
|     |     |                     |                 | ← Wear Resistance |         | Toughness → |
|     |     |                     |                 | PHH603            | PHP910  | PH7920      |
| P   | 1   | Unalloyed Steel     | 125-220         | -                 | 180-250 | 180-240     |
|     | 2   | Low-Alloyed Steel   | 220-280         | -                 | 160-240 | 160-220     |
|     | 3   | High-Alloyed Steel  | 280-380         | 180-310           | 140-230 | 140-210     |
| K   | 7   | Malleable Cast Iron | 130-230         | -                 | 180-300 | 160-260     |
|     | 8   | Grey Cast Iron      | 180-245         | -                 | 160-250 | 140-240     |
|     | 9   | Nodular Cast iron   | 160-250         | -                 | 150-210 | 120-200     |
| H   | 12  | Hardened Steels     | 40-55 HRC       | 70-270            | -       | -           |

(Note 1) Grade PHH603 must be used only on finishing operations.

| Insert      | Feed $f_z$ (mm/t) |           | $a_p$ Rec. |
|-------------|-------------------|-----------|------------|
|             | Roughing          | Finishing |            |
| WNHU 04T310 | 0.15-0.25         | 0.10-0.20 | 0.10-0.50  |

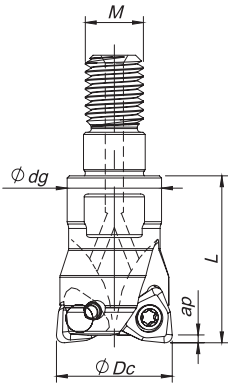
(Note 1) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 2) If chattering occurs, reduce  $a_p$  and  $V_c$  by 30% and keep the same  $f_z$  per tooth.





Threaded Coupling  
 $\kappa_r = 95^\circ$  |  $\gamma_p = -6^\circ$

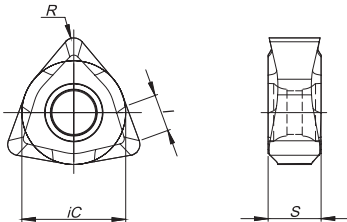
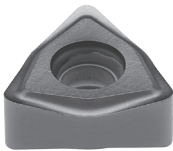


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |     |           |    | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----|-----------|----|-------|----------------|-------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | M   | $\phi dg$ | L  |       | Ap max (mm)    |                               |       |
| 181037500            | 025R45095-02-06-M12030                | 2 | 25                                        | M12 | 21        | 30 | 0,079 | 0,50           | WNHU 060410                   |       |
| 181037600            | 035R45095-03-06-M16035                | 3 | 35                                        | M16 | 29        | 35 | 0,185 | 0,50           | WNHU 060410                   |       |
| 181037700            | 042R45095-04-06-M16035                | 4 | 42                                        | M16 | 29        | 35 | 0,219 | 0,50           | WNHU 060410                   |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

WNHU 060410 | Inserts | Pastilhas | Plaquitas



|                                 |                  | P                                                                                   | K                                                                                   | H                                                                                   |                                                                                     | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |      |
|---------------------------------|------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------|------|------|------|
|                                 |                  | PVD                                                                                 | PVD                                                                                 | PVD                                                                                 |                                                                                     |                                                |      |      |      |
|                                 |                  | <sup>(2)</sup> Grade code                                                           |                                                                                     | X5                                                                                  | X5                                                                                  |                                                |      |      |      |
| <sup>(1)</sup><br>Geometry code | ISO<br>Reference | PHP910                                                                              | PHP910                                                                              | PHH603                                                                              | PHP910                                                                              | iC                                             | S    | I    | R    |
| 1111424                         | WNHU 060410      |  |  |  |  | 9,53                                           | 4,76 | 3,40 | 1,00 |

First choice | Primeira opção | 1ª opción

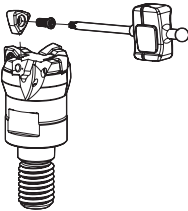
Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

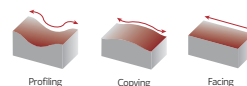
Insert order code = (1) Geometry Code + (2) Grade Code

SPARE PARTS | Complementos | Repuestos

| Cutter<br>$\phi Dc$ | Order separately |            |                 |              |
|---------------------|------------------|------------|-----------------|--------------|
|                     | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value |
| R45095 - 25-42      |                  |            |                 |              |
|                     | P0350902         | XT10       | DT1020          | 2,0          |



Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material            | HB<br>(Brinell) | Grades            |             |
|-----|-----|---------------------|-----------------|-------------------|-------------|
|     |     |                     |                 | ← Wear Resistance | Toughness → |
|     |     |                     |                 | PHH603            | PHP910      |
| P   | 1   | Unalloyed Steel     | 125-220         | ●                 | ✓           |
|     | 2   | Low-Alloyed Steel   | 220-280         |                   | ✓           |
|     | 3   | High-Alloyed Steel  | 280-380         | ✓                 | ✓           |
| K   | 7   | Malleable Cast Iron | 130-230         |                   | ✓           |
|     | 8   | Grey Cast Iron      | 180-245         |                   | ✓           |
|     | 9   | Nodular Cast iron   | 160-250         |                   | ✓           |
| H   | 12  | Hardened Steels     | 40-55 HRC       | ✓                 | ✓           |

- Good Conditions  
 ● Average Conditions  
 ✖ Difficult Conditions

(Note 1) Grade PHH603 must be used only on finishing operations.

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material            | HB<br>(Brinell) | V <sub>c</sub> (m/min) |             |
|-----|-----|---------------------|-----------------|------------------------|-------------|
|     |     |                     |                 | ← Wear Resistance      | Toughness → |
|     |     |                     |                 | PHH603                 | PHP910      |
| P   | 1   | Unalloyed Steel     | 125-220         | -                      | 180-250     |
|     | 2   | Low-Alloyed Steel   | 220-280         | -                      | 160-240     |
|     | 3   | High-Alloyed Steel  | 280-380         | 180-310                | 140-230     |
| K   | 7   | Malleable Cast Iron | 130-230         | -                      | 180-300     |
|     | 8   | Grey Cast Iron      | 180-245         | -                      | 160-250     |
|     | 9   | Nodular Cast iron   | 160-250         | -                      | 150-210     |
| H   | 12  | Hardened Steels     | 40-55 HRC       | 70-270                 | 60-250      |

(Note 1) Grade PHH603 must be used only on finishing operations.

| Insert      | Feed $f_z$ (mm/t) |           | $a_p$ Rec. |
|-------------|-------------------|-----------|------------|
|             | Roughing          | Finishing |            |
| WNHU 060410 | 0.15-0.30         | 0.10-0.25 | 0.10-0.50  |

(Note 1) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 2) If chattering occurs, reduce  $a_p$  and  $V_c$  by 30% and keep the same  $f_z$  per tooth.

# TOROMILL 33590 | 33690 | 33790 | 33890 | 33990

Proprietary milling line

A

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

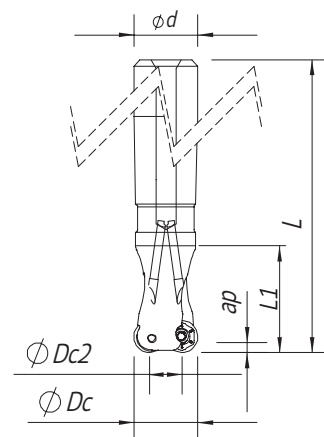
Technical Data

End Mills



## Cylindrical Shank

$\gamma_p = +5^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |      |    |     |    | Kg   | Specifications | Insert<br>Pastilha<br>Inserto | Stock                                                                               |
|----------------------|---------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------|------|----|-----|----|------|----------------|-------------------------------|-------------------------------------------------------------------------------------|
|                      |                                       |                                                                                   | ØDc                                       | ØDc2 | Ød | L   | L1 |      | Ap max<br>(mm) |                               |                                                                                     |
| 33590                |                                       |                                                                                   |                                           |      |    |     |    |      |                |                               |                                                                                     |
| 181122500            | 016E33590-02-04-016160                | 2                                                                                 | 16                                        | 8    | 16 | 160 | 59 | 0,23 | 4,0            | RD...0802 M0E                 |  |
| 181122600            | 020E33590-03-05-020180                | 3                                                                                 | 20                                        | 12   | 20 | 180 | 59 | 0,36 | 4,0            | RD...0802 M0E                 |  |
| 181122700            | 025E33590-04-05-025200                | 4                                                                                 | 25                                        | 17   | 25 | 200 | 59 | 0,65 | 4,0            | RD...0802 M0E                 |  |

## 33690

|           |                        |   |    |    |    |     |    |      |     |  |               |   |
|-----------|------------------------|---|----|----|----|-----|----|------|-----|--|---------------|---|
| 181123400 | 020E33690-02-05-020180 | 2 | 20 | 10 | 20 | 180 | 50 | 0,40 | 5,0 |  | RP...10T3 M0E | ⊗ |
| 181123500 | 025E33690-03-05-025200 | 3 | 25 | 15 | 25 | 200 | 60 | 0,76 | 5,0 |  | RP...10T3 M0E | ⊗ |
| 181123600 | 032E33690-04-05-032200 | 4 | 32 | 22 | 32 | 200 | 60 | 0,98 | 5,0 |  | RP...10T3 M0E | ⊗ |

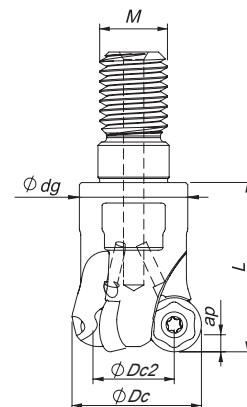
⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



## Threaded Coupling

$\gamma_p = +5^\circ$

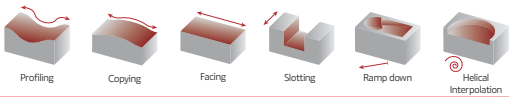


| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |      |     |     |    | Kg   | Specifications | Insert<br>Pastilha<br>Inserto | Stock                                                                                 |
|----------------------|---------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------|------|-----|-----|----|------|----------------|-------------------------------|---------------------------------------------------------------------------------------|
|                      |                                       |                                                                                     | ØDc                                       | ØDc2 | ØM  | Ødg | L  |      | Ap max<br>(mm) |                               |                                                                                       |
| 33590                |                                       |                                                                                     |                                           |      |     |     |    |      |                |                               |                                                                                       |
| 181098600            | 016R33590-02-04-M08020                | 2                                                                                   | 16                                        | 8    | M8  | 13  | 20 | 0,03 | 4,0            | RD...0802 M0E                 |  |
| 181122800            | 020R33590-03-05-M10025                | 3                                                                                   | 20                                        | 12   | M10 | 16  | 25 | 0,07 | 4,0            | RD...0802 M0E                 |  |
| 181122900            | 025R33590-04-05-M12030                | 4                                                                                   | 25                                        | 17   | M12 | 21  | 30 | 0,14 | 4,0            | RD...0802 M0E                 |  |
| 181123000            | 032R33590-05-05-M16043                | 5                                                                                   | 32                                        | 24   | M16 | 29  | 43 | 0,25 | 4,0            | RD...0802 M0E                 |  |

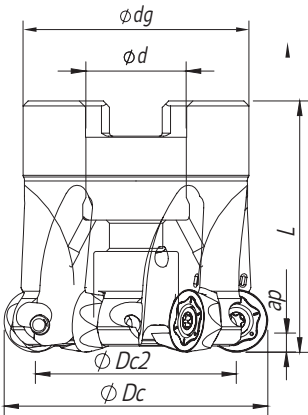
## 33690

|           |                        |   |    |    |     |    |    |      |     |  |               |   |
|-----------|------------------------|---|----|----|-----|----|----|------|-----|--|---------------|---|
| 181110600 | 020R33690-02-05-M10032 | 2 | 20 | 10 | M10 | 16 | 32 | 0,10 | 5,0 |  | RP...10T3 M0E | ○ |
| 181110700 | 025R33690-03-05-M12035 | 3 | 25 | 15 | M12 | 21 | 35 | 0,19 | 5,0 |  | RP...10T3 M0E | ⊗ |
| 181110800 | 032R33690-04-05-M16035 | 4 | 32 | 22 | M16 | 29 | 35 | 0,31 | 5,0 |  | RP...10T3 M0E | ⊗ |
| 181120700 | 035R33690-05-05-M16045 | 5 | 35 | 25 | M16 | 29 | 45 | 0,40 | 5,0 |  | RP...10T3 M0E | ⊗ |

○ Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



Arbor Mounting  
 $\gamma_p = +5^\circ$

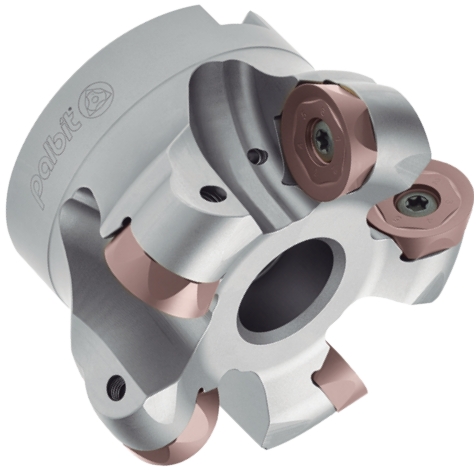


| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |      |      |     |    | Kg   | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock                                                                                 |
|----------------------|---------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------|------|------|-----|----|------|----------------|----------------|-------------------------------|---------------------------------------------------------------------------------------|
|                      |                                       |                                                                                   | ØDc                                       | ØDc2 | Ød/M | Ødg | L  |      | Arbor<br>Type  | Ap max<br>(mm) |                               |                                                                                       |
| 33690                |                                       |                                                                                   |                                           |      |      |     |    |      |                |                |                               |                                                                                       |
| 181123700            | 042A33690-06-05-016040                | 6                                                                                 | 42                                        | 32   | 16   | 36  | 40 | 0,16 | A              | 5,0            | RP...10T3 MOE                 |    |
| 181123800            | 050A33690-06-05-022040                | 6                                                                                 | 50                                        | 40   | 22   | 42  | 40 | 0,26 | A              | 5,0            | RP...10T3 MOE                 |    |
| 181123900            | 052A33690-07-05-022040                | 7                                                                                 | 52                                        | 42   | 22   | 42  | 40 | 0,30 | A              | 5,0            | RP...10T3 MOE                 |    |
| 33790                |                                       |                                                                                   |                                           |      |      |     |    |      |                |                |                               |                                                                                       |
| 181098700            | 040A33790-04-05-016040                | 4                                                                                 | 40                                        | 28   | 16   | 36  | 40 | 0,15 | A              | 6,0            | RP...1204 MOE                 |    |
| 181111500            | 050A33790-04-05-022040                | 4                                                                                 | 50                                        | 38   | 22   | 42  | 40 | 0,20 | A              | 6,0            | RP...1204 MOE                 |   |
| 181124200            | 052A33790-05-05-022040                | 5                                                                                 | 52                                        | 40   | 22   | 42  | 40 | 0,25 | A              | 6,0            | RP...1204 MOE                 |  |
| 181122100            | 063A33790-06-05-022040                | 6                                                                                 | 63                                        | 51   | 22   | 48  | 40 | 0,36 | A              | 6,0            | RP...1204 MOE                 |  |
| 181124300            | 066A33790-06-05-027050                | 6                                                                                 | 66                                        | 54   | 27   | 48  | 50 | 0,40 | A              | 6,0            | RP...1204 MOE                 |  |
| 181124400            | 080A33790-07-05-027050                | 7                                                                                 | 80                                        | 68   | 27   | 60  | 50 | 0,68 | A              | 6,0            | RP...1204 MOE                 |  |

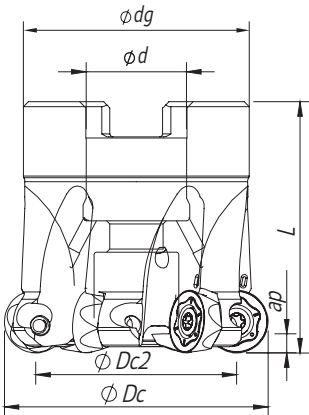
Stock item | Produto de stock | Itens de stock      Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

TOROMILL 33590 | 33690 | 33790 | 33890 | 33990

Proprietary milling line



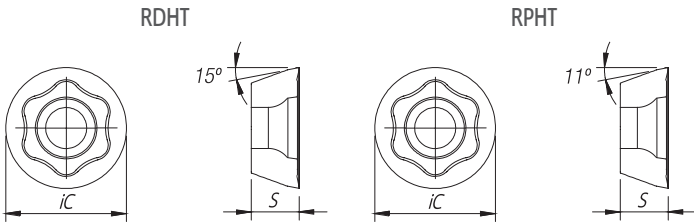
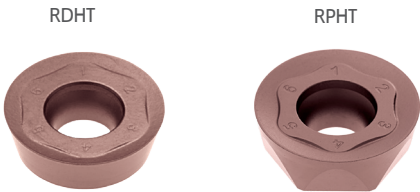
Arbor Mounting  
 $\gamma_p = 5^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |      |    |     |    | Kg   | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock                                                                                 |
|----------------------|---------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------|------|----|-----|----|------|----------------|----------------|-------------------------------|---------------------------------------------------------------------------------------|
|                      |                                       |                                                                                   | ØDc                                       | ØDc2 | Ød | Ødg | L  |      | Arbor<br>Type  | Ap max<br>(mm) |                               |                                                                                       |
| 33890                |                                       |                                                                                   |                                           |      |    |     |    |      |                |                |                               |                                                                                       |
| 181124500            | 050A33890-04-05-022040                | 4                                                                                 | 50                                        | 34   | 22 | 42  | 40 | 0,21 | A              | 8,0            | RP...1605 M0E                 |    |
| 181124600            | 052A33890-04-05-022040                | 4                                                                                 | 52                                        | 36   | 22 | 42  | 40 | 0,25 | A              | 8,0            | RP...1605 M0E                 |    |
| 181114900            | 063A33890-05-05-022040                | 5                                                                                 | 63                                        | 47   | 22 | 48  | 40 | 0,37 | A              | 8,0            | RP...1605 M0E                 |    |
| 181124700            | 066A33890-05-05-027050                | 5                                                                                 | 66                                        | 54   | 27 | 48  | 50 | 0,46 | A              | 8,0            | RP...1605 M0E                 |    |
| 181124800            | 080A33890-06-05-027052                | 6                                                                                 | 80                                        | 64   | 27 | 60  | 52 | 0,85 | A              | 8,0            | RP...1605 M0E                 |    |
| 181124900            | 100A33890-07-05-032052                | 7                                                                                 | 100                                       | 84   | 32 | 80  | 52 | 1,57 | A              | 8,0            | RP...1605 M0E                 |    |
| 181122200            | 125A33890-08-05-040052                | 8                                                                                 | 125                                       | 109  | 40 | 90  | 52 | 2,12 | A              | 8,0            | RP...1605 M0E                 |    |
| 33990                |                                       |                                                                                   |                                           |      |    |     |    |      |                |                |                               |                                                                                       |
| 181112200            | 080A33990-05-05-027050                | 5                                                                                 | 80                                        | 60   | 27 | 60  | 50 | 0,73 | A              | 10,0           | RP...2006 M0E                 |   |
| 181099800            | 100A33990-06-05-032063                | 6                                                                                 | 100                                       | 80   | 32 | 80  | 63 | 1,62 | A              | 10,0           | RP...2006 M0E                 |  |
| 181099900            | 125A33990-06-05-040063                | 6                                                                                 | 125                                       | 105  | 40 | 90  | 63 | 2,53 | A              | 10,0           | RP...2006 M0E                 |  |

Stock item | Produto de stock | Itens de stock      Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

RDHT | RPHT | Inserts | Pastilhas | Plaquitas



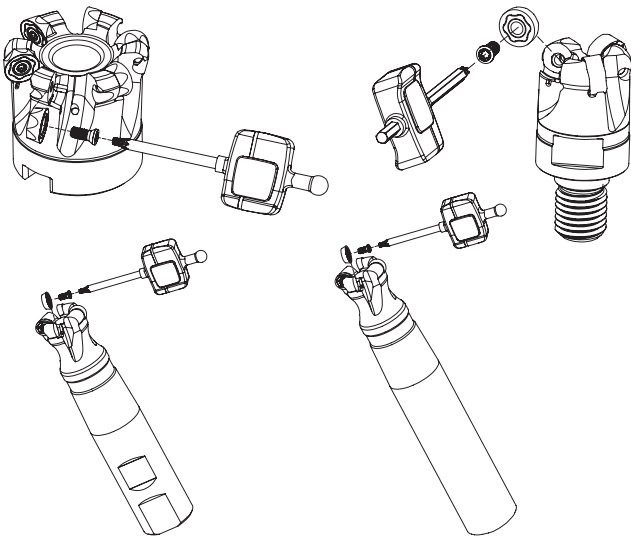
|                                    |                  | P                         |        |        |        | M      |        |        |        | S      |        |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |
|------------------------------------|------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|
|                                    |                  | CVD                       | PVD    |        |        | PVD    |        |        |        | PVD    |        |        |                                                |      |
|                                    |                  | <sup>(2)</sup> Grade code | T9     | T1     | Z1     | Z2     | X9     | Y2     | Z2     | Z3     | X9     | Y2     |                                                |      |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference | PHS740                    | PHP920 | PHP808 | PHP530 | PHH930 | PHH808 | PHP530 | PHH530 | PHH930 | PHH808 | PHH530 | iC                                             | S    |
| 1112152                            | RDHT 0802 M0E-LS |                           |        |        | Ⓢ      |        |        | Ⓢ      | Ⓢ      |        |        | Ⓢ      | 8,00                                           | 2,38 |
| 1112253                            | RPHT 10T3 M0E-MS |                           | Ⓢ      |        |        | Ⓢ      |        |        |        | Ⓢ      |        |        | 10,00                                          | 3,97 |
| 1112772                            | RPHT 10T3 M0E-LS | Ⓢ                         |        | Ⓢ      | Ⓢ      |        | Ⓢ      | Ⓢ      | Ⓢ      |        | Ⓢ      | Ⓢ      | 10,00                                          | 3,97 |
| 1112186                            | RPHT 1204 M0E-MS |                           | Ⓢ      |        |        | Ⓢ      |        |        |        | Ⓢ      |        |        | 12,00                                          | 4,76 |
| 1112766                            | RPHT 1204 M0E-LS | Ⓢ                         |        | Ⓢ      | Ⓢ      |        | Ⓢ      | Ⓢ      | Ⓢ      |        | Ⓢ      | Ⓢ      | 12,00                                          | 4,76 |
| 1112254                            | RPHT 1605 M0E-MS |                           | Ⓢ      |        |        | Ⓢ      |        |        |        | Ⓢ      |        |        | 16,00                                          | 5,56 |
| 1112951                            | RPHT 1605 M0E-LS |                           |        | Ⓢ      | Ⓢ      |        | Ⓢ      | Ⓢ      | Ⓢ      |        | Ⓢ      | Ⓢ      | 16,00                                          | 5,56 |
| 1112958                            | RPHT 2006 M0E-LS |                           |        |        | Ⓢ      |        | Ⓢ      | Ⓢ      | Ⓢ      |        | Ⓢ      | Ⓢ      | 20,00                                          | 6,35 |

Ⓢ First choice | Primeira opção | 1ª opción   Ⓢ Stock item | Produto de stock | Itens de stock   ○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)   Insert order code = (1) Geometry Code + (2) Grade Code

SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc | Insert Screw | Key (Torx) | Key (Torx - Nm) | Torque Value |
|---------------|--------------|------------|-----------------|--------------|
|               |              |            |                 |              |
| 33590         | P0250503     | XT08       | DT0812          | 1,20         |
| 33690         | P0300800     | XT09       | DT0914          | 1,40         |
| 33790         | P0350800     | XT15       | DT1530          | 3,00         |
| 33890         | P0451100     | XT20       | DT2050          | 5,00         |
| 33990         | P0501302     | PT20       | DT2050          | 5,00         |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.





# TURBOMILL 34190

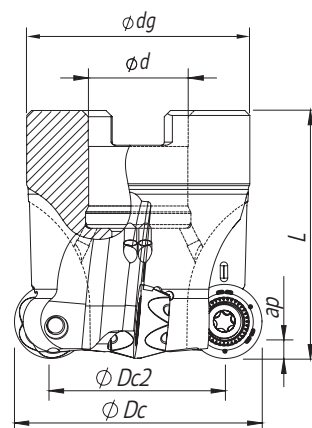
NEW

Proprietary milling line



## Arbor Mounting

$$\gamma_p = 5^\circ$$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |            |          |           |    | Kg   | Specifications |                | Insert             | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|------------|----------|-----------|----|------|----------------|----------------|--------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi Dc2$ | $\phi d$ | $\phi dg$ | L  |      | Arbor Type     | $A_p$ max (mm) |                    |       |
| 181160100            | 042A34190-06-05-016040                | 6 | 42                                        | 32         | 16       | 36        | 40 | 0,16 | A              | 5              | RPHT 10T3M0E-LS(4) | ⊗     |
| 181160200            | 050A34190-06-05-022039                | 6 | 50                                        | 40         | 22       | 42        | 40 | 0,26 | A              | 5              | RPHT 10T3M0E-LS(4) | ⊗     |
| 181160700            | 052 A34190-07-05-022040               | 7 | 52                                        | 42         | 22       | 42        | 40 | 0,30 | A              | 5              | RPHT 10T3M0E-LS(4) | ⊗     |

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire página A-8)

# TURBOMILL 34290

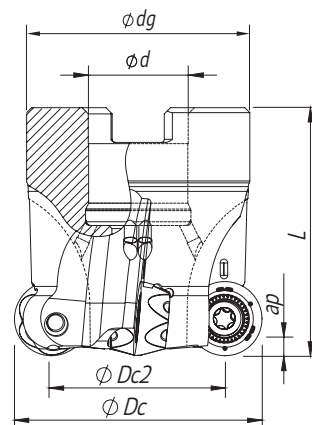
NEW

Proprietary milling line



## Arbor Mounting

$$\gamma_p = 5^\circ$$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |            |          |           |    | Kg   | Specifications |                | Insert              | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|------------|----------|-----------|----|------|----------------|----------------|---------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi Dc2$ | $\phi d$ | $\phi dg$ | L  |      | Arbor Type     | $A_p$ max (mm) |                     |       |
| 181159600            | 040A34290-04-05-016040                | 4 | 40                                        | 28         | 16       | 36        | 40 | 0,15 | A              | 6              | RPHT 1204 M0E-LS(4) | ⊗     |
| 181159500            | 052A34290-05-05-022040                | 5 | 52                                        | 40         | 22       | 42        | 40 | 0,25 | A              | 6              | RPHT 1204 M0E-LS(4) | ⊗     |
| 181160400            | 063A34290-06-05-022040                | 6 | 63                                        | 51         | 22       | 48        | 40 | 0,36 | A              | 6              | RPHT 1204 M0E-LS(4) | ⊗     |
| 181160500            | 066A34290-06-05-027050                | 6 | 66                                        | 54         | 27       | 48        | 50 | 0,40 | A              | 6              | RPHT 1204 M0E-LS(4) | ⊗     |
| 181160600            | 080A34290-07-05-027050                | 7 | 80                                        | 68         | 27       | 60        | 50 | 0,68 | A              | 6              | RPHT 1204 M0E-LS(4) | ⊗     |

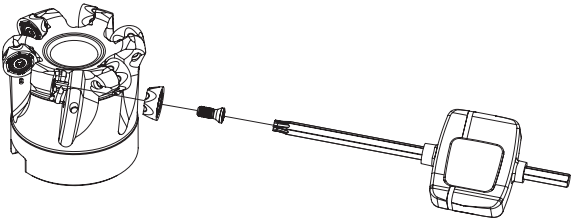
⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire página A-8)

SPARE PARTS Complementos | Repuestos

| Cutter<br>ØDc | Insert Screw                                                                      | Key (Torx)                                                                        | Order separately<br>Key<br>(Torx - Nm)                                            | Torque Value                                                                      |
|---------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|               |  |  |  |  |
| 34190         | P0300800                                                                          | XT09                                                                              | DT0914                                                                            | 1,40                                                                              |
| 34290         | P0350800                                                                          | XT15                                                                              | DT1530                                                                            | 3,00                                                                              |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



RPHT-LS | Inserts | Pastilhas | Plaquitas

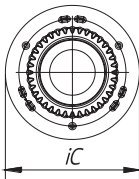
RPHT-LS4

NEW

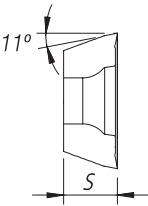


RPHT-LS

NEW



RPHT-LS | LS4



|                                 |                   | P                                                                                   |                                                                                     |                                                                                     | M                                                                                   |                                                                                     |                                                                                       | S                                                                                     |                                                                                       | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |
|---------------------------------|-------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------|------|
|                                 |                   | CVD                                                                                 | PVD                                                                                 |                                                                                     | PVD                                                                                 |                                                                                     |                                                                                       | PVD                                                                                   |                                                                                       |                                                |      |
|                                 |                   | <sup>(2)</sup> Grade code                                                           | T9                                                                                  | Z1                                                                                  | Z2                                                                                  | Y2                                                                                  | Z2                                                                                    | Z3                                                                                    | Y2                                                                                    |                                                |      |
| <sup>(1)</sup><br>Geometry code | ISO<br>Reference  | PHS740                                                                              | PHP808                                                                              | PHP530                                                                              | PHH808                                                                              | PHP530                                                                              | PHH530                                                                                | PHH808                                                                                | PHH530                                                                                | iC                                             | S    |
| 1112772                         | RPHT 10T3M0E-LS   |  |  |  |  |  |  |  |  | 10,00                                          | 3,97 |
| 1113021                         | RPHT 10T3 M0E-LS4 |                                                                                     |                                                                                     |  |                                                                                     |  |  |                                                                                       |  | 10,00                                          | 3,97 |
| 1112766                         | RPHT 1204 M0E-LS  |  |  |  |  |  |  |  |  | 12,00                                          | 4,76 |
| 1113020                         | RPHT 1204 M0E-LS4 |                                                                                     |                                                                                     |  |                                                                                     |  |  |                                                                                       |  | 12,00                                          | 4,76 |

 First choice | Primeira opção | 1ª opción  Stock item | Produto de stock | Itens de stock  Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB (Brinell) | Grades            |        |        |        |             |        |        |
|-----|-----|-----------------------------------|--------------|-------------------|--------|--------|--------|-------------|--------|--------|
|     |     |                                   |              | ← Wear Resistance |        |        |        | Toughness → |        |        |
|     |     |                                   |              | PHP920            | PHH930 | PHP530 | PHH530 | PHP808      | PHH808 | PHS740 |
| P   | 1   | Unalloyed Steel                   | 125-220      | ✓                 |        | ✓      |        | ✓           |        | ✓      |
|     | 2   | Low-Alloyed Steel                 | 220-280      | ✓                 |        | ✓      |        | ✓           |        | ✓      |
|     | 3   | High-Alloyed Steel                | 280-380      | ✓                 |        | ✓      |        | ✓           |        | ✓      |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      |                   | ✓      | ✓      | ✓      |             | ✓      |        |
|     | 5   | SS - Austenitic                   | 200-330      |                   | ✓      |        | ✓      |             | ✓      |        |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      |                   | ✓      |        | ✓      |             | ✓      |        |
| S   | 11  | Heat Resistant Super Alloys       | 200-320      |                   | ✓      |        | ✓      |             | ✓      |        |

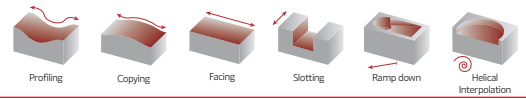
Good Conditions
 Average Conditions
 Difficult Conditions

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB (Brinell) | Vc (m/min)        |         |         |         |             |         |         |
|-----|-----|-----------------------------------|--------------|-------------------|---------|---------|---------|-------------|---------|---------|
|     |     |                                   |              | ← Wear Resistance |         |         |         | Toughness → |         |         |
|     |     |                                   |              | PHP920            | PHH930  | PHP530  | PHH530  | PHP808      | PHH808  | PHS740  |
| P   | 1   | Unalloyed Steel                   | 125-220      | 180-250           | -       | 180-340 | -       | 180-340     | -       | 180-350 |
|     | 2   | Low-Alloyed Steel                 | 220-280      | 160-230           | -       | 180-340 | -       | 180-340     | -       | 180-340 |
|     | 3   | High-Alloyed Steel                | 280-380      | 140-220           | -       | 180-330 | -       | 180-330     | -       | 180-340 |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      | -                 | 140-210 | 150-270 | 170-280 | -           | 160-270 | -       |
|     | 5   | SS - Austenitic                   | 200-330      | -                 | 120-170 | -       | 160-280 | -           | 160-270 | -       |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      | -                 | 100-150 | -       | 150-260 | -           | 150-250 | -       |
| S   | 11  | Heat Resistant Super Alloys       | 200-320      | -                 | 30-110  | -       | 30-150  | -           | 30-140  | -       |

| ISO | PSM | Material                          | HB (Brinell) | Feed fz (mm/t) |            |            |            |            |
|-----|-----|-----------------------------------|--------------|----------------|------------|------------|------------|------------|
|     |     |                                   |              |                |            |            |            |            |
|     |     |                                   |              | RDHT 08..      | RPHT 10... | RPHT 12... | RPHT 16... | RPHT 20... |
| P   | 1   | Unalloyed Steel                   | 125-220      | 0,05-0,35      | 0,05-0,40  | 0,05-0,45  | 0,08-0,55  | 0,10-0,55  |
|     | 2   | Low-Alloyed Steel                 | 220-280      | 0,05-0,35      | 0,05-0,40  | 0,05-0,45  | 0,08-0,55  | 0,10-0,55  |
|     | 3   | High-Alloyed Steel                | 280-380      | 0,05-0,30      | 0,05-0,35  | 0,05-0,40  | 0,08-0,50  | 0,10-0,55  |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330      | 0,05-0,25      | 0,05-0,30  | 0,05-0,35  | 0,08-0,45  | 0,10-0,50  |
|     | 5   | SS - Austenitic                   | 200-330      | 0,05-0,25      | 0,05-0,30  | 0,05-0,35  | 0,08-0,45  | 0,10-0,50  |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260      | 0,05-0,25      | 0,05-0,30  | 0,05-0,35  | 0,08-0,45  | 0,10-0,45  |
| S   | 11  | Heat Resistant Super Alloys       | 200-320      | 0,05-0,20      | 0,05-0,25  | 0,05-0,30  | 0,08-0,35  | 0,10-0,40  |

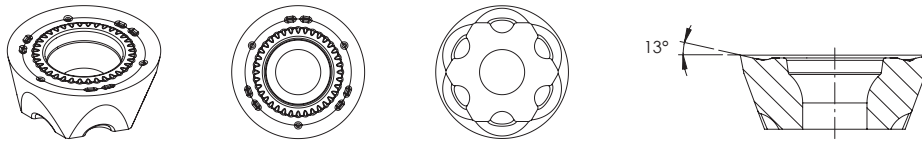
(Note 1) Cutting conditions  $a_e/D_c=70\%$ .



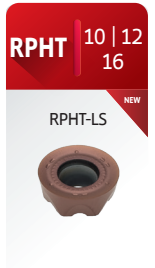
## INSERT INFORMATION | Informação de pastilha | Información del inserto

### RPHT-LS

RPHT-LS



P M S



#### 6 cutting edges insert

- Insert with 6 cutting edges for a higher productivity.

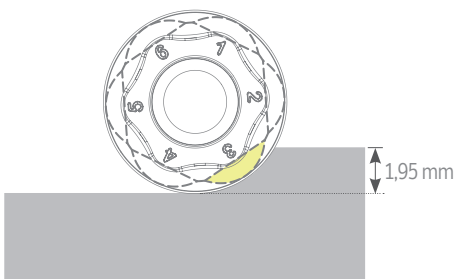
#### Insert Geometry

- Improved geometry for low cutting force;
- Positive insert with a brand new edge positioning system.

### The maximum depth of cut using 6 cutting edges (LS)

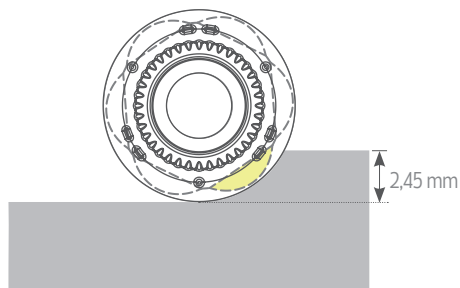
TOROMILL 33590

RDHT 0802...



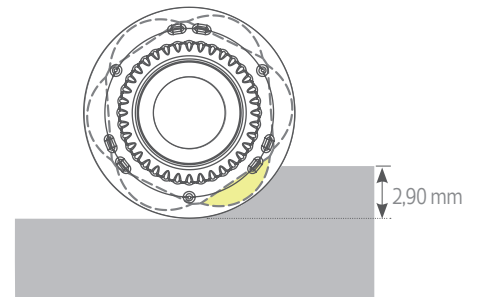
TURBOMILL 34190

RPHT 10T3M0E-LS



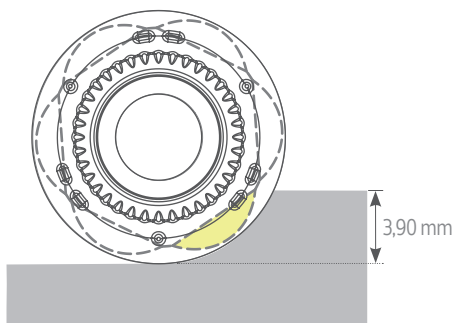
TURBOMILL 34290

RPHT 1204 M0E-LS



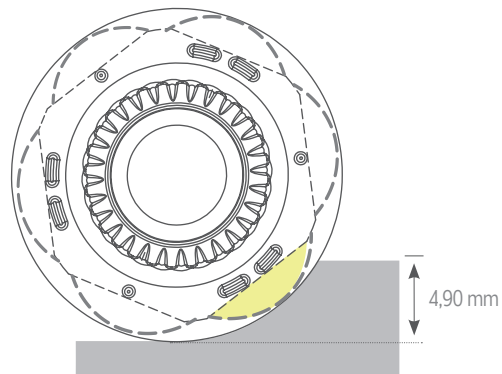
TOROMILL 33890

RPHT 1605 M0E-LS



TOROMILL 33990

RPHT 2006...



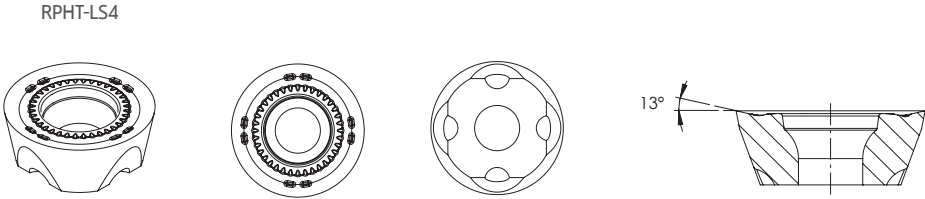
RPHT-LS4

P M S

RPHT 10 | 12

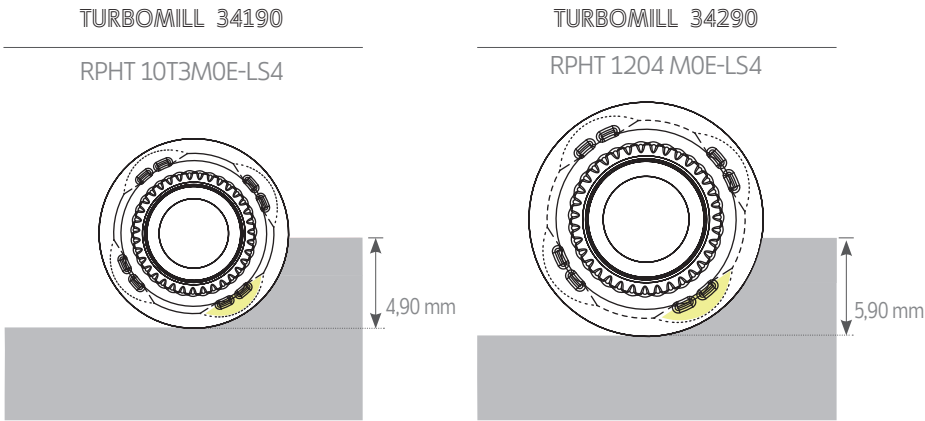
NEW

RPHT-LS



- 4 cutting edges insert**
  - Insert with 4 cutting edges for higher depth of cut.
- Insert Geometry**
  - Improved geometry for low cutting force;
  - Positive insert with a brand new edge positioning system.

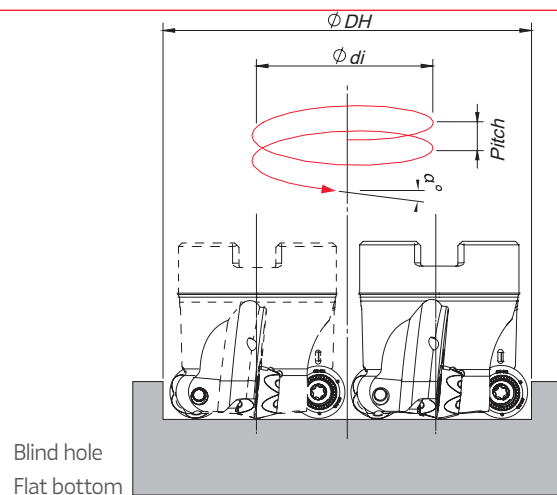
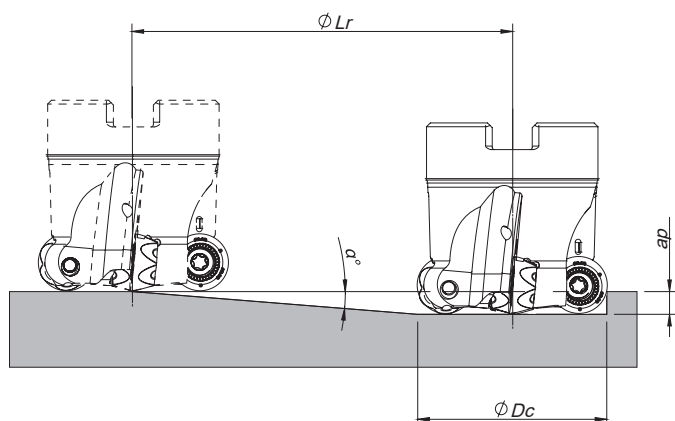
The maximum depth of cut using 4 cutting edges



GEOMETRY FEATURES | Características geométricas | Características geométricas

| Geometry                                 | Features   Características   Características                                                                  |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Geometry <b>LS</b><br>General machining  | Optimized geometry for stainless steel and HRSA. Suitable for alloy steel machining.                          |
| Geometry <b>LS4</b><br>General machining | Optimized geometry for stainless steel and HRSA. Suitable for alloy steel machining. 4 Cutting edges version. |

## RAMPING AND HELICAL INTERPOLATION



Blind hole  
Flat bottom

$$\phi di = \phi DH - \phi Dc$$

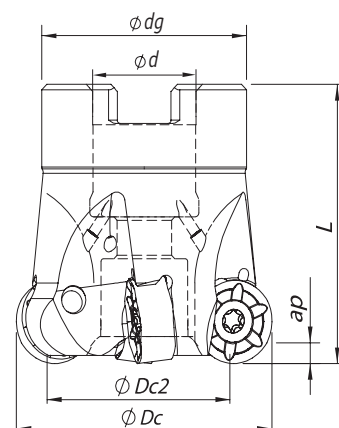
| Insert        | ØDc | Ramping     |        |        | Helical Interpolation |          |                |
|---------------|-----|-------------|--------|--------|-----------------------|----------|----------------|
|               |     | Max Ramp a° | Max ap | Min Lr | ØDHmin                | ØDHmax   | Max Pitch/Rev. |
| 33590         |     |             |        |        |                       |          |                |
| RD... 08      | 16  | 10,0        | 4,0    | 22,7   | 24<br>-               | -<br>32  | 4<br>8         |
|               | 20  | 8,0         | 4,0    | 28,5   | 32<br>-               | -<br>40  | 5<br>8         |
|               | 25  | 10,0        | 4,0    | 22,7   | 42<br>-               | -<br>50  | 9<br>13        |
|               | 32  | 8,0         | 4,0    | 28,5   | 56<br>-               | -<br>64  | 10<br>14       |
| 33690   34190 |     |             |        |        |                       |          |                |
| RP... 10      | 20  | 7,0         | 5,0    | 40,7   | 30<br>-               | -<br>40  | 3<br>7         |
|               | 25  | 6,0         | 5,0    | 47,6   | 40<br>-               | -<br>50  | 4<br>8         |
|               | 32  | 6,0         | 5,0    | 47,6   | 54<br>-               | -<br>64  | 7<br>10        |
|               | 35  | 5,0         | 5,0    | 57,2   | 60<br>-               | -<br>70  | 6<br>9         |
|               | 42  | 5,0         | 5,0    | 57,2   | 74<br>-               | -<br>84  | 8<br>11        |
|               | 50  | 4,0         | 5,0    | 71,5   | 90<br>-               | -<br>100 | 8<br>10        |
|               | 52  | 3,0         | 5,0    | 95,4   | 94<br>-               | -<br>104 | 6<br>8         |
| 34290         |     |             |        |        |                       |          |                |
| RP... 12      | 40  | 8,0         | 6,0    | 42,7   | 68<br>-               | -<br>80  | 12<br>17       |
|               | 50  | 3,5         | 6,0    | 98,1   | 88<br>-               | -<br>100 | 7<br>9         |
|               | 52  | 3,0         | 6,0    | 114,5  | 92<br>-               | -<br>104 | 6<br>8         |
|               | 63  | 2,5         | 6,0    | 137,4  | 114<br>-              | -<br>126 | 6<br>8         |
|               | 66  | 2,5         | 6,0    | 137,4  | 120<br>-              | -<br>132 | 7<br>9         |
|               | 80  | 2,0         | 6,0    | 171,8  | 148<br>-              | -<br>160 | 7<br>8         |
| 33890         |     |             |        |        |                       |          |                |
| RP... 16      | 50  | 7,0         | 8,0    | 65,2   | 84<br>-               | -<br>100 | 13<br>19       |
|               | 52  | 7,0         | 8,0    | 65,2   | 88<br>-               | -<br>104 | 13<br>20       |
|               | 63  | 7,0         | 8,0    | 65,2   | 110<br>-              | -<br>126 | 18<br>24       |
|               | 66  | 3,0         | 8,0    | 152,6  | 116<br>-              | -<br>132 | 8<br>10        |
|               | 80  | 3,0         | 8,0    | 152,6  | 144<br>-              | -<br>160 | 10<br>13       |
|               | 100 | 3,0         | 8,0    | 152,6  | 184<br>-              | -<br>200 | 13<br>16       |
|               | 125 | 2,5         | 8,0    | 183,2  | 234<br>-              | -<br>250 | 14<br>17       |
| 33990         |     |             |        |        |                       |          |                |
| RP... 20      | 80  | 4,0         | 10,0   | 143,0  | 140<br>-              | -<br>160 | 13<br>17       |
|               | 100 | 3,0         | 10,0   | 190,8  | 180<br>-              | -<br>200 | 13<br>16       |
|               | 125 | 2,5         | 10,0   | 229,0  | 230<br>-              | -<br>250 | 14<br>17       |

Note: During helical interpolation do not exceed max Pitch.



## Arbor Mounting

$$\gamma_p = -7^\circ$$



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |            |          |           |    | Kg   | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|------------|----------|-----------|----|------|----------------|----------------|-------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi Dc2$ | $\phi d$ | $\phi dg$ | L  |      | Arbor<br>Type  | Ap max<br>(mm) |                               |       |
| 181111600            | 040A35190-04-07-016040                | 4 | 40                                        | 32         | 16       | 32        | 40 | 0,20 | A              | 3,0            | RNHX 1204 M0E...              |       |
| 181100200            | 050A35190-05-07-022040                | 5 | 50                                        | 42         | 22       | 40        | 40 | 0,24 | A              | 3,0            | RNHX 1204 M0E...              |       |
| 181128800            | 063A35190-06-07-022050                | 6 | 63                                        | 49         | 22       | 48        | 50 | 0,55 | A              | 3,0            | RNHX 1204 M0E...              |       |
| 181128900            | 080A35190-07-07-027050                | 7 | 80                                        | 60         | 27       | 60        | 50 | 0,78 | A              | 3,0            | RNHX 1204 M0E...              |       |
| 181175600            | 100A35190-09-07-032050                | 9 | 100                                       | 80         | 32       | 70        | 50 | 1,00 | B              | 3,0            | RNHX 1204 M0E...              |       |

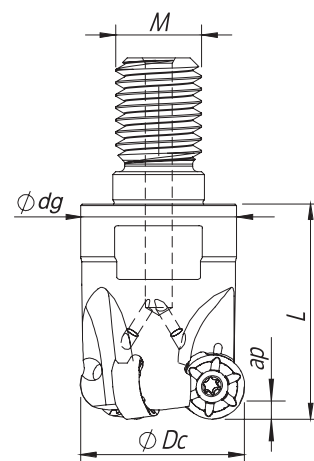
Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



## Threaded Coupling

$$\gamma_p = -7^\circ$$

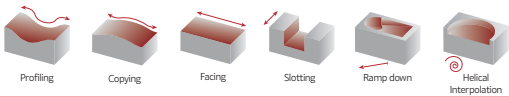


| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg   | Specifications |  | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|----------|-----------|----|------|----------------|--|-------------------------------|-------|
|                      |                                       |   | $\phi Dc$                                 | $\phi M$ | $\phi dg$ | L  |      | Ap max<br>(mm) |  |                               |       |
| 181128500            | 032R35190-03-07-M16040                | 3 | 32                                        | M16      | 29        | 40 | 0,16 | 3,0            |  | RNHX 1204 M0E...              |       |
| 181128700            | 042R35190-04-07-M16040                | 4 | 42                                        | M16      | 29        | 40 | 0,20 | 3,0            |  | RNHX 1204 M0E...              |       |

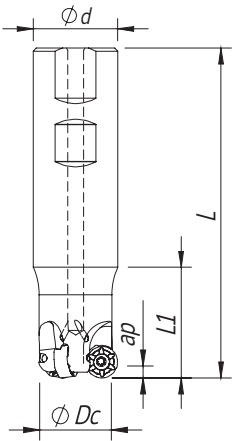
Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)





Weldon Shank  
 $\gamma_p = -7^\circ$



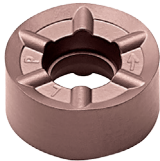
| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |      |     |    | Kg   | Specifications | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|------|-----|----|------|----------------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ød/M | L   | L1 |      | Ap max (mm)    |                               |       |
| 181087000            | 032W35190-03-07-032125                | 3 | 32                                        | 32   | 125 | 42 | 0,98 | 3,0            | RNHX 1204 MOE...              |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

RNHX 1204... | Inserts | Pastilhas | Plaquetas

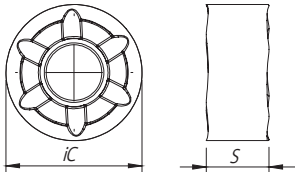
RNHX-LP



RNHX-MP



RNHX-LP | MP



|                                 |                  | P                         |        |        | M      |        |        | K      |        | S      |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |
|---------------------------------|------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|
|                                 |                  | PVD                       |        |        | PVD    |        |        | PVD    |        | PVD    |        |                                                |      |
|                                 |                  | <sup>(2)</sup> Grade code | T1     | P4     | Z2     | X9     | Z2     | Z3     | T1     | P4     | X9     |                                                |      |
| <sup>(1)</sup><br>Geometry code | ISO<br>Reference | PHP920                    | PHP930 | PHP530 | PHH930 | PHP530 | PHH530 | PHP920 | PHP930 | PHH930 | PHH530 | IC                                             | S    |
| 1112030                         | RNHX 1204 M0E-LP |                           |        |        |        |        |        |        |        |        |        | 12,00                                          | 4,76 |
| 1112052                         | RNHX 1204 M0E-MP |                           |        |        |        |        |        |        |        |        |        | 12,00                                          | 4,76 |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

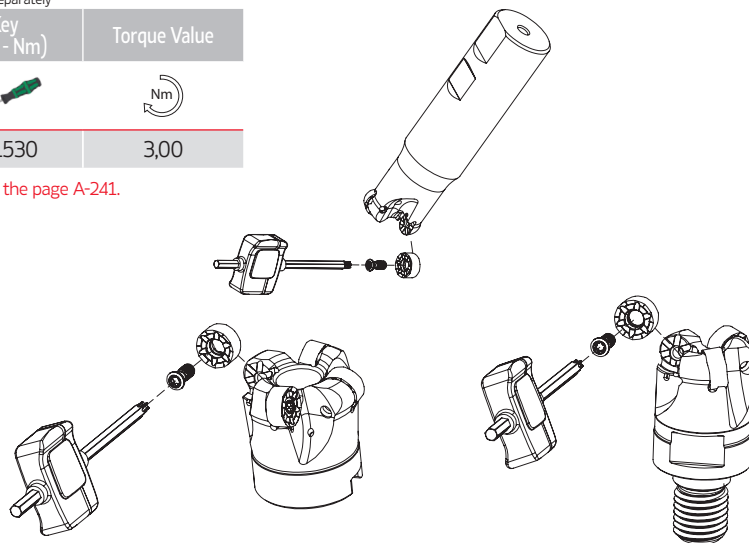


# TOROMILL X2 35190

## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc | Insert Screw                                                                      | Key (Torx)                                                                        | Key<br>(Torx - Nm)                                                                | Torque Value                                                                      |
|---------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|               |  |  |  |  |
| 35190         | P0401065                                                                          | XT15                                                                              | DT1530                                                                            | 3,00                                                                              |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades            |        |             |        |        |
|-----|-----|-----------------------------------|-----------------|-------------------|--------|-------------|--------|--------|
|     |     |                                   |                 | ← Wear Resistance |        | Toughness → |        |        |
|     |     |                                   |                 | PHP920            | PHP930 | PHH930      | PHP530 | PHH530 |
| P   | 1   | Unalloyed Steel                   | 125-220         | ✓                 | ✓      |             | ✓      |        |
|     | 2   | Low-Alloyed Steel                 | 220-280         | ✓                 | ✓      |             | ✓      |        |
|     | 3   | High-Alloyed Steel                | 280-380         | ✓                 | ✓      |             | ✓      |        |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         |                   |        | ✓           | ✓      | ✓      |
|     | 5   | SS - Austenitic                   | 200-330         |                   |        | ✓           |        | ✓      |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         |                   |        | ✓           |        | ✓      |
| K   | 7   | Malleable Cast Iron               | 130-230         | ✓                 | ✓      |             |        |        |
|     | 8   | Grey Cast Iron                    | 180-245         | ✓                 | ✓      |             |        |        |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓                 | ✓      |             |        |        |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         |                   |        | ✓           |        | ✓      |



Good Conditions



Average Conditions



Difficult Conditions

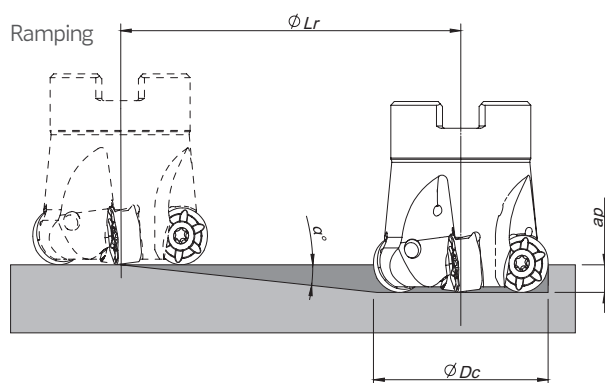
## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |             |         |         | Feed fz (mm/t) |               |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|-------------|---------|---------|----------------|---------------|
|     |     |                                   |                 | ← Wear Resistance |         | Toughness → |         |         | RNHX 12... LP  | RNHX 12... MP |
|     |     |                                   |                 | PHP920            | PHP930  | PHH930      | PHP530  | PHH530  |                |               |
| P   | 1   | Unalloyed Steel                   | 125-220         | 180-250           | 160-230 | -           | 180-340 | -       | 0,15-0,45      | 0,15-0,50     |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 160-230           | 140-210 | -           | 180-340 | -       | 0,15-0,45      | 0,15-0,50     |
|     | 3   | High-Alloyed Steel                | 280-380         | 140-220           | 120-200 | -           | 180-330 | -       | 0,15-0,45      | 0,15-0,45     |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | -                 | -       | 140-210     | 150-270 | 170-280 | 0,10-0,35      | -             |
|     | 5   | SS - Austenitic                   | 200-330         | -                 | -       | 120-170     | -       | 160-280 | 0,10-0,35      | -             |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | -                 | -       | 100-150     | -       | 150-260 | 0,10-0,35      | -             |
| K   | 7   | Malleable Cast Iron               | 130-230         | -                 | 150-280 | -           | -       | -       | -              | 0,15-0,55     |
|     | 8   | Grey Cast Iron                    | 180-245         | -                 | 130-230 | -           | -       | -       | -              | 0,15-0,55     |
|     | 9   | Nodular Cast iron                 | 160-250         | -                 | 80-190  | -           | -       | -       | -              | 0,15-0,50     |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | -                 | -       | 30-110      | -       | 30-150  | 0,05-0,30      | -             |

## CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra-aparas | Guía para aplicación del rompevirutas

| ISO | PSM | Material                          | HB<br>(Brinell) | Chip-Breaker Application |                      |
|-----|-----|-----------------------------------|-----------------|--------------------------|----------------------|
|     |     |                                   |                 | 1st choice               | Difficult Operations |
| P   | 1   | Unalloyed Steel                   | 125-220         | LP                       | MP                   |
|     | 2   | Low-Alloyed Steel                 | 220-280         | LP                       | MP                   |
|     | 3   | High-Alloyed Steel                | 280-380         | MP                       | -                    |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | LP                       | -                    |
|     | 5   | SS - Austenitic                   | 200-330         | LP                       | -                    |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | LP                       | -                    |
| K   | 7   | Malleable Cast Iron               | 130-230         | MP                       | -                    |
|     | 8   | Grey Cast Iron                    | 180-245         | MP                       | -                    |
|     | 9   | Nodular Cast iron                 | 160-250         | MP                       | -                    |
| S   | 11  | Heat Resistant Super Alloys       | 200-320         | LP                       | -                    |

## RAMPING | Descida em rampa | Bajada en rampa



| Insert    | $\phi Dc$ | Ramping            |           |          |
|-----------|-----------|--------------------|-----------|----------|
|           |           | Max Ramp $a^\circ$ | Max $a_p$ | Min $Lr$ |
| RNHX 1204 | 32        | 1                  | 3         | 171,9    |
|           | 40        | 0,8                | 3         | 214,8    |
|           | 42        | 0,8                | 3         | 214,8    |
|           | 50        | 0,8                | 3         | 214,8    |
|           | 63        | 0,6                | 3         | 286,5    |
|           | 80        | 0,5                | 3         | 343,8    |



PDF

# TOROMILL 24590 | 25090 | 25190

A

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

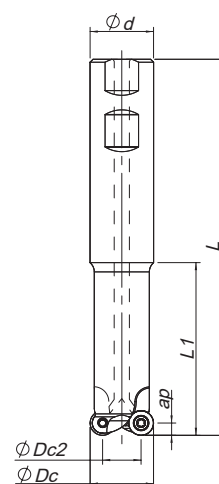
Technical Data

End Mills



## Weldon Shank

$$\gamma_p = 0^\circ$$



| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |      |    |     |     |     |    | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock                                                                                 |
|----------------------|---------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------|------|----|-----|-----|-----|----|-------|----------------|-------------------------------|---------------------------------------------------------------------------------------|
|                      |                                       |                                                                                   | ØDc                                       | ØDc2 | Ød | Ødg | L   | L1  | L2 |       | Ap max<br>(mm) |                               |                                                                                       |
| 24590                |                                       |                                                                                   |                                           |      |    |     |     |     |    |       |                |                               |                                                                                       |
| 181047000            | 015W24590-02-U016160                  | 2                                                                                 | 15                                        | 8    | 16 | -   | 160 | 60  | 40 | 0,220 | 3,5            | RD... 0702...                 |    |
| 181047100            | 015W24590-02-U025220                  | 2                                                                                 | 15                                        | 8    | 25 | -   | 220 | 120 | 40 | 0,600 | 3,5            | RD... 0702...                 |    |
| 25090                |                                       |                                                                                   |                                           |      |    |     |     |     |    |       |                |                               |                                                                                       |
| 181047200            | 020W25090-02-020160                   | 2                                                                                 | 20                                        | 10   | 20 | -   | 160 | 60  | -  | 0,322 | 5,0            | RD... 1003...                 |    |
| 181047300            | 020W25090-02-025220                   | 2                                                                                 | 20                                        | 10   | 25 | -   | 220 | 120 | 60 | 0,610 | 5,0            | RD... 1003...                 |    |
| 25190                |                                       |                                                                                   |                                           |      |    |     |     |     |    |       |                |                               |                                                                                       |
| 181047400            | 025W25190-02-025220                   | 2                                                                                 | 25                                        | 13   | 25 | -   | 220 | 120 | -  | 0,678 | 6,0            | RD... 12T3...                 |  |
| 181047500            | 025W25190-02-032230                   | 2                                                                                 | 25                                        | 13   | 32 | -   | 230 | 130 | 80 | 1,015 | 6,0            | RD... 12T3...                 |  |

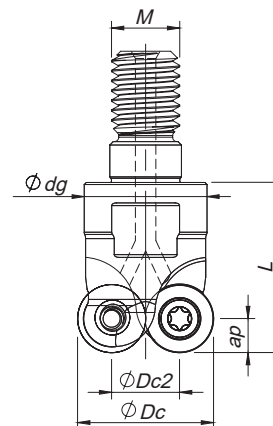
⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



## Threaded Coupling

$$\gamma_p = 0^\circ$$



| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |      |     |     |    | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock                                                                                 |
|----------------------|---------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------|------|-----|-----|----|-------|----------------|-------------------------------|---------------------------------------------------------------------------------------|
|                      |                                       |                                                                                     | ØDc                                       | ØDc2 | ØM  | Ødg | L  |       | Ap max<br>(mm) |                               |                                                                                       |
| 24590                |                                       |                                                                                     |                                           |      |     |     |    |       |                |                               |                                                                                       |
| 181015400            | 015R24590-03-M08020                   | 3                                                                                   | 15                                        | 8    | M8  | 13  | 20 | 0,019 | 3,5            | RD... 0702...                 |  |
| 181019100            | 016R24590-02-M08020                   | 2                                                                                   | 16                                        | 9    | M8  | 13  | 20 | 0,019 | 3,5            | RD... 0702...                 |  |
| 181037900            | 016R24590-03-M08020                   | 3                                                                                   | 16                                        | 9    | M8  | 13  | 20 | 0,019 | 3,5            | RD... 0702...                 |  |
| 181011400            | 020R24590-04-M10025                   | 4                                                                                   | 20                                        | 13   | M10 | 18  | 25 | 0,047 | 3,5            | RD... 0702...                 |  |
| 25090                |                                       |                                                                                     |                                           |      |     |     |    |       |                |                               |                                                                                       |
| 181011500            | 020R25090-02-M10025                   | 2                                                                                   | 20                                        | 10   | M10 | 18  | 25 | 0,041 | 5,0            | RD... 1003...                 |  |
| 181011600            | 025R25090-03-M12030                   | 3                                                                                   | 25                                        | 15   | M12 | 21  | 30 | 0,075 | 5,0            | RD... 1003...                 |  |
| 181011700            | 030R25090-04-M16035                   | 4                                                                                   | 30                                        | 20   | M16 | 29  | 35 | 0,190 | 5,0            | RD... 1003...                 |  |
| 181015500            | 035R25090-05-M16043                   | 5                                                                                   | 35                                        | 25   | M16 | 29  | 43 | 0,240 | 5,0            | RD... 1003...                 |  |
| 181049900            | 042R25090-05-M16040                   | 5                                                                                   | 42                                        | 32   | M16 | 29  | 40 | 0,243 | 5,0            | RD... 1003...                 |  |
| 25190                |                                       |                                                                                     |                                           |      |     |     |    |       |                |                               |                                                                                       |
| 181011800            | 024R25190-02-M12032                   | 2                                                                                   | 24                                        | 12   | M12 | 21  | 32 | 0,072 | 6,0            | RD... 12T3...                 |  |
| 181011900            | 035R25190-03-M16042                   | 3                                                                                   | 35                                        | 23   | M16 | 29  | 42 | 0,205 | 6,0            | RD... 12T3...                 |  |
| 181012000            | 042R25190-04-M16042                   | 4                                                                                   | 42                                        | 30   | M16 | 29  | 42 | 0,232 | 6,0            | RD... 12T3...                 |  |

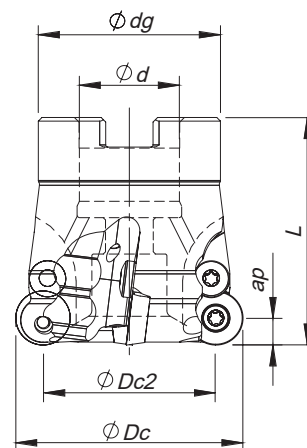
⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



### Arbor Mounting

$$\gamma_p = 0^\circ (*+7^\circ)$$



| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |      |    |     |      | Kg    | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock                                                                                 |
|----------------------|---------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------|------|----|-----|------|-------|----------------|----------------|-------------------------------|---------------------------------------------------------------------------------------|
|                      |                                       |                                                                                   | ØDc                                       | ØDc2 | Ød | Ødg | L    |       | Arbor<br>Type  | Ap max<br>(mm) |                               |                                                                                       |
| 25090                |                                       |                                                                                   |                                           |      |    |     |      |       |                |                |                               |                                                                                       |
| 181010600            | 042A25090-06-016044                   | 6                                                                                 | 42                                        | 32   | 16 | 36  | 44   | 0,254 | A              | 5,0            | RD... 1003...                 |    |
| 181017500            | 052A25090-07-022050                   | 7                                                                                 | 52                                        | 42   | 22 | 40  | 50   | 0,395 | A              | 5,0            | RD... 1003...                 |    |
| 25190                |                                       |                                                                                   |                                           |      |    |     |      |       |                |                |                               |                                                                                       |
| 181051900            | 050C25190-05-07-022050*               | 5                                                                                 | 50                                        | 38   | 22 | 40  | 50   | 0,312 | A              | 6,0            | RD... 12T3...                 |    |
| 181010700            | 052C25190-05-022050                   | 5                                                                                 | 52                                        | 40   | 22 | 40  | 50   | 0,337 | A              | 6,0            | RD... 12T3...                 |    |
| 181010800            | 052C25190-05-07-022050*               | 5                                                                                 | 52                                        | 40   | 22 | 40  | 50   | 0,335 | A              | 6,0            | RD... 12T3...                 |  |
| 181016100            | 066C25190-06-027050                   | 6                                                                                 | 66                                        | 54   | 27 | 48  | 50   | 0,550 | A              | 6,0            | RD... 12T3...                 |  |
| 181010900            | 066C25190-06-07-027050*               | 6                                                                                 | 66                                        | 54   | 27 | 48  | 50   | 0,600 | A              | 6,0            | RD... 12T3...                 |  |
| 181016500            | 080C25190-07-027050                   | 7                                                                                 | 80                                        | 68   | 27 | 60  | 50   | 1,000 | A              | 6,0            | RD... 12T3...                 |  |
| 181016600            | 080C25190-07-07-027052*               | 7                                                                                 | 80                                        | 68   | 27 | 60  | 52,5 | 1,000 | A              | 6,0            | RD... 12T3...                 |  |

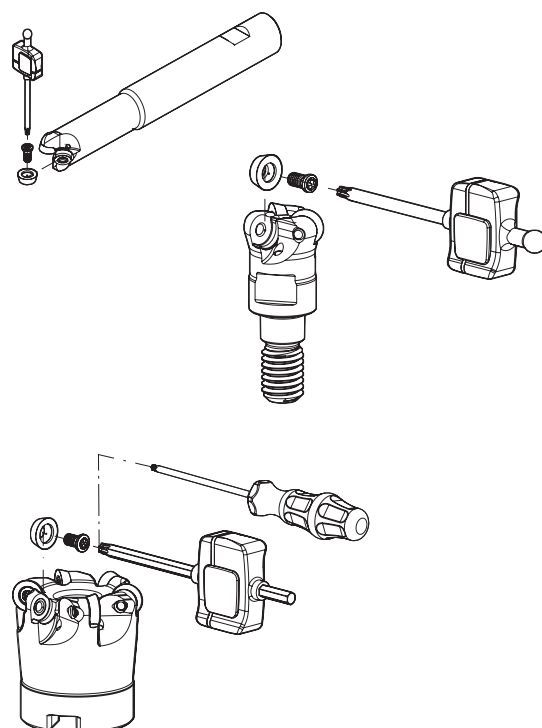
Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire página A-8)

## SPARE PARTS | Complementos | Repuestos

| Cutter<br>$\phi Dc$ | Insert Screw | Key (Torx) | Key<br>(Torx - Nm) | Torque Value | Screw Clamp |
|---------------------|--------------|------------|--------------------|--------------|-------------|
|                     |              |            |                    |              |             |
| W24590 - 15         | P0250503     | XT08       | DT0812             | 1,2          | -           |
| R24590 - 15-20      | P0250503     | XT08       | DT0812             | 1,2          | -           |
| W25090 - 20         | P0350800     | XT15       | DT1530             | 3,0          | -           |
| R25090 - 20-42      | P0350800     | XT15       | DT1530             | 3,0          | -           |
| A25090 - 42-52      | P0350800     | XT15       | DT1530             | 3,0          | -           |
| W25190 - 25         | P0350800     | XT15       | DT1530             | 3,0          | -           |
| R25190 - 24-42      | P0350800     | XT15       | DT1530             | 3,0          | -           |
| C25190 - 50-80      | P0350800     | XT15       | DT1530             | 3,0          | P0350750    |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



# TOROMILL 25290 | 25390

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

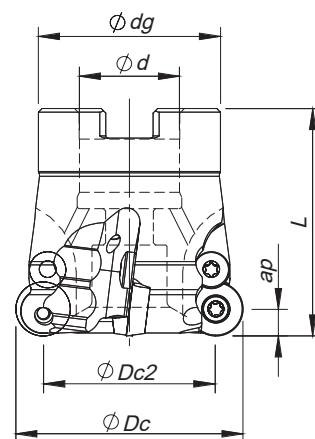
Technical Data

End Mills



## Arbor Mounting

$\gamma_p = 0^\circ$  (\*+7°)



| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |      |    |     |    | Kg    | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock                                                                                 |
|----------------------|---------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------|------|----|-----|----|-------|----------------|----------------|-------------------------------|---------------------------------------------------------------------------------------|
|                      |                                       |                                                                                   | ØDc                                       | ØDc2 | Ød | Ødg | L  |       | Arbor<br>Type  | Ap max<br>(mm) |                               |                                                                                       |
| 25290                |                                       |                                                                                   |                                           |      |    |     |    |       |                |                |                               |                                                                                       |
| 181017900            | 052C25290-04-022050                   | 4                                                                                 | 52                                        | 36   | 22 | 40  | 50 | 0,305 | A              | 8,0            | RD... 1604...                 |    |
| 181018000            | 052C25290-04-07-022050*               | 4                                                                                 | 52                                        | 36   | 22 | 40  | 50 | 0,324 | A              | 8,0            | RD... 1604...                 |    |
| 181011000            | 066C25290-05-027050                   | 5                                                                                 | 66                                        | 50   | 27 | 48  | 50 | 0,550 | A              | 8,0            | RD... 1604...                 |    |
| 181016700            | 066C25290-05-07-027050*               | 5                                                                                 | 66                                        | 50   | 27 | 48  | 50 | 0,550 | A              | 8,0            | RD... 1604...                 |    |
| 181016200            | 080C25290-06-027052                   | 6                                                                                 | 80                                        | 64   | 27 | 60  | 52 | 0,910 | A              | 8,0            | RD... 1604...                 |    |
| 181011100            | 080C25290-06-07-027052*               | 6                                                                                 | 80                                        | 64   | 27 | 60  | 52 | 0,934 | A              | 8,0            | RD... 1604...                 |  |
| 181017300            | 125C25290-08-07-U040052*              | 8                                                                                 | 125                                       | 109  | 40 | 90  | 52 | 2,340 | B              | 8,0            | RD... 1604...                 |  |
| 181017400            | 160C25290-09-07-U040052*              | 9                                                                                 | 160                                       | 144  | 40 | 120 | 52 | 4,750 | B              | 8,0            | RD... 1604...                 |  |
| 25390                |                                       |                                                                                   |                                           |      |    |     |    |       |                |                |                               |                                                                                       |
| 181026400            | 080C25390-05-07-027050*               | 5                                                                                 | 80                                        | 60   | 27 | 60  | 50 | 0,840 | A              | 10,0           | RD... 2006...                 |  |
| 181016800            | 100C25390-06-07-U032052*              | 6                                                                                 | 100                                       | 80   | 32 | 70  | 52 | 1,180 | B              | 10,0           | RD... 2006...                 |  |
| 181020500            | 125C25390-07-07-U040052*              | 7                                                                                 | 125                                       | 105  | 40 | 90  | 52 | 2,030 | B              | 10,0           | RD... 2006...                 |  |
| 181020600            | 160C25390-08-07-U040052*              | 8                                                                                 | 160                                       | 140  | 40 | 120 | 52 | 4,320 | B              | 10,0           | RD... 2006...                 |  |

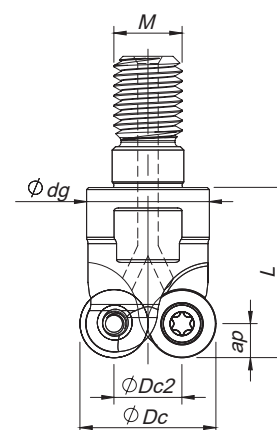
⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



## Threaded Coupling

$\gamma_p = 0^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |      |     |     |    | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock                                                                                 |
|----------------------|---------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------|------|-----|-----|----|-------|----------------|-------------------------------|---------------------------------------------------------------------------------------|
|                      |                                       |                                                                                     | ØDc                                       | ØDc2 | ØM  | Ødg | L  |       | Ap max<br>(mm) |                               |                                                                                       |
| 25290                |                                       |                                                                                     |                                           |      |     |     |    |       |                |                               |                                                                                       |
| 181002600            | 032R25290-02-M16040                   | 2                                                                                   | 32                                        | 16   | M16 | 29  | 40 | 0,162 | 8,0            | RD... 1604...                 |  |
| 181034800            | 032R25290-03-M16042                   | 3                                                                                   | 35                                        | 19   | M16 | 29  | 42 | 0,230 | 8,0            | RD... 1604...                 |  |

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



RD... || Inserts | Pastilhas | Plaquitas

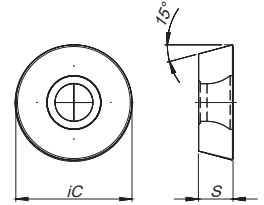
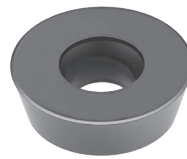
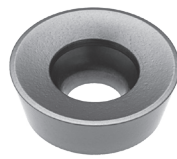
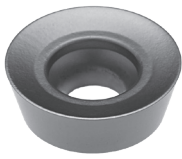
RDHT

RDHW

RDMT

RDMW

RDHT | RDHW | RDMT | RDMW



|                         | (2) Grade code   | P      |        |        |        |        |        | K      |        |        | H      | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |
|-------------------------|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|
|                         |                  | PVD    |        |        |        |        |        | PVD    |        |        | PVD    |                                                |      |
|                         |                  | M6     | 54     | 68     | 78     | 86     | I5     | 54     | 68     | I5     | M6     | iC                                             | S    |
| (1)<br>Geometry<br>code | ISO<br>Reference | PH6103 | PH6910 | PH6920 | PH6125 | PH6135 | PH6740 | PH6910 | PH6920 | PH6740 | PH6103 |                                                |      |
| 1110548                 | RDHW 0702 M0T    | ⊗      | ⊗      | ⊗      |        |        |        | ⊗      | ⊗      |        | ⊗      | 7,00                                           | 2,38 |
| 1110087                 | RDHW 1003 M0T    | ⊗      | ⊗      | ⊗      |        | ⊗      |        | ⊗      | ⊗      |        | ⊗      | 10,00                                          | 3,18 |
| 1110082                 | RDHT 1003 M0T    |        |        |        | ⊗      | ⊗      |        |        |        |        |        | 10,00                                          | 3,18 |
| 1110583                 | RDMT 1003 M0T    |        |        |        | ⊗      | ⊗      |        |        |        |        |        | 10,00                                          | 3,18 |
| 1110549                 | RDMW 1003 M0T    |        |        | ⊗      | ⊗      | ⊗      |        |        |        |        |        | 10,00                                          | 3,18 |
| 1110090                 | RDHW 12T3 M0T    | ⊗      | ⊗      | ⊗      |        | ⊗      |        | ⊗      | ⊗      |        | ⊗      | 10,00                                          | 3,97 |
| 1112040                 | RDHT 12T3 M0S-MP |        |        | ⊗      |        |        | ⊗      |        | ⊗      | ⊗      |        | 10,00                                          | 3,18 |
| 1110083                 | RDHT 12T3 M0T    |        |        |        | ⊗      | ⊗      |        |        |        |        |        | 12,00                                          | 3,97 |
| 1110558                 | RDMT 12T3 M0T    |        |        |        | ⊗      | ⊗      |        |        |        |        |        | 12,00                                          | 3,97 |
| 1110096                 | RDMW 12T3 M0T    |        |        | ⊗      | ⊗      | ⊗      |        |        | ⊗      |        |        | 12,00                                          | 3,97 |
| 1110092                 | RDHW 1604 M0T    | ⊗      | ⊗      | ⊗      |        | ⊗      |        | ⊗      | ⊗      |        | ⊗      | 16,00                                          | 4,76 |
| 1112039                 | RDHT 1604 M0S-MP |        |        | ⊗      |        |        | ⊗      |        | ⊗      | ⊗      |        | 16,00                                          | 4,76 |
| 1110084                 | RDHT 1604 M0T    |        |        |        | ⊗      | ⊗      |        |        |        |        |        | 16,00                                          | 4,76 |
| 1110556                 | RDMT 1604 M0T    |        |        |        | ⊗      | ⊗      |        |        |        |        |        | 16,00                                          | 4,76 |
| 1110097                 | RDMW 1604 M0T    |        |        | ⊗      | ⊗      | ⊗      |        |        | ⊗      |        |        | 16,00                                          | 4,76 |
| 1110869                 | RDMW 2006 M0T    |        |        |        | ⊗      |        |        |        |        |        |        | 20,00                                          | 6,35 |

⊗ First choice | Primeira opção | 1ª opción    ⊗ Stock item | Produto de stock | Itens de stock    ○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)    Insert order code = (1) Geometry Code + (2) Grade Code

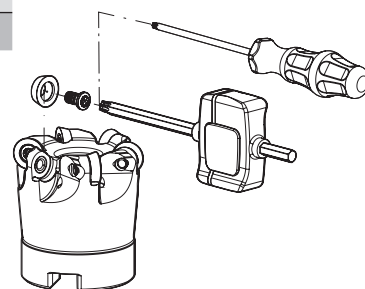
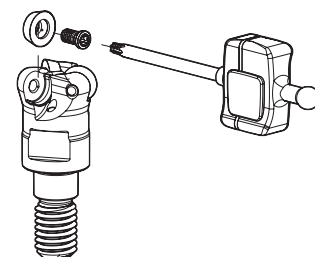
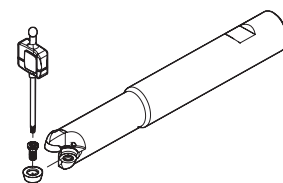


# TOROMILL 24590 | 25090 | 25190 | 25290 | 25390

## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc    | Order separately |            |                 |              | Order separately |         |              |
|------------------|------------------|------------|-----------------|--------------|------------------|---------|--------------|
|                  | Insert Screw     | Key (Torx) | Key (Torx - Nm) | Torque Value | Screw Clamp      | Washer  | Washer Screw |
| W24590 - 15      | P0250503         | XT08       | DT0812          | 1,2          | -                | -       | -            |
| R24590 - 15-20   | P0250503         | XT08       | DT0812          | 1,2          | -                | -       | -            |
| W25090 - 20      | P0350800         | XT15       | DT1530          | 3,0          | -                | -       | -            |
| R25090 - 20-42   | P0350800         | XT15       | DT1530          | 3,0          | -                | -       | -            |
| A25090 - 42-52   | P0350800         | XT15       | DT1530          | 3,0          | -                | -       | -            |
| W25190 - 25      | P0350800         | XT15       | DT1530          | 3,0          | -                | -       | -            |
| R25190 - 24-42   | P0350800         | XT15       | DT1530          | 3,0          | -                | -       | -            |
| C25190 - 50-80   | P0350800         | XT15       | DT1530          | 3,0          | P0350750         | -       | -            |
| R25290 - 32-35   | P0451001         | XT20       | DT2050          | 5,0          | -                | -       | -            |
| C25290 - 52-80   | P0451001         | XT20       | DT2050          | 5,0          | -                | HC01200 | P0451001     |
| C25290 - 125-160 | P0451001         | XT20       | DT2050          | 5,0          | -                | HC01200 | P0451001     |
| C25390 - 80-160  | P0601402         | TT20       | -               | 10,0         | -                | HC01200 | P0451001     |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material            | HB<br>(Brinell) | Grades            |        |        |             |        |        |
|-----|-----|---------------------|-----------------|-------------------|--------|--------|-------------|--------|--------|
|     |     |                     |                 | ← Wear Resistance |        |        | Toughness → |        |        |
|     |     |                     |                 | PH6103            | PH6910 | PH6920 | PH6125      | PH6135 | PH6740 |
| P   | 1   | Unalloyed Steel     | 125-220         | ✓                 | ✓      | ✓      | ✓           | ✓      | ✓      |
|     | 2   | Low-Alloyed Steel   | 220-280         | ✓                 | ✓      | ✓      | ✓           | ✓      | ✓      |
|     | 3   | High-Alloyed Steel  | 280-380         | ✓                 | ✓      | ✓      | ✓           | ✓      | ✓      |
| K   | 7   | Malleable Cast Iron | 130-230         |                   | ✓      | ✓      |             |        | ✓      |
|     | 8   | Grey Cast Iron      | 180-245         |                   | ✓      | ✓      |             |        | ✓      |
|     | 9   | Nodular Cast iron   | 160-250         |                   | ✓      | ✓      |             |        | ✓      |
| H   | 12  | Hardened Steels     | 40-55 HRC       | ✓                 |        |        |             |        |        |

- Good Conditions
- Average Conditions
- Difficult Conditions

CHIP-BREAKER SELECTION GUIDE | Guia para aplicações do quebra-apanas | Guía para aplicación del rompevirutas

| ISO | PSM | Material            | HB<br>(Brinell) | Chip-Breaker Application |                     |
|-----|-----|---------------------|-----------------|--------------------------|---------------------|
|     |     |                     |                 | 1st choise               | Dificult Operations |
| P   | 1   | Unalloyed Steel     | 125-220         | RD...T ...               | RD...W ...          |
|     | 2   | Low-Alloyed Steel   | 220-280         | RD...T ...               | -                   |
|     | 3   | High-Alloyed Steel  | 280-380         | RD...W ...               | -                   |
| K   | 7   | Malleable Cast Iron | 130-230         | RD...T ...               | RD...W ...          |
|     | 8   | Grey Cast Iron      | 180-245         | RD...W ...               | -                   |
|     | 9   | Nodular Cast iron   | 160-250         | RD...W ...               | -                   |
| H   | 12  | Hardened Steels     | 40-55 HRC       | RD...W ...               | -                   |

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

Technical Data

End Mills



# TOROMILL 24590 | 25090 | 25190 | 25290 | 25390

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material            | HB<br>(Brinell) | Vc (m/min)        |         |         |         |             |         |
|-----|-----|---------------------|-----------------|-------------------|---------|---------|---------|-------------|---------|
|     |     |                     |                 | ← Wear Resistance |         |         |         | Toughness → |         |
|     |     |                     |                 | PH6103            | PH6910  | PH6920  | PH6125  | PH6135      | PH6740  |
| P   | 1   | Unalloyed Steel     | 125-220         | 180-300           | 180-250 | 150-230 | 160-190 | 150-180     | 130-160 |
|     | 2   | Low-Alloyed Steel   | 220-280         | 180-250           | 170-210 | 140-220 | 140-180 | 140-170     | 120-150 |
|     | 3   | High-Alloyed Steel  | 280-380         | 180-230           | 160-200 | 130-180 | 130-160 | 120-150     | 100-130 |
| K   | 7   | Malleable Cast Iron | 130-230         | -                 | 170-300 | 150-280 | -       | -           | 130-250 |
|     | 8   | Grey Cast Iron      | 180-245         | -                 | 150-250 | 130-230 | -       | -           | 110-220 |
|     | 9   | Nodular Cast iron   | 160-250         | -                 | 90-210  | 80-190  | -       | -           | 80-170  |
| H   | 12  | Hardened Steels     | 40-55 HRC       | 120-240           | -       | -       | -       | -           | -       |

| ISO | PSM | Material            | HB<br>(Brinell) | RD... 07  |         | RD... 10  |         | RD... 12  |         |
|-----|-----|---------------------|-----------------|-----------|---------|-----------|---------|-----------|---------|
|     |     |                     |                 | fz (mm/t) | ap (mm) | fz (mm/t) | ap (mm) | fz (mm/t) | ap (mm) |
| P   | 1   | Unalloyed Steel     | 125-220         | ≤0,18     | ≤1,50   | ≤0,24     | ≤2,50   | ≤0,27     | ≤2,50   |
|     | 2   | Low-Alloyed Steel   | 220-280         | ≤0,18     | ≤1,50   | ≤0,24     | ≤2,50   | ≤0,25     | ≤2,50   |
|     | 3   | High-Alloyed Steel  | 280-380         | ≤0,15     | ≤1,50   | ≤0,21     | ≤2,50   | ≤0,20     | ≤2,50   |
| K   | 7   | Malleable Cast Iron | 130-230         | ≤0,20     | ≤1,50   | ≤0,25     | ≤2,50   | ≤0,24     | ≤2,50   |
|     | 8   | Grey Cast Iron      | 180-245         | ≤0,20     | ≤1,50   | ≤0,25     | ≤2,50   | ≤0,24     | ≤2,50   |
|     | 9   | Nodular Cast iron   | 160-250         | ≤0,18     | ≤1,50   | ≤0,22     | ≤2,50   | ≤0,22     | ≤2,50   |
| H   | 12  | Hardened Steels     | 40-55 HRC       | ≤0,12     | ≤1,50   | ≤0,18     | ≤2,50   | ≤0,18     | ≤2,50   |

| ISO | PSM | Material            | HB<br>(Brinell) | RD... 16  |         | RD... 20  |         |
|-----|-----|---------------------|-----------------|-----------|---------|-----------|---------|
|     |     |                     |                 | fz (mm/t) | ap (mm) | fz (mm/t) | ap (mm) |
| P   | 1   | Unalloyed Steel     | 125-220         | ≤0,33     | ≤3,50   | ≤0,33     | ≤5,00   |
|     | 2   | Low-Alloyed Steel   | 220-280         | ≤0,33     | ≤3,50   | ≤0,33     | ≤5,00   |
|     | 3   | High-Alloyed Steel  | 280-380         | ≤0,27     | ≤3,50   | ≤0,27     | ≤5,00   |
| K   | 7   | Malleable Cast Iron | 130-230         | ≤0,35     | ≤3,50   | ≤0,35     | ≤5,00   |
|     | 8   | Grey Cast Iron      | 180-245         | ≤0,35     | ≤3,50   | ≤0,35     | ≤5,00   |
|     | 9   | Nodular Cast iron   | 160-250         | ≤0,32     | ≤3,50   | ≤0,32     | ≤5,00   |
| H   | 12  | Hardened Steels     | 40-55 HRC       | ≤0,25     | ≤3,50   | ≤0,20     | ≤5,00   |

(Note 1) Cutting conditions  $a_e/D_c=70\%$ .

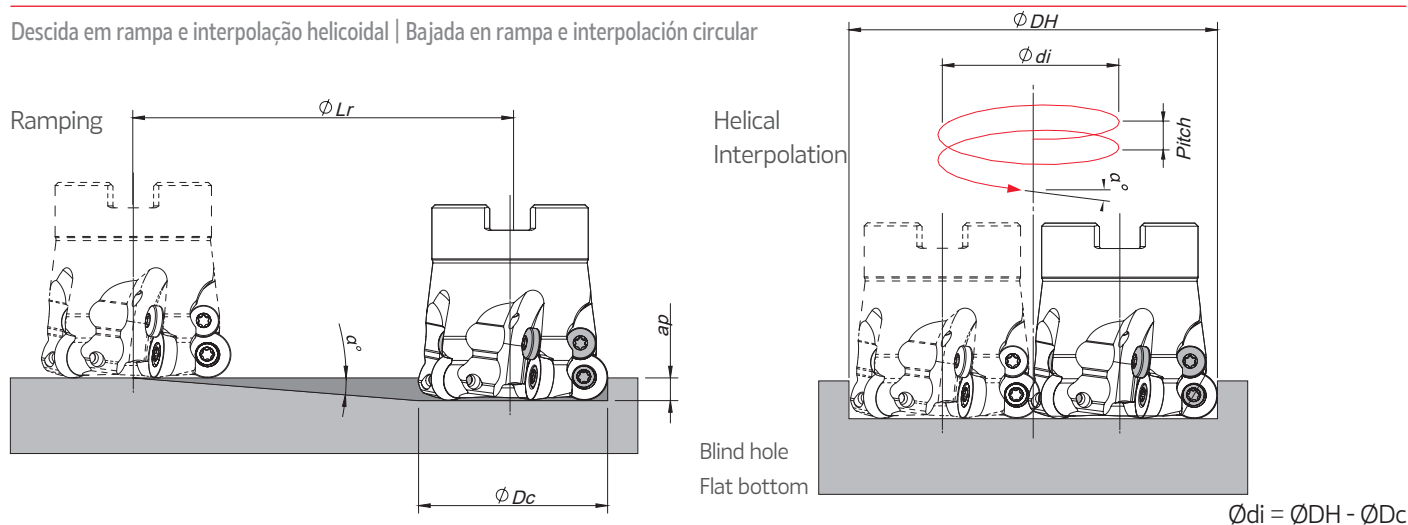
(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

## RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular



| Insert   | $\phi Dc$ | Ramping                 |          |          | Helical Interpolation |                 |                |
|----------|-----------|-------------------------|----------|----------|-----------------------|-----------------|----------------|
|          |           | Max Ramp $\alpha^\circ$ | Max $ap$ | Min $Lr$ | $\phi DH_{min}$       | $\phi DH_{max}$ | Max Pitch/Rev. |
| RD... 07 | 15        | 9,4                     | 3,5      | 21,1     | 23,0                  | -               | 4,0            |
|          | 16        | 8                       | 3,5      | 24,9     | 25,0                  | 30,0            | 7,0            |
|          | 20        | 6                       | 3,5      | 33,3     | -                     | 32,0            | 3,0            |
| RD... 10 | 20        | 25,0                    | 5,0      | 10,7     | 33,0                  | 40,0            | 4,0            |
|          | 25        | 22,0                    | 5,0      | 12,4     | -                     | 40,0            | 6,0            |
|          | 30        | 13,5                    | 5,0      | 20,8     | 40,0                  | -               | 14,0           |
|          | 35        | 12,0                    | 5,0      | 23,5     | -                     | 50,0            | 29,0           |
|          | 42        | 10,0                    | 5,0      | 28,4     | 50,0                  | 60,0            | 19,0           |
|          | 52        | 7,0                     | 5,0      | 40,7     | 60,0                  | 70,0            | 31,0           |
| RD... 12 | 24        | 17,0                    | 6,0      | 19,6     | 74,0                  | 84,0            | 15,0           |
|          | 25        | 16,2                    | 6,0      | 20,7     | -                     | 84,0            | 22,0           |
|          | 35        | 12,0                    | 6,0      | 28,2     | 94,0                  | 104,0           | 17,0           |
|          | 42        | 10,3                    | 6,0      | 33,0     | -                     | 104,0           | 23,0           |
|          | 50        | 6,4                     | 6,0      | 53,5     | 36,0                  | 48,0            | 11,1           |
|          | 52        | 6,0                     | 6,0      | 57,1     | 38,0                  | 50,0            | 23,0           |
|          | 66        | 3,5                     | 6,0      | 79,8     | 58,0                  | 70,0            | 11,0           |
|          | 80        | 2,5                     | 6,0      | 104,1    | 72,0                  | 84,0            | 15,0           |
| RD... 16 | 32        | 20,0                    | 8,0      | 22,0     | 88,0                  | 100,0           | 13,0           |
|          | 35        | 18,0                    | 8,0      | 24,6     | 92,0                  | 104,0           | 17,0           |
|          | 52        | 13,0                    | 8,0      | 34,7     | 120,0                 | 132,0           | 12,0           |
|          | 66        | 8,5                     | 8,0      | 53,5     | 148,0                 | 160,0           | 12,0           |
|          | 80        | 6,0                     | 8,0      | 76,1     | -                     | 160,0           | 14,0           |
|          | 125       | 3,5                     | 8,0      | 130,8    | 48,0                  | 64,0            | 18,0           |
|          | 160       | 2,5                     | 8,0      | 183,2    | 54,0                  | 70,0            | 36,0           |
| RD... 20 | 80        | 6,0                     | 10,0     | 76,1     | 88,0                  | 104,0           | 26,0           |
|          | 100       | 5,0                     | 10,0     | 91,4     | 116,0                 | 132,0           | 30,0           |
|          | 125       | 4,5                     | 10,0     | 101,6    | 144,0                 | 160,0           | 21,0           |
|          | 160       | 3,0                     | 10,0     | 152,6    | 234,0                 | 250,0           | 25,0           |

Note: During helical interpolation do not exceed max Pitch.

# LINEPRO 40095 | 40595 | 41095

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

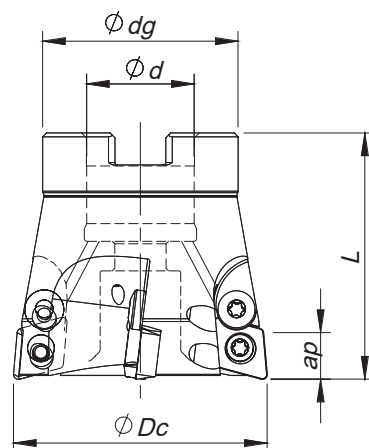
Technical Data

End Mills



## Arbor Mouting

$K_r=95^\circ$  |  $\gamma_p=+7^\circ$



| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |    |     |    | Kg    | Specifications |                | Insert<br>Pastilha<br>Inserto | Stock                                                                               |
|----------------------|---------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------|----|-----|----|-------|----------------|----------------|-------------------------------|-------------------------------------------------------------------------------------|
|                      |                                       |                                                                                   | ØDc                                       | Ød | Ødg | L  |       | Arbor<br>Type  | Ap max<br>(mm) |                               |                                                                                     |
| 40595                |                                       |                                                                                   |                                           |    |     |    |       |                |                |                               |                                                                                     |
| 181027700            | 052C40595-05-07-022050                | 5                                                                                 | 52                                        | 22 | 40  | 50 | 0,342 | A              | 1,0            | XD... 10T3...                 |  |
| 181027800            | 066C40595-06-07-027050                | 6                                                                                 | 66                                        | 27 | 48  | 50 | 0,565 | A              | 1,0            | XD... 10T3...                 |  |
| 181027900            | 080C40595-07-07-027050                | 7                                                                                 | 80                                        | 27 | 60  | 50 | 0,972 | A              | 1,0            | XD... 10T3...                 |  |

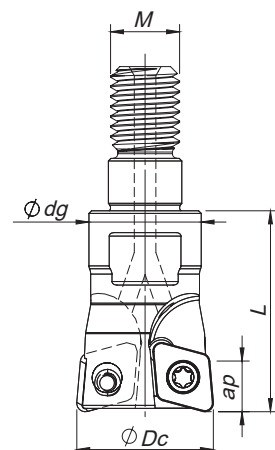
Ⓢ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



## Threaded Coupling

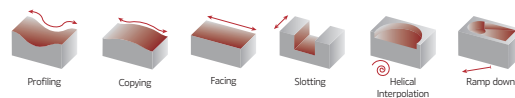
$K_r=95^\circ$  |  $\gamma_p=+7^\circ$  (\*+9)



| Order code<br>Código | Reference<br>Referência<br>Referencia |  | Dimensions   Dimensões   Dimensiones (mm) |     |     |    | Kg    | Specifications | Insert<br>Pastilha<br>Inserto | Stock                                                                                 |  |
|----------------------|---------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------|-----|-----|----|-------|----------------|-------------------------------|---------------------------------------------------------------------------------------|--|
|                      |                                       |                                                                                     | ØDc                                       | ØM  | Ødg | L  |       | Ap max<br>(mm) |                               |                                                                                       |  |
| 41095                |                                       |                                                                                     |                                           |     |     |    |       |                |                               |                                                                                       |  |
| 181012400            | 010R41095-02-09-M06020*               | 2                                                                                   | 10                                        | M6  | 9,8 | 20 | 0,010 | 0,8            | XD... 0401...                 |  |  |
| 181016300            | 012R41095-02-09-M06020*               | 2                                                                                   | 12                                        | M6  | 9,8 | 20 | 0,012 | 0,8            | XD... 0401...                 |  |  |
| 40095                |                                       |                                                                                     |                                           |     |     |    |       |                |                               |                                                                                       |  |
| 181012100            | 016R40095-02-07-M08023                | 2                                                                                   | 16                                        | M8  | 13  | 23 | 0,022 | 1,0            | XD... 0602...                 |  |  |
| 181012200            | 020R40095-03-07-M10028                | 3                                                                                   | 20                                        | M10 | 18  | 28 | 0,050 | 1,0            | XD... 0602...                 |  |  |
| 181015600            | 025R40095-03-07-M12030                | 3                                                                                   | 25                                        | M12 | 21  | 30 | 0,081 | 1,0            | XD... 0602...                 |  |  |
| 181034000            | 025R40095-04-07-M12030                | 4                                                                                   | 25                                        | M12 | 21  | 30 | 0,078 | 1,0            | XD... 0602...                 |  |  |
| 40595                |                                       |                                                                                     |                                           |     |     |    |       |                |                               |                                                                                       |  |
| 181015700            | 025R40595-02-07-M12035                | 2                                                                                   | 25                                        | M12 | 21  | 35 | 0,077 | 1,0            | XD... 10T3...                 |  |  |
| 181012300            | 035R40595-03-07-M16043                | 3                                                                                   | 35                                        | M16 | 29  | 43 | 0,200 | 1,0            | XD... 10T3...                 |  |  |
| 181016900            | 042R40595-04-07-M16043                | 4                                                                                   | 42                                        | M16 | 29  | 43 | 0,230 | 1,0            | XD... 10T3...                 |  |  |

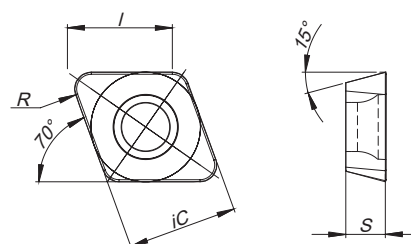
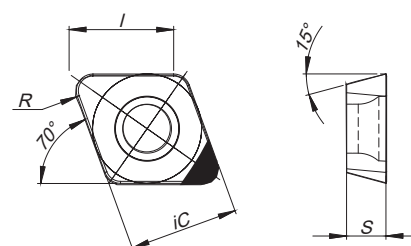
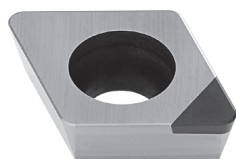
Ⓢ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)



## XDHW | Inserts | Pastilhas | Plaquetas

XDHW

XDHW - PCD & PCBN  
(HARDMILL)

|                         | (2) Grade code   | P      |        |        |        | K      |        | N      |        | H      |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |      |
|-------------------------|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|------|------|
|                         |                  | PVD    |        |        |        | PVD    |        | CVD    | PCD    | PVD    | PCBN   |                                                |      |      |      |
|                         |                  | M6     | 54     | 78     | 86     | 54     | 78     | P2     | D6     | M6     | S4     |                                                |      |      |      |
| (1)<br>Geometry<br>code | ISO<br>Reference | PH6103 | PH6910 | PH6125 | PH6135 | PH6910 | PH6125 | PHD103 | PDP410 | PH6103 | PBH920 | iC                                             | S    | I    | R    |
| 1110905                 | XDHW 040105      | ○      | ○      | ○      |        | ○      |        | ⊗      |        | ○      |        | 4,00                                           | 1,59 | 4,00 | 0,50 |
| 1110573                 | XDHW 040110      | ⊗      | ⊗      | ⊗      |        | ⊗      | ⊗      | ⊗      |        | ⊗      |        | 4,00                                           | 1,59 | 4,00 | 1,00 |
| 1112316                 | XDHW 040110 FN   |        |        |        |        |        |        |        | ⊗      |        |        | 4,00                                           | 1,59 | 4,00 | 1,00 |
| 1112317                 | XDHW 040110 SN   |        |        |        |        |        |        |        |        |        | ⊗      | 4,00                                           | 1,59 | 4,00 | 1,00 |
| 1110532                 | XDHW 060210      | ⊗      | ⊗      | ⊗      | ⊗      | ⊗      | ⊗      | ⊗      |        | ⊗      |        | 6,50                                           | 2,38 | 6,20 | 1,00 |
| 1112318                 | XDHW 060210 FN   |        |        |        |        |        |        |        | ⊗      |        |        | 6,50                                           | 2,38 | 6,20 | 1,00 |
| 1111875                 | XDHW 060210 SN   |        |        |        |        |        |        |        |        |        | ⊗      | 6,50                                           | 2,38 | 6,20 | 1,00 |
| 1110565                 | XDHW 10T310      | ⊗      | ⊗      | ⊗      | ⊗      | ⊗      | ⊗      | ○      |        | ⊗      |        | 10,00                                          | 3,97 | 9,90 | 1,00 |
| 1112320                 | XDHW 10T310 FN   |        |        |        |        |        |        |        | ⊗      |        |        | 10,00                                          | 3,97 | 9,90 | 1,00 |
| 1112321                 | XDHW 10T310 SN   |        |        |        |        |        |        |        |        |        | ⊗      | 10,00                                          | 3,97 | 9,90 | 1,00 |

⊗ First choice | Primeira opção | 1ª opción

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request (see page A-9) | Disponível sobre consulta  
(consulte a página A-9) | Disponible bajo consulta (mire página A-9)

Insert order code = (1) Geometry Code + (2) Grade Code



# LINEPRO 40095 | 40595 | 41095

A

## SPARE PARTS | Complementos | Repuestos

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

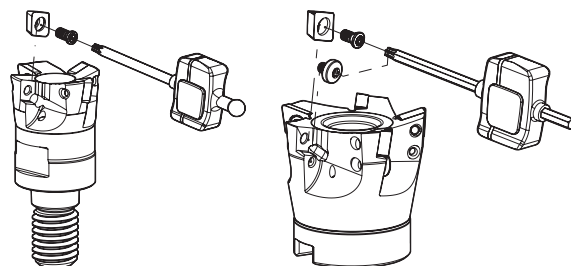
Spot face

Spare Parts

Technical Data

End Mills

| Cutter<br>ØDc    | Order separately |            |                    | Order separately |             |
|------------------|------------------|------------|--------------------|------------------|-------------|
|                  | Insert Screw     | Key (Torx) | Key<br>(Torx - Nm) | Torque Value     | Screw Clamp |
| R41095 - 10 - 12 | P0180401         | XT06       | DT0606             | 0,6              | -           |
| R40095 - 16 - 25 | P0250503         | XT08       | DT0812             | 1,2              | -           |
| R40595 - 25 - 42 | P0350800         | XT15       | DT1530             | 3,0              | -           |
| C40595 - 52 - 80 | P0350800         | XT15       | DT1530             | 3,0              | P0350750    |



Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                  | HB<br>(Brinell) | Grades            |        |        |             |        | PCD | PCBN |
|-----|-----|---------------------------|-----------------|-------------------|--------|--------|-------------|--------|-----|------|
|     |     |                           |                 | ← Wear Resistance |        |        | Toughness → |        |     |      |
|     |     |                           |                 | PHD103            | PH6103 | PH6910 | PH6125      | PH6135 |     |      |
| P   | 1   | Unalloyed Steel           | 125-220         |                   | ✓      | ✓      | ✓           | ✓      |     |      |
|     | 2   | Low-Alloyed Steel         | 220-280         |                   | ✓      | ✓      | ✓           | ✓      |     |      |
|     | 3   | High-Alloyed Steel        | 280-380         |                   | ✓      | ✓      | ✓           | ✓      |     |      |
| K   | 7   | Malleable Cast Iron       | 130-230         |                   |        |        | ✓           |        |     |      |
|     | 8   | Grey Cast Iron            | 180-245         |                   |        |        | ✓           |        |     |      |
|     | 9   | Nodular Cast iron         | 160-250         |                   |        |        | ✓           |        |     |      |
| N   | 10  | Aluminium and Non Ferrous | 30-130          | ✓                 |        |        |             |        | ✓   |      |
| H   | 12  | Hardened Steels           | 40-55 HRC       |                   | ✓      |        |             |        |     | ✓    |



## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                  | HB<br>(Brinell) | Vc (m/min)        |         |             |         |         | PCD      | PCBN    |
|-----|-----|---------------------------|-----------------|-------------------|---------|-------------|---------|---------|----------|---------|
|     |     |                           |                 | ← Wear Resistance |         | Toughness → |         |         |          |         |
|     |     |                           |                 | PHD103            | PH6103  | PH6910      | PH6125  | PH6135  | PDP410   | PBH920  |
| P   | 1   | Unalloyed Steel           | 125-220         | -                 | 180-300 | 180-250     | 160-190 | 150-180 | -        | -       |
|     | 2   | Low-Alloyed Steel         | 220-280         | -                 | 180-250 | 170-210     | 140-180 | 140-170 | -        | -       |
|     | 3   | High-Alloyed Steel        | 280-380         | -                 | 180-230 | 160-200     | 130-160 | 120-150 | -        | -       |
| K   | 7   | Malleable Cast Iron       | 130-230         | -                 | -       | 170-300     | 160-290 | -       | -        | -       |
|     | 8   | Grey Cast Iron            | 180-245         | -                 | -       | 150-250     | 140-240 | -       | -        | -       |
|     | 9   | Nodular Cast iron         | 160-250         | -                 | -       | 90-210      | 80-200  | -       | -        | -       |
| N   | 10  | Aluminium and Non Ferrous | 30-130          | 300-1000          | -       | -           | -       | -       | 800-3000 | -       |
| H   | 12  | Hardened Steels           | 40-55 HRC       | -                 | 120-260 | -           | -       | -       | -        | 200-600 |

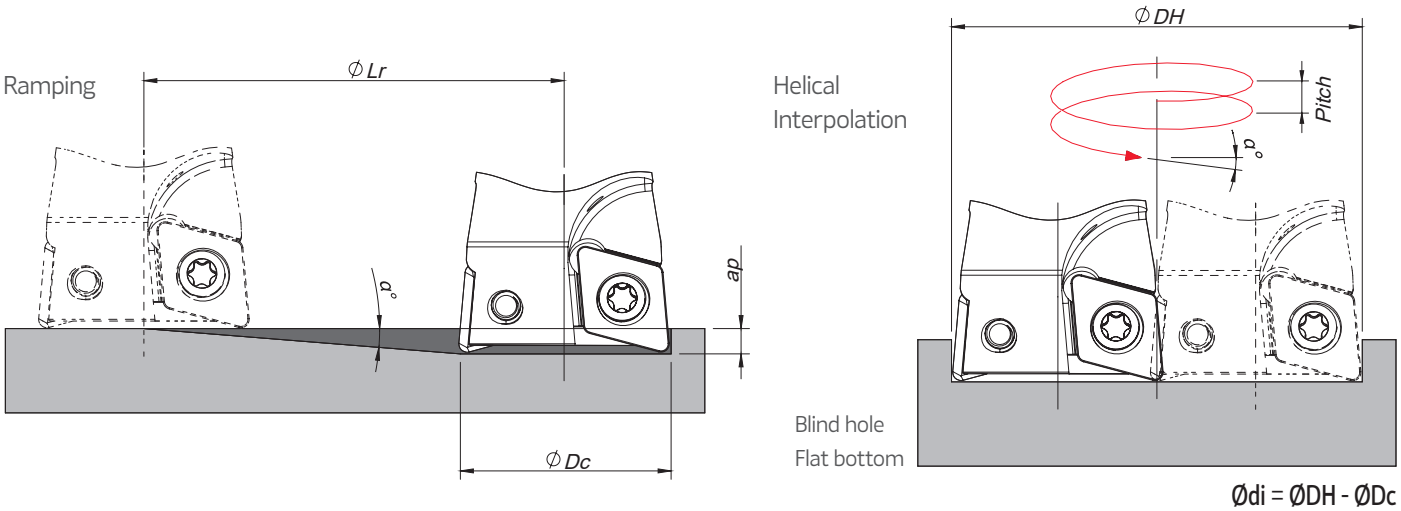
| Insert   | Feed fz (mm/t) |           | ap Rec. |
|----------|----------------|-----------|---------|
|          | Roughing       | Finishing |         |
| XD... 04 | 0,10-0,20      | 0,10-0,15 | 0,1-0,5 |
| XD... 06 | 0,15-0,30      | 0,10-0,25 | 0,2-0,8 |
| XD... 10 | 0,15-0,35      | 0,10-0,30 | 0,2-0,8 |

(Note 1) Cutting conditions should be adjusted according to the machine and work rigidity.  
(Note 2) If chattering occurs, reduce ap and Vc by 30% and keep the same fz per tooth.



RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular



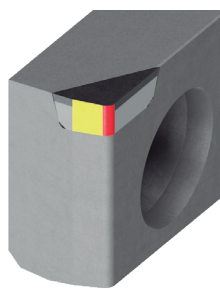
| Insert     | $\phi Dc$ | Ramping                 |          |          | Helical Interpolation |                 |                |
|------------|-----------|-------------------------|----------|----------|-----------------------|-----------------|----------------|
|            |           | Max Ramp $\alpha^\circ$ | Max $ap$ | Min $Lr$ | $\phi DH_{min}$       | $\phi DH_{max}$ | Max Pitch/Rev. |
| XDHW 04... | 10        | 7,3                     | 0,8      | 6,2      | 18,0<br>-             | -<br>20,0       | 3,2<br>4,0     |
|            | 12        | 5,3                     | 0,8      | 8,6      | 22,0<br>-             | -<br>24,0       | 2,9<br>3,5     |
| XDHW 06... | 16        | 8                       | 1,0      | 7,1      | 30,0<br>-             | -<br>32,0       | 6,2<br>7,1     |
|            | 20        | 5,7                     | 1,0      | 10,0     | 38,0<br>-             | -<br>40,0       | 5,6<br>6,3     |
|            | 25        | 4                       | 1,0      | 14,3     | 48,0<br>-             | -<br>50,0       | 5,1<br>5,5     |
| XDHW 10... | 25        | 8,7                     | 1,0      | 6,5      | 48,0<br>-             | -<br>50,0       | 11,1<br>12,0   |
|            | 35        | 5,2                     | 1,0      | 11,0     | 68,0<br>-             | -<br>70,0       | 9,4<br>10,0    |
|            | 42        | 4                       | 1,0      | 14,3     | 82,0<br>-             | -<br>84,0       | 8,8<br>9,2     |
|            | 52        | 3                       | 1,0      | 19,1     | 102,0<br>-            | -<br>104,0      | 8,2<br>8,6     |
|            | 66        | 2,3                     | 1,0      | 24,9     | 130,0<br>-            | -<br>132,0      | 8,1<br>8,3     |
|            | 80        | 1,8                     | 1,0      | 31,8     | 158,0<br>-            | -<br>160,0      | 7,7<br>7,9     |

Note: During helical interpolation do not exceed max Pitch.

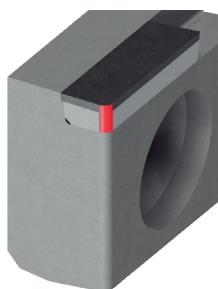
# HARDMILL 72090

INSERTS CODIFICATION SYSTEM | Sistema de codificação de pastilhas | Sistema de codificación de insertos

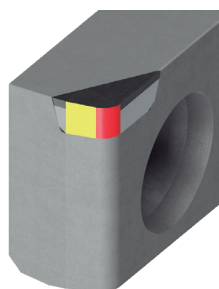
| ISO CODE | Insert size | Insert thickness | Insert radius | Cutting edge position angle | Cutting edge relief angle | Cutting edge conditions | Cut direction |   | Wiper edge lenght | Máx. Ap |
|----------|-------------|------------------|---------------|-----------------------------|---------------------------|-------------------------|---------------|---|-------------------|---------|
| XNHW     | 12          | 05               | 04            | P                           | Z                         | F                       | R             | - | 015               | 030     |



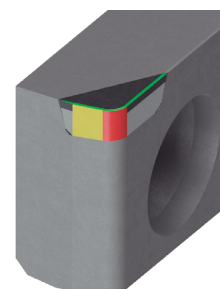
XNHW 120504 PZFR-0150045



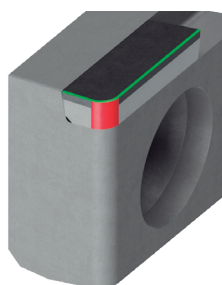
XNHW 120504 PZFR-000080



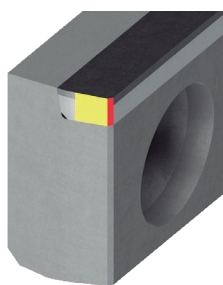
XNHW 120508 PZFR-015045



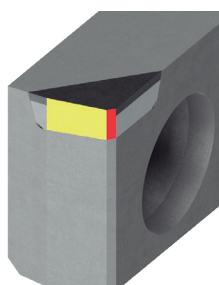
XNHW 120508 PZTR-015045



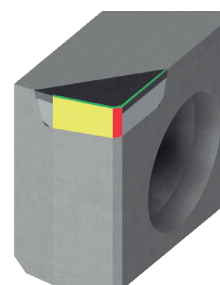
XNHW 120508 PZTR-000080



XNHW 1205 PZFR-020120



XNHW 1205 PZFR-030045



XNHW 1205 PZTR-030045

■ Cutting edge Type (radius, chamfer)

■ Wiper cutting edge

■ Edge Preparation (F, T)

A

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

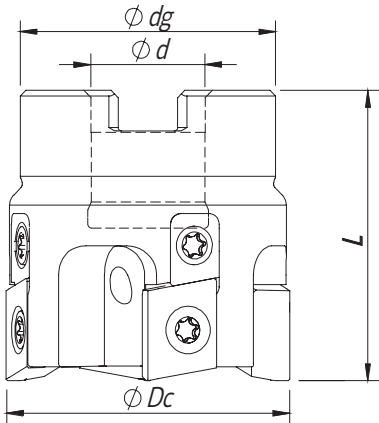
Technical Data

End Mills

# HARDMILL 72090



Arbor Mounting  
 $K_r=90^\circ \mid \gamma_p=0^\circ$



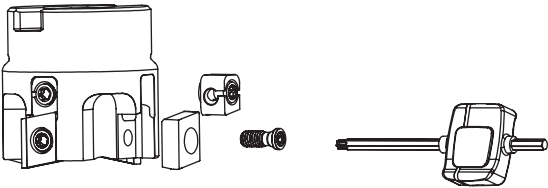
| Order code<br>Código | Reference<br>Referência<br>Referencia |    | Dimensions   Dimensões   Dimensiones (mm) |          |           |    | Kg   | Specifications |               | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|----|-------------------------------------------|----------|-----------|----|------|----------------|---------------|-------------------------------|-------|
|                      |                                       |    | $\phi Dc$                                 | $\phi d$ | $\phi dg$ | L  |      | Arbor<br>Type  | N max<br>(mm) |                               |       |
| 181129700            | 040A72090-04-016040                   | 4  | 40                                        | 16       | 36        | 40 | 0,32 | A              | 32 000        | XNHW 1205...                  |       |
| 181129800            | 050A72090-04-022040                   | 4  | 50                                        | 22       | 46        | 40 | 0,38 | A              | 32 000        | XNHW 1205...                  |       |
| 181129900            | 050A72090-05-022040                   | 5  | 50                                        | 22       | 46        | 40 | 0,37 | A              | 32 000        | XNHW 1205...                  |       |
| 181130000            | 063A72090-04-022040                   | 4  | 63                                        | 22       | 49        | 40 | 0,65 | A              | 29 000        | XNHW 1205...                  |       |
| 181130100            | 063A72090-07-022040                   | 7  | 63                                        | 22       | 49        | 40 | 0,62 | A              | 29 000        | XNHW 1205...                  |       |
| 181130200            | 080A72090-05-027050                   | 5  | 80                                        | 27       | 60        | 50 | 1,25 | A              | 26 000        | XNHW 1205...                  |       |
| 181130300            | 080A72090-09-027050                   | 9  | 80                                        | 27       | 60        | 50 | 1,17 | A              | 26 000        | XNHW 1205...                  |       |
| 181130400            | 100A72090-06-032050                   | 6  | 100                                       | 32       | 70        | 50 | 1,93 | A              | 24 000        | XNHW 1205...                  |       |
| 181130500            | 100A72090-12-032050                   | 12 | 100                                       | 32       | 70        | 50 | 1,80 | A              | 24 000        | XNHW 1205...                  |       |
| 181130600            | 125A72090-08-040063                   | 8  | 125                                       | 40       | 72        | 63 | 2,88 | A              | 22 000        | XNHW 1205...                  |       |
| 181130700            | 125A72090-14-040063                   | 14 | 125                                       | 40       | 72        | 63 | 2,60 | A              | 22 000        | XNHW 1205...                  |       |
| 181135500            | 160A72090-10-040063                   | 10 | 160                                       | 40       | 72        | 63 | 3,30 | A              | 18 000        | XNHW 1205...                  |       |
| 181135600            | 160A72090-16-040063                   | 16 | 160                                       | 40       | 118       | 63 | 5,45 | A              | 18 000        | XNHW 1205...                  |       |

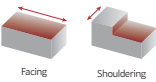
Stock item | Produto de stock | Itens de stock      Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

## SPARE PARTS | Complementos | Repuestos

| Cutter<br>$\phi Dc$ | Insert Screw | Key (Torx) | Key<br>(Torx - Nm) | Torque Value | Wedge           |
|---------------------|--------------|------------|--------------------|--------------|-----------------|
|                     |              |            |                    |              |                 |
| A72090 - 40-160     | P0401100     | XT15       | DT1530             | 3,00         | SETDEV AS 04 00 |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.





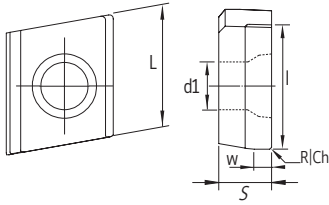
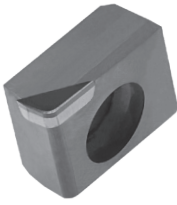
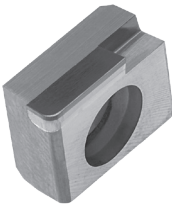
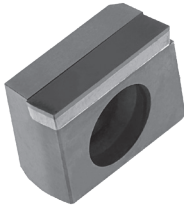
XNHW 1205... || Inserts | Pastilhas | Plaquitas

XNHW 1205 PZFR-020120

XNHW 120508 PZTR-000080

XNHW 120508 PZTR-015045

XNHW



|                                    |                         | N                         |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |       |      |      |      |
|------------------------------------|-------------------------|---------------------------|--------|------------------------------------------------|------|-------|------|------|------|
|                                    |                         | PCD                       |        |                                                |      |       |      |      |      |
|                                    |                         | <sup>(2)</sup> Grade code | I3     |                                                |      |       |      |      |      |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference        | PDP403                    | PDP410 | L                                              | S    | l     | d1   | r    | W    |
| 1112564                            | XNHW 120504 PZFR-015045 | ○                         | ○      | 12,25                                          | 5,40 | 4,50  | 4,80 | 0,40 | 1,50 |
| 1112565                            | XNHW 120504 PZFR-000080 | ○                         | ○      | 12,25                                          | 5,40 | 8,00  | 4,80 | 0,40 | -    |
| 1112566                            | XNHW 120508 PZFR-015045 | ⊗                         | ○      | 12,25                                          | 5,40 | 4,50  | 4,80 | 0,80 | 1,50 |
| 1112551                            | XNHW 120508 PZTR-015045 | ⊗                         | ○      | 12,25                                          | 5,40 | 4,50  | 4,80 | 0,80 | 1,50 |
| 1112552                            | XNHW 120508 PZTR-000080 | ⊗                         | ○      | 12,25                                          | 5,40 | 8,00  | 4,80 | 0,80 | -    |
| 1112553                            | XNHW 1205 PZFR-020120   | ⊗                         | ○      | 12,25                                          | 5,40 | 12,00 | 4,80 | -    | 2,00 |
| 1112567                            | XNHW 1205 PZFR-030045   | ○                         | ○      | 12,25                                          | 5,40 | 4,50  | 4,80 | -    | 3,00 |
| 1112568                            | XNHW 1205 PZTR-030045   | ○                         | ○      | 12,25                                          | 5,40 | 4,50  | 4,80 | -    | 3,00 |

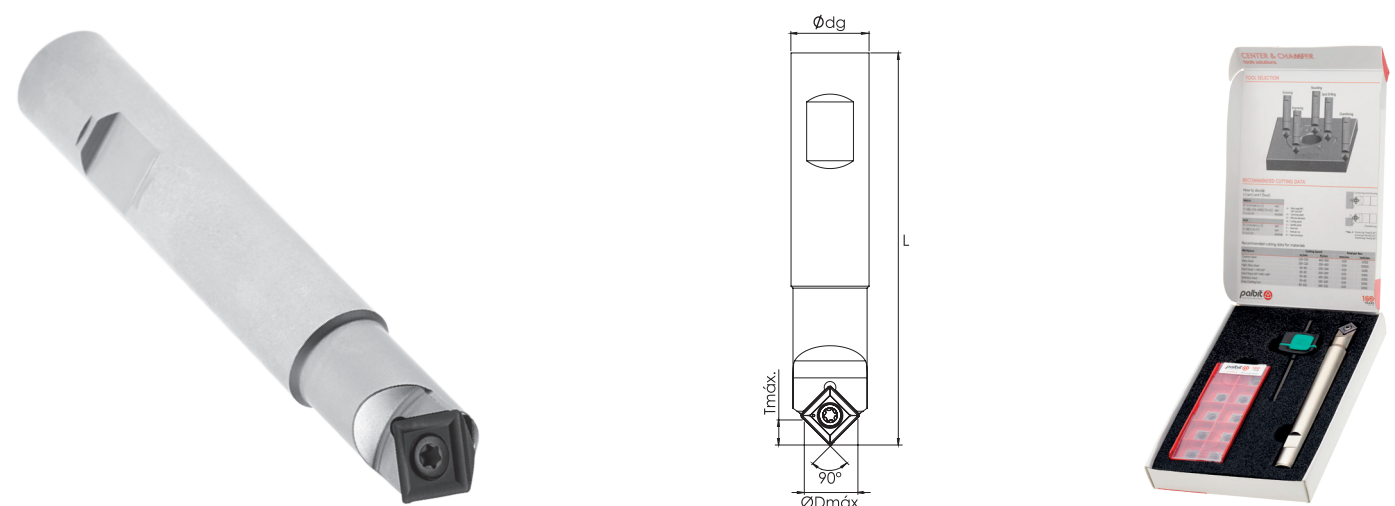
⊗ First choice | Primeira opção | 1ª opción    ⊗ Stock item | Produto de stock | Itens de stock    ○ Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire página A-9)    Insert order code = (1) Geometry Code + (2) Grade Code

RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | Material                 |                                          | HB<br>(Brinell) | Vc (m/min) | Feed fz (mm/t) |
|-----|--------------------------|------------------------------------------|-----------------|------------|----------------|
|     | Work piece material      | Type of treatment / alloy                |                 | PDP403     | XNHW 12...     |
| N   | Aluminium wrought alloys |                                          | 80              | 300 - 4000 | 0,05 - 0,40    |
|     |                          |                                          | 90              | 300 - 1500 |                |
|     | Aluminium cast alloys    | < 12% Si                                 | 130             | 300 - 5000 |                |
|     |                          | < 12% Si                                 | 90              | 300 - 3000 |                |
|     |                          | > 12% Si                                 | 100             | 300 - 1000 |                |
|     |                          | brass, red bronze                        | 100             | 100 - 700  |                |
|     | Non-metallic materials   | bronze                                   | -               | 100 - 1500 |                |
|     |                          | lead-free copper and electrolytic copper | -               | 300 - 3000 |                |
|     |                          | thermosetting plastics                   | -               | 80 - 300   |                |
|     |                          | fibre-reinforced plastics                | 200-320         | 80 - 300   |                |
|     |                          | hard rubber                              |                 | 80 - 300   |                |



CENTER & CHAMFER



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |       |       |     |     |         | Kg    | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-------|-------|-----|-----|---------|-------|-------------------------------|-------|
|                      |                                       |   | ØDmax.                                    | Tmax. | Tmix. | Ødg | L   | Angle ° |       |                               |       |
| 181147400            | CHT S16H N11-45                       | 1 | 13                                        | 6,5   | 1,0   | 16  | 100 | 45      | 0,146 | SO..T 11T3..                  |       |
| 181147500            | CHT S16M N11-45                       | 1 | 13                                        | 6,5   | 1,0   | 16  | 150 | 45      | 0,180 | SO..T 11T3..                  |       |

| Order code<br>Código | Designation<br>Designação<br>Designación | Nº<br>Toolholder | Holder designation |  | Nº<br>inserts | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|------------------------------------------|------------------|--------------------|--|---------------|-------------------------------|-------|
| 1410286G4            | PK SOMT 11T308 CHTS16H                   | 1                | CHT S16H N11-45    |  | 10            | SOMT 11T308                   |       |
| 1410287G4            | PK SOMT 11T308 CHTS16M                   | 1                | CHT S16M N11-45    |  | 10            | SOMT 11T308                   |       |
| 1410314G4            | PK SOGT 11T308 CHTS16H                   | 1                | CHT S16H N11-45    |  | 10            | SOGT 11T303                   |       |
| 1410315G4            | PK SOGT 11T308 CHTS16M                   | 1                | CHT S16M N11-45    |  | 10            | SOGT 11T303                   |       |

Stock item | Produto de stock | Itens de stock

Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

SO...T 11T3.. | Inserts | Pastilhas | Plaquetas



|                                 |                  | P                                                                                   | M                                                                                   | K                                                                                   | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |       |        |
|---------------------------------|------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------|------|-------|--------|
|                                 |                  | PVD                                                                                 | PVD                                                                                 | PVD                                                                                 |                                                |      |       |        |
|                                 |                  | <sup>(2)</sup> Grade code                                                           | G4                                                                                  | G4                                                                                  |                                                |      |       |        |
| <sup>(1)</sup><br>Geometry code | ISO<br>Reference | PH7920                                                                              | PH7920                                                                              | PH7920                                                                              | iC                                             | S    | l     | r      |
| 1112425                         | SOMT 11T308      |  |  |  | 10,87                                          | 3,97 | 11,00 | 0,80   |
| 1112973                         | SOGT 11T303      |  |  |  | 10,87                                          | 3,97 | 11,00 | (0,30) |

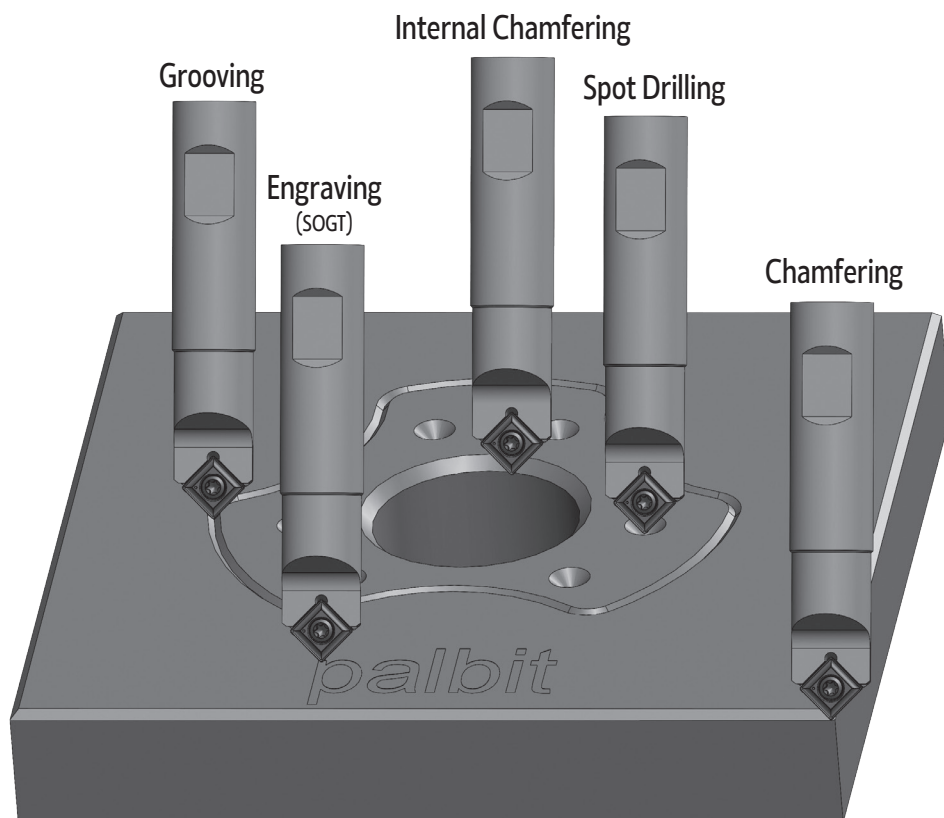
First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

Insert order code = (1) Geometry Code + (2) Grade Code

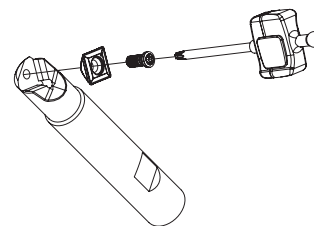
## TOOL SELECTION || Seleccão de ferramenta | Selección de herramienta



## SPARE PARTS || Complementos | Repuestos

| Cutter<br>ØDc | Order separately |            |                    |              |
|---------------|------------------|------------|--------------------|--------------|
|               | Insert Screw     | Key (Torx) | Key<br>(Torx - Nm) | Torque Value |
| CHT S16...    | P0350800         | XT15       | DT1530             | 3,0          |

Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.



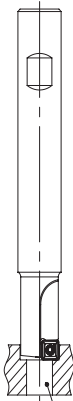
## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min) | Feed fz (mm/t) |             |
|-----|-----|-----------------------------------|-----------------|------------|----------------|-------------|
|     |     |                                   |                 | PH7920     | SOMT 11T308    | SOGT 11T303 |
| P   | 1   | Unalloyed Steel                   | 125-220         | 120-150    | 0,04-0,08      | 0,05-0,10   |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 100-120    | 0,03-0,07      | 0,05-0,10   |
|     | 3   | High-Alloyed Steel                | 280-380         | 60-100     | 0,03-0,06      | 0,04-0,08   |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | 100-150    | 0,04-0,07      | 0,03-0,06   |
|     | 5   | SS - Austenitic                   | 200-330         | 80-120     | 0,03-0,06      | 0,03-0,06   |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | 50-90      | 0,03-0,06      | 0,03-0,08   |
| K   | 7   | Malleable Cast Iron               | 130-230         | 90-150     | 0,05-0,10      | 0,05-0,10   |
|     | 8   | Grey Cast Iron                    | 180-245         | 80-120     | 0,05-0,08      | 0,05-0,08   |
|     | 9   | Nodular Cast iron                 | 160-250         | 70-110     | 0,04-0,08      | 0,04-0,08   |

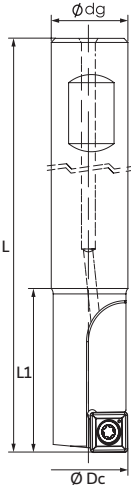




SPOT FACE



Note: Hole previously drilled



| Order code<br>Código | Reference<br>Referência<br>Referencia |   | Dimensions   Dimensões   Dimensiones (mm) |     |     |    | Kg    | Insert<br>Pastilha<br>Inserto | Stock |
|----------------------|---------------------------------------|---|-------------------------------------------|-----|-----|----|-------|-------------------------------|-------|
|                      |                                       |   | ØDc                                       | Ødg | L   | L1 |       |                               |       |
| 181150100            | SP91 D10-W10/100-01-05                | 1 | 10                                        | 10  | 100 | 30 | 0,048 | SPKX 05T104                   |       |
| 181150200            | SP91 D11-W12/100-01-05                | 1 | 11                                        | 12  | 100 | 30 | 0,070 | SPKX 05T104                   |       |
| 181150300            | SP91 D13-W16/100-01-06                | 1 | 13                                        | 16  | 100 | 30 | 0,116 | SPKX 060204                   |       |
| 181150400            | SP91 D14-W16/120-01-06                | 1 | 14                                        | 16  | 120 | 30 | 0,123 | SPKX 060204                   |       |
| 181150500            | SP91 D17-W20/120-01-07                | 1 | 17                                        | 20  | 120 | 35 | 0,224 | SPKX 070308                   |       |
| 181150600            | SP91 D18-W20/140-01-07                | 1 | 18                                        | 20  | 140 | 35 | 0,272 | SPKX 070308                   |       |
| 181150700            | SP91 D20-W20/140-01-09                | 1 | 20                                        | 20  | 140 | 40 | 0,303 | SPKX 090308                   |       |
| 181150800            | SP91 D21-W25/150-01-09                | 1 | 21                                        | 25  | 150 | 40 | 0,449 | SPKX 090308                   |       |
| 181150900            | SP91 D25-W25/150-01-11                | 1 | 25                                        | 25  | 150 | 40 | 0,473 | SPKX 110408                   |       |

Stock item | Produto de stock | Itens de stock

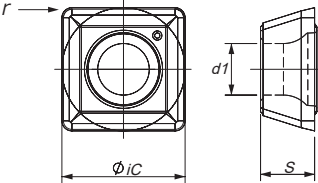
Available under request (see page A-8) | Disponível sobre consulta (consulte a página A-8) | Disponible bajo consulta (mire pagina A-8)

SPKX | Inserts | Pastilhas | Plaquitas



(PHC grade)

SPKX



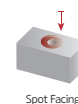
|                                    |                  | P                         |        |        | M      |        |        | K      |        |        | Dimensions<br>Dimensões<br>Dimensiones<br>(mm) |      |      |      |
|------------------------------------|------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|------------------------------------------------|------|------|------|
|                                    |                  | PVD                       |        |        | PVD    |        |        | PVD    |        |        |                                                |      |      |      |
|                                    |                  | <sup>(2)</sup> Grade code | 68     | 66     | J3     | 68     | 66     | J3     | 68     | 66     |                                                |      |      |      |
| <sup>(1)</sup><br>Geometry<br>code | ISO<br>Reference | PH6920                    | PH6930 | PHC930 | PH6920 | PH6930 | PHC930 | PH6920 | PH6930 | PHC930 | IC                                             | S    | d1   | r    |
| 1111635                            | SPKX 05T104      |                           |        |        |        |        |        |        |        |        | 5,00                                           | 1,98 | 2,20 | 0,40 |
| 1111282                            | SPKX 060204      |                           |        |        |        |        |        |        |        |        | 6,00                                           | 2,38 | 2,55 | 0,80 |
| 1111636                            | SPKX 070308      |                           |        |        |        |        |        |        |        |        | 7,94                                           | 3,18 | 2,85 | 0,80 |
| 1111637                            | SPKX 090308      |                           |        |        |        |        |        |        |        |        | 9,80                                           | 3,18 | 4,10 | 0,80 |
| 1111285                            | SPKX 110408      |                           |        |        |        |        |        |        |        |        | 11,50                                          | 4,80 | 4,40 | 0,80 |

First choice | Primeira opção | 1ª opción

Stock item | Produto de stock | Itens de stock

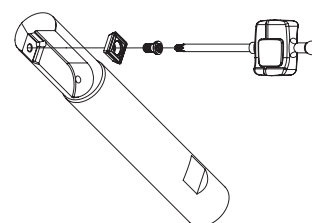
Available under request (see page A-9) | Disponível sobre consulta (consulte a página A-9) | Disponible bajo consulta (mire pagina A-9)

Insert order code = (1) Geometry Code + (2) Grade Code



## SPARE PARTS | Complementos | Repuestos

| Cutter<br>ØDc | Insert Screw | Key (Torx) | Order separately   |              |
|---------------|--------------|------------|--------------------|--------------|
|               |              |            | Key<br>(Torx - Nm) | Torque Value |
| 10-11         | P0200400     | XT06       | DT0606             | 0,6          |
| 13-14         | P0220500     | XT07       | DT0709             | 0,9          |
| 17-18         | P0250704     | XT08       | DT0812             | 1,2          |
| 20-21         | P0350702     | XT15       | DT1530             | 3,0          |
| 25            | P0400900     | XT15       | DT1530             | 3,0          |



Note: The toolholder is supplied with the XT/PT key. To order the DT key please check the page A-241.  
Check the procedures for the clamping screws on the page A-241.

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | PSM | Material                          | HB<br>(Brinell) | Grades            |        |             |
|-----|-----|-----------------------------------|-----------------|-------------------|--------|-------------|
|     |     |                                   |                 | ← Wear Resistance |        | Toughness → |
|     |     |                                   |                 | PH6920            | PH6930 | PHC930      |
| P   | 1   | Unalloyed Steel                   | 125-220         | ✓                 | ✓      | ✓           |
|     | 2   | Low-Alloyed Steel                 | 220-280         | ✓                 | ✓      | ✓           |
|     | 3   | High-Alloyed Steel                | 280-380         | ✓                 | ✓      | ✓           |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | ✓                 | ✓      | ✓           |
|     | 5   | SS - Austenitic                   | 200-330         | ✓                 | ✓      | ✓           |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | ✓                 | ✓      | ✓           |
| K   | 8   | Grey Cast Iron                    | 180-245         | ✓                 | ✓      | ✓           |
|     | 9   | Nodular Cast iron                 | 160-250         | ✓                 | ✓      | ✓           |



## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

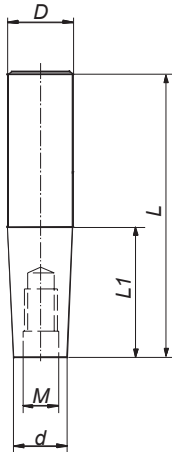
| ISO | PSM | Material                          | HB<br>(Brinell) | Vc (m/min)        |         |             |
|-----|-----|-----------------------------------|-----------------|-------------------|---------|-------------|
|     |     |                                   |                 | ← Wear Resistance |         | Toughness → |
|     |     |                                   |                 | PH6920            | PH6930  | PHC930      |
| P   | 1   | Unalloyed Steel                   | 125-220         | 180-250           | 160-240 | 160-240     |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 160-220           | 140-200 | 140-200     |
|     | 3   | High-Alloyed Steel                | 280-380         | 130-180           | 110-160 | 110-160     |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | 170-230           | 140-210 | 140-210     |
|     | 5   | SS - Austenitic                   | 200-330         | 160-200           | 130-200 | 130-200     |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | 140-180           | 120-190 | 120-190     |
| K   | 8   | Grey Cast Iron                    | 180-245         | 180-250           | 150-220 | 150-220     |
|     | 9   | Nodular Cast iron                 | 160-250         | 130-200           | 110-180 | 110-180     |

| ISO | PSM | Material                          | HB<br>(Brinell) | Feed fz (mm/t) |            |            |            |            |
|-----|-----|-----------------------------------|-----------------|----------------|------------|------------|------------|------------|
|     |     |                                   |                 |                |            |            |            |            |
|     |     |                                   |                 | SPKX 05...     | SPKX 06... | SPKX 07... | SPKX 09... | SPKX 11... |
| P   | 1   | Unalloyed Steel                   | 125-220         | 0,05-0,08      | 0,06-0,10  | 0,06-0,12  | 0,07-0,13  | 0,08-0,15  |
|     | 2   | Low-Alloyed Steel                 | 220-280         | 0,06-0,12      | 0,08-0,15  | 0,10-0,18  | 0,12-0,22  | 0,12-0,25  |
|     | 3   | High-Alloyed Steel                | 280-380         | 0,06-0,10      | 0,08-0,15  | 0,10-0,20  | 0,12-0,23  | 0,12-0,26  |
| M   | 4   | SS - Ferritic / Martensitic       | 200-330         | 0,05-0,10      | 0,06-0,12  | 0,08-0,15  | 0,09-0,16  | 0,10-0,20  |
|     | 5   | SS - Austenitic                   | 200-330         | 0,04-0,08      | 0,05-0,10  | 0,06-0,12  | 0,07-0,13  | 0,08-0,18  |
|     | 6   | SS - Austenitic-ferritic (Duplex) | 230-260         | 0,04-0,08      | 0,05-0,11  | 0,06-0,13  | 0,07-0,14  | 0,08-0,19  |
| K   | 8   | Grey Cast Iron                    | 180-245         | 0,06-0,12      | 0,08-0,16  | 0,12-0,20  | 0,15-0,25  | 0,15-0,30  |
|     | 9   | Nodular Cast iron                 | 160-250         | 0,06-0,10      | 0,08-0,15  | 0,10-0,18  | 0,12-0,20  | 0,15-0,25  |

# SPARE PARTS

A

## MULTIFIT DENSIMET ANTI-VIBRATION | Shank | Adaptador | Fijación



| order code | Reference                   | Dimensions (mm) |     |     |      |     | Stock |
|------------|-----------------------------|-----------------|-----|-----|------|-----|-------|
|            |                             | D               | L1  | L   | d    | M   |       |
| 1191008A0  | AC-RI-D12-M06-L040-AV       | 12              | 40  | 90  | 9,8  | M6  | ⊗     |
| 1191009A0  | AC-RI-D12-M06-L060-AV       | 12              | 60  | 110 | 9,8  | M6  | ⊗     |
| 1191021A0  | AC-RI-D12-M06-L080-AV       | 12              | 80  | 130 | 9,8  | M6  | ⊗     |
| 1191010A0  | AC-RI-D16-M08-L040-AV       | 16              | 40  | 95  | 12,8 | M8  | ⊗     |
| 1191011A0  | AC-RI-D16-M08-L060-AV       | 16              | 60  | 115 | 12,8 | M8  | ⊗     |
| 1191012A0  | AC-RI-D16-M08-L080-AV       | 16              | 80  | 135 | 12,8 | M8  | ⊗     |
| 1191013A0  | AC-RI-D16-M08-L100-AV       | 16              | 100 | 155 | 12,8 | M8  | ⊗     |
| 1191022A0  | AC-RI-D16-M08-L120-AV       | 16              | 120 | 175 | 12,8 | M8  | ⊗     |
| 1191014A0  | AC-RI-D20-M10-L040-AV       | 20              | 40  | 100 | 15,8 | M10 | ⊗     |
| 1191015A0  | AC-RI-D20-M10-L060-AV       | 20              | 60  | 120 | 15,8 | M10 | ⊗     |
| 1191016A0  | AC-RI-D20-M10-L080-AV       | 20              | 80  | 140 | 15,8 | M10 | ○     |
| 1191017A0  | AC-RI-D20-M10-L100-AV       | 20              | 100 | 160 | 15,8 | M10 | ○     |
| 1191018A0  | AC-RI-D20-M10-L120-AV       | 20              | 120 | 180 | 15,8 | M10 | ○     |
| 1191026A0  | AC-RI-D20-M10-L080-D17,8-AV | 20              | 80  | 140 | 17,8 | M10 | ⊗     |
| 1191027A0  | AC-RI-D20-M10-L100-D17,8-AV | 20              | 100 | 160 | 17,8 | M10 | ⊗     |
| 1191028A0  | AC-RI-D20-M10-L120-D17,8-AV | 20              | 120 | 180 | 17,8 | M10 | ⊗     |
| 1191023A0  | AC-RI-D25-M12-L060-AV       | 25              | 60  | 125 | 20,8 | M12 | ⊗     |
| 1191024A0  | AC-RI-D25-M12-L080-AV       | 25              | 80  | 145 | 20,8 | M12 | ⊗     |
| 1191025A0  | AC-RI-D25-M12-L100-AV       | 25              | 100 | 165 | 20,8 | M12 | ⊗     |

⊗ Stock item | Produto de stock | Itens de stock      ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

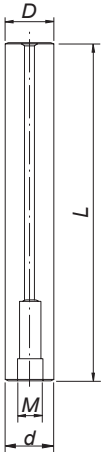
Spot face

Spare Parts

Technical Data

End Mills

MULTIFIT CARBIDE ANTI-VIBRATION | Shank | Adaptador | Fijación



| order code | Reference             | Dimensions (mm) |     |    |     | Stock |
|------------|-----------------------|-----------------|-----|----|-----|-------|
|            |                       | D               | L   | d  | M   |       |
| 219102600  | AC-RI-D12-M06-L100-HW | 12              | 100 | 12 | M6  | ⊗     |
| 219102700  | AC-RI-D12-M06-L150-HW | 12              | 150 | 12 | M6  | ⊗     |
| 219102800  | AC-RI-D16-M08-L100-HW | 16              | 100 | 16 | M8  | ⊗     |
| 219102900  | AC-RI-D16-M08-L150-HW | 16              | 150 | 16 | M8  | ⊗     |
| 219103000  | AC-RI-D20-M10-L150-HW | 20              | 150 | 20 | M10 | ⊗     |
| 219103100  | AC-RI-D20-M10-L200-HW | 20              | 200 | 20 | M10 | ⊗     |
| 219103200  | AC-RI-D25-M12-L150-HW | 25              | 150 | 25 | M12 | ⊗     |
| 219103300  | AC-RI-D25-M12-L200-HW | 25              | 200 | 25 | M12 | ⊗     |
| 219103400  | AC-RI-D32-M16-L250-HW | 32              | 250 | 32 | M16 | ⊗     |

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request | Disponível sobre consulta | Disponible bajo consulta

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

Technical Data

End Mills

# SPARE PARTS

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

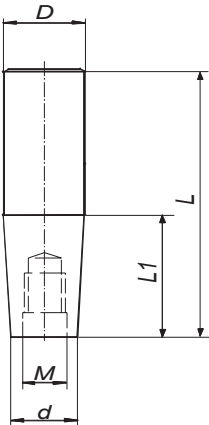
Spot face

Spare Parts

Technical Data

End Mills

## MULTIFIT CYLINDRICAL IN STEEL || Shank | Adaptador | Fijación

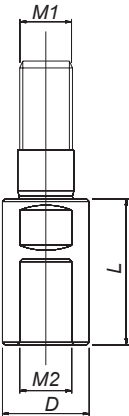


| order code | Reference          | Dimensions (mm) |    |     |      |     | Stock |
|------------|--------------------|-----------------|----|-----|------|-----|-------|
|            |                    | D               | L1 | L   | d    | M   |       |
| 229000500  | AC-RI-D12-M06-L020 | 12              | 20 | 65  | 9,8  | M6  |       |
| 229000600  | AC-RI-D16-M08-L040 | 16              | 40 | 88  | 12,8 | M8  |       |
| 229000700  | AC-RI-D20-M10-L045 | 20              | 45 | 95  | 17,8 | M10 |       |
| 229000800  | AC-RI-D25-M12-L050 | 25              | 50 | 106 | 20,8 | M12 |       |
| 229000900  | AC-RI-D32-M16-L050 | 32              | 50 | 110 | 28,8 | M16 |       |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

## MULTIFIT EXTENSIONS FOR THREADED TYPE CUTTER || Shank | Adaptador | Fijación

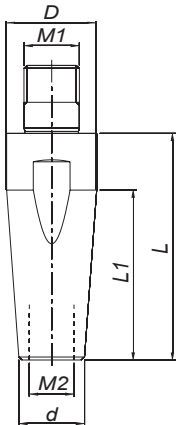


| order code | Reference       | Dimensions (mm) |     |     |    | Stock |
|------------|-----------------|-----------------|-----|-----|----|-------|
|            |                 | D               | M1  | M2  | L  |       |
| 229003200  | AL-M08-L040-M08 | 13,8            | M8  | M8  | 40 |       |
| 229003600  | AL-M10-L060-M10 | 18,0            | M10 | M10 | 60 |       |
| 229003700  | AL-M12-L060-M12 | 21,0            | M12 | M12 | 60 |       |
| 229003100  | AL-M16-L060-M16 | 29,0            | M16 | M16 | 60 |       |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

MULTIFIT REDUCERS FOR THREADED TYPE CUTTER || Shank | Adaptador | Fijación



| order code | Reference       | Dimensions (mm) |     |      |      |    |    | Stock |
|------------|-----------------|-----------------|-----|------|------|----|----|-------|
|            |                 | M1              | M2  | D    | d    | L  | L1 |       |
| 229012100  | AL-M08-L040-M06 | M8              | M6  | 13,8 | 10,0 | 40 | 25 |       |
| 229012200  | AL-M10-L040-M08 | M10             | M8  | 18,0 | 13,8 | 40 | 25 |       |
| 229012300  | AL-M12-L040-M10 | M12             | M10 | 21,0 | 18,0 | 40 | 15 |       |
| 229012400  | AL-M16-L040-M12 | M16             | M12 | 29,0 | 21,0 | 40 | 19 |       |

Stock item | Produto de stock | Itens de stock Available under request | Disponível sobre consulta | Disponible bajo consulta

A

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

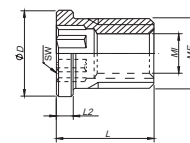
Technical Data

End Mills

# SPARE PARTS

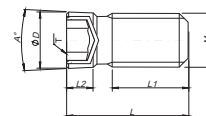
A

## SHIM SCREW



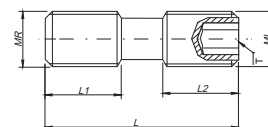
| order code | Screw    | Dimensions (mm) |            |            |     |   |     |
|------------|----------|-----------------|------------|------------|-----|---|-----|
|            |          | SW              | MI         | ME         | ØD  | L | L2  |
| 290030400  | T0503509 | 3,5             | M3,5 x 0,6 | M5,0 x 0,5 | 6,3 | 7 | 1,2 |

## ADJUSTMENT SCREW



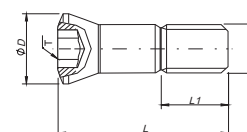
| order code | Screw    | T (torx) | Dimensions (mm) |     |    |      |     |     |
|------------|----------|----------|-----------------|-----|----|------|-----|-----|
|            |          |          | M               | ØD  | A° | L    | L1  | L2  |
| 290051500  | F0601441 | T-20     | M6 x 1,0        | 6,3 | 5° | 13,6 | 8,5 | 3,2 |

## DIFFERENTIAL SCREW



| order code | Screw    | T (torx) | Dimensions (mm) |           |    |     |     |
|------------|----------|----------|-----------------|-----------|----|-----|-----|
|            |          |          | MR              | ML        | L  | L1  | L2  |
| 290016300  | F0701800 | T-20     | M7 x 0,75       | M7 x 0,75 | 18 | 7,5 | 7,5 |

## INSERT SCREW



| order code | Screw    | T (torx) | Dimensions (mm) |      |      |     |
|------------|----------|----------|-----------------|------|------|-----|
|            |          |          | M               | ØD   | L    | L1  |
| 290013900  | P0400925 | T-15     | M4 x 0,5        | 5,80 | 8,6  | 3,5 |
| 290010600  | P0500925 | T-20     | M5 x 0,5        | 6,70 | 9,5  | 3,4 |
| 290014400  | P0501325 | T-20     | M5 x 0,5        | 7,50 | 12,8 | 4,5 |
| 290014000  | P0501525 | T-20     | M5 x 0,5        | 7,50 | 15,5 | 4,5 |

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

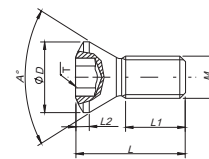
Spare Parts

Technical Data

End Mills



## INSERT SCREW

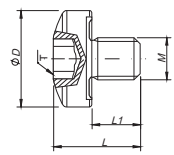


| order code | Screw    | T (torx) | Dimensions (mm) |      |     |      |     |     |
|------------|----------|----------|-----------------|------|-----|------|-----|-----|
|            |          |          | M               | ØD   | A°  | L    | L1  | L2  |
| 290078800  | P0180300 | T-GIP    | M1,8 x 0,35     | 2,45 | 60° | 3,4  | 1,5 | 0,5 |
| 290058400  | P0180400 | T-GIP    | M1,8 x 0,35     | 2,45 | 60° | 3,7  | 1,8 | 0,5 |
| 290011300  | P0180401 | T-6      | M1,8 x 0,35     | 2,75 | 55° | 3,6  | 1,9 | 0,4 |
| 290031400  | P0200500 | T-6      | M2 x 0,4        | 2,80 | 60° | 4,7  | 2,9 | 0,6 |
| 290030600  | P0220500 | T-7      | M2,2 x 0,45     | 3,20 | 60° | 5,0  | 3,0 | 0,6 |
| 290033100  | P0250503 | T-8      | M2,5 x 0,45     | 3,45 | 60° | 5,5  | 2,8 | 0,7 |
| 290048900  | P0250601 | T-8      | M2,5 x 0,45     | 3,45 | 60° | 6,0  | 3,5 | 0,8 |
| 290013400  | P0250700 | T-8      | M2,5 x 0,45     | 3,3  | 55  | 7    | 4   | 0,8 |
| 290031300  | P0250704 | T-8      | M2,5 x 0,45     | 3,45 | 60° | 6,5  | 4,0 | 0,7 |
| 290009100  | P0300800 | T-9      | M3 x 0,5        | 4,4  | 60° | 7,4  | 4,2 | 0,8 |
| 290081700  | P0350702 | T-15     | M3,5            | 5,3  | 55  | 7    | 3,1 | 2   |
| 290019900  | P0350800 | T-15     | M3,5 x 0,6      | 5,5  | 60° | 7,7  | 3,7 | 1   |
| 290027100  | P0350902 | T-10     | M3,5 x 0,6      | 4,7  | 60° | 9    | 5,5 | 0,4 |
| 290030900  | P0350903 | T-15     | M3,5 x 0,6      | 5,45 | 60° | 9    | 6   | 0,6 |
| 290075200  | P0350904 | T-15     | M3,5 x 0,6      | 4,8  | 60° | 9    | 5   | 0,8 |
| 290005800  | P0351200 | T-15     | M3,5 x 0,6      | 5,30 | 60° | 12   | 8   | 1,4 |
| 119198800  | P0400803 | T-15     | M4 x 0,7        | 5,5  | 60° | 8    | 5,5 | 1   |
| 290048200  | P0400900 | T-15     | M4 x 0,7        | 5,5  | 60° | 9    | 5,5 | 1   |
| 290075600  | P0401065 | T-15     | M4 x 0,6        | 5,7  | 60  | 10   | 6   | 1   |
| 290007000  | P0401100 | T-15     | M4 x 0,7        | 5,3  | 55  | 11   | 8   | 2   |
| 290047500  | P0401200 | T-15     | M4 x 0,7        | 5,5  | 60° | 11   | 6   | 1,2 |
| 290026900  | P0451001 | T-20     | M4,5 x 0,75     | 6,6  | 55° | 10,5 | 5,5 | 1   |
| 290006700  | P0451400 | T-20     | M4,5 x 0,75     | 7,2  | 60° | 14   | 9   | 1   |
| 290017500  | P0501100 | T-20     | M5 x 0,8        | 6,4  | 43° | 11   | 5,9 | 0,5 |
| 290031700  | P0501300 | T-20     | M5 x 0,8        | 7    | 60° | 12,8 | 8   | 1,3 |
| 290078900  | P0501302 | T-20     | M5 x 0,5        | 7    | 60° | 13   | 8,2 | 0,8 |
| 290048300  | P0601402 | T-20     | M6 x 1,0        | 8,4  | 60° | 14   | 9   | 0,9 |

# SPARE PARTS

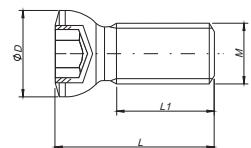
A

## ADJUSTMENT SCREW



| order code | Screw    | T (torx) | Dimensions (mm) |      |     |     |
|------------|----------|----------|-----------------|------|-----|-----|
|            |          |          | M               | ØD   | L   | L1  |
| 290014200  | P0350750 | T-15     | M3,5 x 0,6      | 8,00 | 7,2 | 4,0 |

## WASHER SCREW



| order code | Screw    | Dimensions (mm) |      |      |      |
|------------|----------|-----------------|------|------|------|
|            |          | M               | ØD   | L    | L1   |
| 290075600  | P0401065 | M4 x 0,6        | 5,7  | 10,0 | 6,0  |
| 290018500  | P0601265 | M6 x 1,0        | 9,00 | 12,4 | 6,5  |
| 290011000  | P0601765 | M6 x 1,0        | 9,00 | 17,0 | 11,0 |
| 290028400  | P0802265 | M8 x 1,25       | 11,0 | 22,0 | 15,0 |

## OTHERS

| Washer | Order Code | Reference |
|--------|------------|-----------|
|        | 119200900  | HC01200   |
|        | 290060200  | HC01400   |
|        | 290002900  | HC01800   |

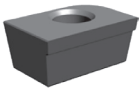
| Cartridge Screw | Order Code | Reference |
|-----------------|------------|-----------|
|                 | 119169600  | D0602096  |

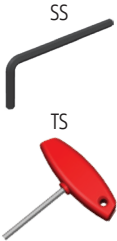
| Torx Keys | Order Code | Reference |
|-----------|------------|-----------|
|           | 290058600  | XT 06IP   |
|           | 290011400  | XT 06     |
|           | 290012900  | XT07      |
|           | 290011700  | XT 08     |
|           | 290025700  | XT 09     |
|           | 290013100  | XT 10     |
|           | 290012400  | XT 15     |
|           | 290013200  | XT 20     |
|           | 290014800  | PT 15     |
|           | 290014900  | PT 20     |
|           | 290056000  | TT 20     |
|           | 290059500  | LT 30     |

| Shim | Order Code | Reference |
|------|------------|-----------|
|      | 160022218  | CS130300  |
|      | 290060400  | CT160300  |
|      | 290060300  | CT220300  |

| Spring Pin | Order Code | Reference |
|------------|------------|-----------|
|            | 290060600  | BE02500   |
|            | 290060500  | BE04000   |

| Wedge (insert) | Order Code | Reference       |
|----------------|------------|-----------------|
|                | 290060900  | WA7001          |
|                | 290061100  | WA7003          |
|                | 119200100  | SETDEV AS 04 00 |

| Wedge (Cartridge)                                                                 | Order Code | Reference |
|-----------------------------------------------------------------------------------|------------|-----------|
|  | 290061000  | WA7002    |
|                                                                                   | 290061200  | WA7004    |

| Hex Key                                                                                       | Order Code | Reference |
|-----------------------------------------------------------------------------------------------|------------|-----------|
| <br>SS<br>TS | 290021200  | SS40      |
|                                                                                               | 290021300  | SS50      |
|                                                                                               | 290058700  | TS40      |

| Screw for Coolant Supply                                                                                                                                               | Order Code | Reference | M  | Ø Ext. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|----|--------|
|   | 119163000  | J0123510  | 12 | 37,9   |
|                                                                                                                                                                        | 119163100  | J0164110  | 16 | 45,0   |
|                                                                                                                                                                        | 119163200  | J0204610  | 20 | 54,8   |

| Tork Keys                                                                                | Order Code | Reference | Torx | Nm  |
|------------------------------------------------------------------------------------------|------------|-----------|------|-----|
| <br>Nm | 290078300  | DT0606IP  | 6IP  | 0,6 |
|                                                                                          | 290059600  | DT0606    | 6    | 0,6 |
|                                                                                          | 290059700  | DT0709    | 7    | 0,9 |
|                                                                                          | 290059800  | DT0812    | 8    | 1,2 |
|                                                                                          | 290059900  | DT0914    | 9    | 1,4 |
|                                                                                          | 290060000  | DT1020    | 10   | 2,0 |
|                                                                                          | 290047800  | DT1530    | 15   | 3,0 |
|                                                                                          | 290078400  | DT2050    | 20   | 5,0 |

| DIN 6368 Wrench                                                                    | Order Code | Reference |
|------------------------------------------------------------------------------------|------------|-----------|
|  | 290058000  | SD6368-12 |
|                                                                                    | 290058100  | SD6368-16 |
|                                                                                    | 290058200  | SD6368-20 |

| Retaining Screw                                                                     | Order Code | Reference |
|-------------------------------------------------------------------------------------|------------|-----------|
|  | 290087700  | D1603500  |
|                                                                                     | 290087800  | D2004000  |

## PROCEDURES FOR CLAMPING SCREWS

1. Always use a torque wrench to ensure that screws are correctly tightened (please confirm torques data on catalogue). Torque that is too high will negatively affect the performance of the tool and can cause screw and insert breakage. Torque that is too low will cause insert movement, vibration and degrade the cutting result. Dedicated adjustable torque wrench can be ordered separately (please see above).

2. Clean the insert seat.

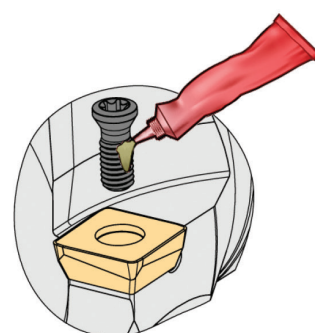
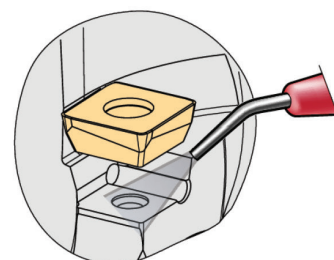
Make sure that the insert seat is free from dust or chips from the machining. If necessary, clean the insert seat with compressed air.

3. Check the insert seat.

Before assembly cutter it is important to ensure that the insert seat has not been damaged during machining or handling.

4. Apply sufficient screw lubrication to prevent seizure. Lubricant should be applied to the screw threads as well as to the screw head face.

5. Replace worn or damaged screws.



MILLING GRADES

| A                       | 115101520253035404550 |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
|-------------------------|-----------------------|--|--------|-----|--|--------|--------|--|--------|-----|-----|-----|-----|--|--|--|--|
| MILLING                 |                       |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
| Overview                |                       |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
| Face milling            |                       |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
| Hifeed milling          |                       |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
| Shoulder milling        |                       |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
| Profile milling         |                       |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
| Hardmill                |                       |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
| Center & Chamfer        |                       |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
| Spot face               |                       |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
| Spare Parts             |                       |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
| Technical Data          |                       |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
| End Mills               |                       |  |        |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
| P<br>STEEL              |                       |  | PHP910 | NEW |  |        |        |  |        |     |     |     | PVD |  |  |  |  |
|                         |                       |  | PH7910 |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
|                         |                       |  | PHP920 |     |  |        |        |  | NEW    |     |     |     |     |  |  |  |  |
|                         |                       |  | PH7920 |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        | PHP930 |  |        |     | NEW |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        | PH7930 |  |        |     |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        | PHP530 |  |        | NEW |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        | PHP808 |  |        | NEW |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        |        |  | PH7740 |     |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        |        |  | PHS740 |     |     | CVD |     |  |  |  |  |
| M<br>STAINLESS<br>STEEL |                       |  |        |     |  | PHH930 |        |  | NEW    |     |     | PVD |     |  |  |  |  |
|                         |                       |  |        |     |  | PH7930 |        |  |        |     |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        |        |  | PHH530 |     |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        |        |  | PHP530 |     |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        |        |  | PHH808 |     |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        |        |  | PH7740 |     |     |     |     |  |  |  |  |
| K<br>CAST IRON          |                       |  | PHP910 | NEW |  |        |        |  |        |     |     |     | PVD |  |  |  |  |
|                         |                       |  | PH7910 |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
|                         |                       |  | PHP920 |     |  |        |        |  | NEW    |     |     |     |     |  |  |  |  |
|                         |                       |  | PH7920 |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        | PHP930 |  |        | NEW |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        | PH7930 |  |        |     |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        | PH7740 |  |        |     |     |     |     |  |  |  |  |
|                         |                       |  | PH5705 |     |  |        |        |  |        |     |     | CVD |     |  |  |  |  |
|                         |                       |  | PH5320 |     |  |        |        |  |        |     |     |     |     |  |  |  |  |
|                         |                       |  |        |     |  |        | PH5740 |  |        |     |     |     |     |  |  |  |  |

|                                          | 1 | 5      | 10     | 15     | 20     | 25 | 30     | 35     | 40  | 45 | 50 |          |
|------------------------------------------|---|--------|--------|--------|--------|----|--------|--------|-----|----|----|----------|
| N<br>ALUMINIUM & NFM                     |   | PH0910 |        |        |        |    |        |        |     |    |    | UNCOATED |
|                                          |   |        | PHD103 |        |        |    |        |        |     |    |    | CVD      |
|                                          |   | PDP403 |        |        |        |    |        |        |     |    |    | PCD      |
|                                          |   | PDP410 |        |        |        |    |        |        |     |    |    |          |
| S<br>HEAT RESISTENT /<br>TITANIUM ALLOYS |   |        |        |        |        |    | PHH930 | NEW    |     |    |    | PVD      |
|                                          |   |        |        |        |        |    | PH7930 |        |     |    |    |          |
|                                          |   |        |        |        |        |    | PHH530 | NEW    |     |    |    |          |
|                                          |   |        |        |        |        |    |        | PHH808 | NEW |    |    |          |
|                                          |   |        |        |        |        |    |        | PH7740 |     |    |    |          |
| H<br>HARDENED<br>MATERIALS               |   |        | PHH603 | NEW    |        |    |        |        |     |    |    | PVD      |
|                                          |   |        |        | PH7603 |        |    |        |        |     |    |    |          |
|                                          |   |        |        |        | PHH910 |    |        | NEW    |     |    |    |          |
|                                          |   | PBH920 |        |        |        |    |        |        |     |    |    | PCBN     |

|                  |
|------------------|
| A                |
| MILLING          |
| Overview         |
| Face milling     |
| Hifeed milling   |
| Shoulder milling |
| Profile milling  |
| Hardmill         |
| Center & Chamfer |
| Spot face        |
| Spare Parts      |
| Technical Data   |
| End Mills        |

# MILLING GRADES

## PVD GRADES

### PHP...

Product of the latest coating technology, the new PHP coating comes to revolutionize the milling of Steel and Cast Iron. PHP is a balanced PVD coating that combines high hardness and high cracking resistance.

It's composition and structure ensure an optimal adhesion which results in a very smooth surface preventing built-up edge, coating worn-out and keeps the insert in a lubricated-like condition.



#### WEAR RESISTANCE

#### TOUGHNESS

**PHP910** NEW  
P05-P10  
K05-K10

Recommended for light operations in steels.

**PHP920** NEW  
P10-P35  
K10-K30

Recommended for General Steel & Cast Iron Milling.

**PHP930** NEW  
P20-P40  
K20-K40

Recommended for medium to roughing operations in steels and cast irons.

**PHP530** NEW  
P25-P40  
M25-M40

Extremely heat resistant grade. First choice in cold-section turbine blade milling.

**PHP808** NEW  
P30-P40

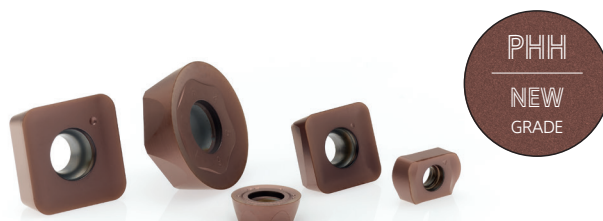
High heat resistance grade. Economic choice for cold-section turbine blade milling.

### PHH...

Product of the latest coating technology, the new PHH coating comes to revolutionize the milling of stainless steel, HRSA as well and hardened steel.

PHH is a stable PVD coating that merges both high hardness and an unmatched heat resistance.

It's structure contains refractory materials which allows it to work at the highest temperature and the hardest conditions.



#### WEAR RESISTANCE

#### TOUGHNESS

**PHH603** NEW  
H05-H15  
P01-P05

Recommended for finishing operations in steels and hardened steels. First choice in mold and die finishing applications.

**PHH910** NEW  
P05-P10  
H15-H30

Recommended for finishing operations in steels and hardened steels in unstable conditions.

**PHH930** NEW  
M20-M40  
S20-S30

Recommended for general purpose milling of stainless steels and HRSA.

**PHH530** NEW  
M25-M40  
S25-S35

Extremely heat resistant grade. First choice in hot-section turbine blade milling.

**PHH808** NEW  
M30-M40  
S30-S40

High heat resistance grade. Economic choice in hot-section turbine blade milling.

### PH7... | PH6...

A medium thickness PVD coating with good compatibility with steels, stainless steels, cast irons and HRSA.

#### WEAR RESISTANCE

#### TOUGHNESS

**PH7603**  
(PH6103)  
H01-H20

**PH7910**  
(PH6910)  
P05-P10  
K05-K10

**PH7920**  
(PH6920)  
P10-P35  
K10-K30

**PH7930**  
(PH6930)  
P20-P40  
M20-M30  
K20-K40  
S25-S35

**PH7740**  
(PH6740)  
P30-P50  
M30-M50  
K30-K40  
S30-S40

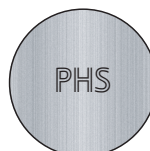
Note: PH6... grades are very similar to PH7... The difference being that PH7 is mostly used in proprietary milling lines while PH6... is used on interchangeable inserts.

## CVD GRADES

## PHS740...

A tough substrate combined with a thin CVD coating with excellent thermal resistance and hardness at high temperature. 1st choice solution for removal of oxide layer from workpiece surface and for unstable conditions where a lot of heat is generated (ex: heavy duty applications).

**PHS740**  
P30-P50



## PH5...

A thick CVD coating with very smooth surface. Can be used wet or dry. Ideal for machining cast irons.



## PHD103

A carbide substrate with high abrasion resistance coated with crystalline diamond CVD coating. Ideal for graphite machining.

**PHD103**  
N05-N15

## PH0910 - UNCOATED GRADE

Uncoated carbide micro-grain grade combining a good abrasive wear resistance and toughness. Suitable for rough to finish operations of aluminum alloys.

**PH0910**  
N01-N05

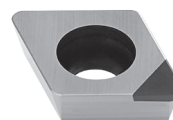


## PCBN GRADE

## PBH920

Carbide insert with Polycrystalline Cubic Boron Nitride tip for finishing operations on hardened steels.

**PBH920**  
H01-N05



## PCD GRADE

## PDP4...

Carbide insert with Polycrystalline Diamond tip for finishing operations on aluminums and non-ferrous metallic materials.

**PDP403**  
N01-N10

**PDP410**  
N01-N20





# COMPARATIVE GRADES CHART

PVD COATED GRADES | GRAUS REVESTIDOS A PVD | GRADOS CON RECUBRIMIENTO PVD

| ISO             | Material | Palbit                                                  | Sandvik                              | Kennametal                                                                                       | Iscar                                                                          | Seco                             | Mitsubishi                                                        | Sumitomo                   | Hitachi                                                          | Walter                           | Kyocera                             | Taegutec                                                 | Dijet                                          | Ceratizit                     |
|-----------------|----------|---------------------------------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------|-------------------------------------------------------------------|----------------------------|------------------------------------------------------------------|----------------------------------|-------------------------------------|----------------------------------------------------------|------------------------------------------------|-------------------------------|
|                 |          |                                                         |                                      |                                                                                                  |                                                                                |                                  |                                                                   |                            |                                                                  |                                  |                                     |                                                          |                                                |                               |
| STEEL           | P01      | PH7603<br>PH6103                                        | GC1010                               | KC505M<br>KC510M<br>KC515M                                                                       | IC903                                                                          |                                  |                                                                   |                            | ATH80D<br>JP4105                                                 |                                  |                                     | TT2510<br>TT5505                                         | JC8003                                         |                               |
|                 | P10      | PH7910<br>PH6910<br>PH9P910                             | GC1010<br>GC1025                     | KC505M<br>KC510M<br>KC515M<br>KC610M<br>KC715M                                                   | IC903<br>IC907<br>IC950<br>IC908<br>IC910<br>IC380<br>IC900                    | CP200<br>TS2001                  | MP6120<br>VP15TF                                                  | ACP200                     | ATH80D<br>PN08M<br>ATH10E<br>PN15M<br>JP4105<br>JP4115<br>JP4120 | WHH15<br>WXM15                   | PR830<br>PR1225<br>PR1230<br>PR1525 | TT2510<br>TT5505<br>TT5515<br>TT7080                     | JC8003<br>JC8015<br>JC5015<br>JC5118           |                               |
|                 | P20      | PH7920<br>PH6920<br>PH6125<br>PH9P920                   | GC1025<br>GC1030<br>GC2030           | KC522M<br>KC525M<br>KC527M<br>KC530M<br>KC610M<br>KC620M<br>KC635M<br>KC715M<br>KC720M<br>KC730M | IC907<br>IC950<br>IC908<br>IC910<br>IC380<br>IC900<br>IC830<br>IC928<br>IC1008 | CP250<br>TS2500                  | MP6120<br>VP15TF<br>MP6130<br>UP20M<br>VP20RT                     | ACP200<br>ACP300           | JP4120<br>JS4045<br>CY250                                        | WHH15<br>WXM15                   | PR830<br>PR1225<br>PR1230<br>PR1525 | TT2510<br>TT5505<br>TT5525<br>TT7080<br>TT9030<br>TT9080 | JC8015<br>JC5015<br>JC5118<br>JC5040           | CTP1235<br>CTP1625            |
|                 | P30      | PH808<br>PH530<br>PH7930<br>PH6930<br>PH6135<br>PH9P930 | GC1025<br>GC1125                     | KC525M<br>KC527M<br>KC530M<br>KC537M<br>KC610M<br>KC620M<br>KC720M<br>KC725M<br>KC730M<br>KC735M | IC907<br>IC950<br>IC908<br>IC910<br>IC380<br>IC900<br>IC830<br>IC928<br>IC1008 | MP3000<br>F25M<br>F30M<br>F40M   | MP6120<br>VP15TF<br>MP6130<br>UP20M<br>VP20RT<br>VP30RT           | ACP200<br>ACP300           | JS4045<br>CY250<br>JM4160                                        | WSP45<br>WSP46                   | PR830<br>PR1225<br>PR1230<br>PR1525 | TT5525<br>TT7080<br>TT8020<br>TT8080<br>TT9030<br>TT9080 | JC5118<br>JC5040<br>JC8050<br>JC7560           | CTP1235<br>CTP1625<br>CTP2235 |
|                 | P40      | PH7740<br>PH6740                                        |                                      | KC537M<br>KC720M<br>KC725M<br>KC735M                                                             | IC830<br>IC928<br>IC1008                                                       | MP3000<br>F40M<br>T60M           | VP30RT                                                            | ACP300                     | JM4160                                                           | WSP45<br>WSP46                   |                                     | TT8020                                                   | JC5118<br>JC5040<br>JC8050<br>JC7560           | CTP1235<br>CTP2235            |
|                 |          |                                                         |                                      |                                                                                                  |                                                                                |                                  |                                                                   |                            |                                                                  |                                  |                                     |                                                          |                                                |                               |
| STAINLESS STEEL | M01      |                                                         | GC1010                               |                                                                                                  | IC907<br>IC903                                                                 |                                  |                                                                   | ACM100<br>ACK300           | PCS08M                                                           |                                  |                                     |                                                          |                                                |                               |
|                 | M10      | PH7910<br>PH6910                                        | GC1010<br>GC1025<br>GC1030<br>GC2030 | KC515M<br>KC610M<br>KC635M<br>KC720M                                                             | IC907<br>IC903                                                                 |                                  | VP15TF                                                            | ACM100<br>ACK300<br>ACP300 | PCS08M<br>CY150                                                  | WXM15                            | PR830<br>PR1225<br>PR1525<br>PR1535 |                                                          |                                                |                               |
|                 | M20      | PH7920<br>PH6920                                        | GC1025<br>GC1030<br>GC1040<br>GC2030 | KC522M<br>KC525M<br>KC530M<br>KC610M<br>KC635M<br>KC720M<br>KC730M                               | IC380<br>IC900<br>IC908<br>IC928<br>IC1008                                     | MP3000<br>MS2050<br>F25M<br>F30M | VP15TF<br>MP7130<br>MP7030<br>UP20M<br>VP20RT                     | ACM300<br>ACP300           | CY150<br>CY250                                                   | WXM15<br>WSM35<br>WSM36          | PR830<br>PR1225<br>PR1525<br>PR1535 | TT8020<br>TT8080                                         | JC8015<br>JC5015<br>JC5118                     | CTP1235<br>CTP1625            |
|                 | M30      | PH7930<br>PH6930<br>PH6135<br>PHH530<br>PHH930          | GC1040<br>GC2030                     | KC522M<br>KC525M<br>KC530M<br>KC537M<br>KC725M<br>KC730M<br>KC735M                               | IC380<br>IC900<br>IC908<br>IC928<br>IC1008<br>IC328<br>IC330                   | MP3000<br>MS2050<br>F30M<br>F40M | VP15TF<br>MP7130<br>MP7030<br>UP20M<br>VP20RT<br>MP7140<br>VP30RT | ACM300                     | CY250<br>JM4160                                                  | WSM35<br>WSM36<br>WSP45<br>WSP46 | PR830<br>PR1225<br>PR1525<br>PR1535 | TT8020<br>TT8080                                         | JC8015<br>JC5015<br>JC5118<br>JC8050<br>JC7560 | CTP1235<br>CTP2235            |
|                 | M40      | PH7740<br>PH6740<br>PHH808                              | GC1040                               | KC725M                                                                                           | IC1008<br>IC328<br>IC330                                                       | MS2050<br>F40M                   | MP7140<br>VP30RT                                                  | ACM300                     | JM4160                                                           | WSM35<br>WSM36<br>WSP45<br>WSP46 | PR1225<br>PR1525<br>PR1535          | TT8020                                                   | JC5015<br>JC5118<br>JC8050<br>JC7560           | CTP2235                       |
|                 |          |                                                         |                                      |                                                                                                  |                                                                                |                                  |                                                                   |                            |                                                                  |                                  |                                     |                                                          |                                                |                               |
| CAST IRON       | K01      |                                                         | GC1010                               |                                                                                                  | IC380<br>IC900                                                                 |                                  | MP8010                                                            |                            | ATH80D<br>JP4105                                                 |                                  | PR1510                              | TT6080                                                   | JC8003                                         | AMZ                           |
|                 | K10      | PH7910<br>PH6910<br>PH9P910                             | GC1010<br>GC1020                     | KC514M<br>KC515M<br>KC520M<br>KC620M                                                             | IC380<br>IC900<br>IC810<br>IC910                                               | MK2050                           | MP8010<br>VP15TF                                                  |                            | ATH80D<br>JP4105<br>JP4120<br>CY150                              | WHH15<br>WXM15<br>WKK25          | PR1210<br>PR1510                    | TT6080                                                   | JC8015                                         | AMZ<br>CTP3220<br>CTP6215     |
|                 | K20      | PH9P920<br>PH7920<br>PH6920                             | GC1020                               | KC514M<br>KC520M<br>KC522M<br>KC524M<br>KC527M<br>KC610M<br>KC620M<br>KC635M                     | IC810<br>IC910<br>IC950<br>IC350<br>IC830<br>IC928                             | MK2050                           | MP8010<br>VP15TF<br>VP20RT                                        | ACK300                     | JP4120<br>CY150<br>CY250                                         | WHH15<br>WXM15<br>WKK25          | PR1210<br>PR1510                    |                                                          | JC8015<br>JC5015                               | CTP3220<br>CTP1625            |
|                 | K30      | PH7740<br>PH6740                                        |                                      | KC522M<br>KC524M<br>KC527M<br>KC537M<br>KC610M<br>KC620M<br>KC635M                               | IC830<br>IC928<br>IC1008<br>IC808<br>IC908                                     | MK2050                           | VP15TF VP20RT                                                     | ACK300                     | CY250                                                            | WKK25                            | PR1510                              |                                                          | JC8015<br>JC5015                               |                               |
|                 |          |                                                         |                                      |                                                                                                  |                                                                                |                                  |                                                                   |                            |                                                                  |                                  |                                     |                                                          |                                                |                               |

PVD COATED GRADES | GRAUS REVESTIDOS A PVD | GRADOS CON RECUBRIMIENTO PVD

| ISO               |     | Palbit                                         | Sandvik                              | Kennametal                           | Iscar                                     | Seco           | Mitsubishi                           | Sumitomo         | Hitachi          | Walter                           | Kyocera                   | Taegutec                   | Dijet                                          | Ceratizit          |
|-------------------|-----|------------------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------------|----------------|--------------------------------------|------------------|------------------|----------------------------------|---------------------------|----------------------------|------------------------------------------------|--------------------|
| Material          |     |                                                |                                      |                                      |                                           |                |                                      |                  |                  |                                  |                           |                            |                                                |                    |
| Z                 | N01 |                                                |                                      | KC410M<br>KC510M<br>KC5410           |                                           |                |                                      |                  |                  |                                  |                           | TT6080                     |                                                | AMZ                |
|                   | N10 |                                                | GC1025<br>GC1030                     | KC410M<br>KC510M<br>KC5410<br>KC620M |                                           |                |                                      | DL1000           | SD5010<br>HD7010 | WXN15                            |                           | TT6080<br>TT8020           |                                                | AMZ                |
|                   | N20 |                                                | GC1025<br>GC1030                     | KC422M<br>KC620M                     |                                           | F15M           | LC15TF                               | DL1000           | SD5010<br>HD7010 | WXN15                            |                           | TT8020                     |                                                |                    |
| S                 | S01 |                                                | GC1010                               | KC510M                               | IC808<br>IC907<br>IC908                   |                |                                      | ACM100<br>ACK300 |                  |                                  | PR905<br>PR1210<br>PR1535 |                            | JC8003<br>JC8015                               | AMZ                |
|                   | S10 | PH7910<br>PH6910                               | GC1010<br>GC1030<br>GC2030           | KC510M<br>KC610M                     | IC808<br>IC907<br>IC908<br>IC903          | MS2050         | MP9120<br>VP15TF<br>MP9130<br>MP9030 | ACM100<br>ACK300 | PTH13S<br>JS1025 |                                  | PR905<br>PR1210<br>PR1535 | TT9030<br>TT9080<br>TT8080 | JC8003<br>JC8015<br>JC5015<br>JC5118           | AMZ<br>CTP1625     |
|                   | S20 | PH7920<br>PH6920                               | GC1030<br>GC1040<br>GC2030<br>GC2040 | KC522M<br>KC525M<br>KC610M           | IC300<br>IC900<br>IC830<br>IC928          | MS2050<br>F40M | MP9120<br>VP15TF<br>MP9130<br>MP9030 | ACM300           | PTH13S<br>JS1025 | WSM35<br>WSM36                   | PR905<br>PR1210<br>PR1535 | TT8080<br>TT8020           | JC8015<br>JC5015<br>JC5118<br>JC8050<br>JC7560 | CTP1235<br>CTP1625 |
|                   | S30 | PH7930<br>PH6930<br>PHH930<br>PHH530           | S30T<br>GC1040<br>GC2040             | KC522M<br>KC525M<br>KC725M           | IC830<br>IC928                            | MS2050<br>F40M | MP9130<br>MP9030                     | ACM300           |                  | WSM35<br>WSM36<br>WSP45<br>WSP46 | PR1535                    | TT8020                     | JC5118<br>JC8050<br>JC7560                     | CTP1235<br>CTP2235 |
|                   | S40 | PH7740<br>PH6740<br>PHH808                     | GC2040<br>GC1040                     | KC725M                               | IC830<br>IC928                            | MS2050<br>F40M |                                      |                  |                  | WSP45<br>WSP46                   |                           |                            | JC5118<br>JC8050<br>JC7560                     |                    |
| H                 | H01 | PH7603<br>PH6103<br>PHH603                     | GC1010                               | KC510M                               | IC903                                     |                | MP8010                               |                  |                  |                                  |                           | TT2510<br>TT5505           | DH102<br>JC6102<br>JC8003<br>JC8008            |                    |
|                   | H10 | PHH603<br>PH7603<br>PH6103<br>PH7910<br>PHH910 | GC1010<br>GC1025<br>GC1030           | KC505M<br>KC510M<br>KC635M           | IC903<br>IC808<br>IC907<br>IC908          | MH1000<br>F15M | MP8010<br>VP15TF                     |                  | PTH08M<br>JP4105 | WHH15                            |                           | TT5515<br>TT6080           | JC6102<br>JC8003<br>JC8008<br>JC8015<br>JC5118 | CTP6215            |
|                   | H20 |                                                | GC1025<br>GC1030                     | KC635M                               | IC808<br>IC907<br>IC908<br>IC380<br>IC900 | F15M           | VP15TF                               |                  | JP4105           | WHH15                            |                           | TT5515<br>TT6080           | JC8015<br>JC5118                               | CTP6215            |
|                   | K10 |                                                |                                      |                                      | IC380<br>IC900<br>IC1008                  | MP3000<br>F30M |                                      |                  |                  |                                  |                           |                            |                                                |                    |
| HARDENED MATERIAL |     |                                                |                                      |                                      |                                           |                |                                      |                  |                  |                                  |                           |                            |                                                |                    |

# COMPARATIVE GRADES CHART

CVD COATED GRADES | GRAUS REVESTIDOS A CVD | GRADOS CON RECUBRIMIENTO CVD

| ISO             |     | Palbit | Sandvik                                        | Kennametal                                              | Iscar                                                    | Seco                    | Mitsubishi | Sumitomo | Hitachi          | Walter                            | Kyocera | Taegutec | Dijet                     | Ceratizit                                      |
|-----------------|-----|--------|------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------|-------------------------|------------|----------|------------------|-----------------------------------|---------|----------|---------------------------|------------------------------------------------|
| Material        |     |        |                                                |                                                         |                                                          |                         |            |          |                  |                                   |         |          |                           |                                                |
| STEEL           | P   | P40    | PHS740                                         |                                                         |                                                          | MP2500                  |            |          |                  | WKP35S                            |         |          |                           |                                                |
|                 | M   |        |                                                |                                                         |                                                          |                         |            |          |                  |                                   |         |          |                           |                                                |
| STAINLESS STEEL | M10 |        | GC2015                                         | KCPM20                                                  | IC9250<br>IC520M<br>IC9350                               |                         |            | ACM200   |                  |                                   |         |          | JC730U                    |                                                |
|                 | M20 |        | GC4230                                         | KCPM20<br>KCPM30<br>KC927M                              | IC9250<br>IC520M<br>IC9350<br>IC4050<br>IC635            | MP2500<br>T350M<br>T25M | F7030      | ACM200   |                  |                                   | CA6535  | TT7800   | JC730U                    | CTC5235<br>GM226+                              |
|                 | M30 |        | GC2040<br>GC4230<br>GC4240<br>S40T             | KCPM30<br>KC927M                                        | IC9350<br>IC4050<br>IC635                                | MP2500<br>T350M<br>T25M | F7030      | ACM200   | GX2160           |                                   | CA6535  | TT7800   | JC730U                    | CTC5235<br>CTC5240<br>GM226+<br>GM246<br>GM43+ |
|                 | M40 |        | GC2040<br>GC4240<br>S40T                       |                                                         | IC635                                                    | In4500<br>T350M         |            |          | GX2160           |                                   | CA6535  |          |                           | CTC5235<br>CTC5240<br>GM246<br>GM43+           |
| K               | K01 | PH5705 |                                                | KC907M                                                  | IC8080<br>IC4100<br>IC5100<br>IC9150                     |                         | MC5020     | ACK200   |                  | WKP15                             | CA420M  |          | JC605W                    | CTC3215                                        |
|                 | K10 | PH5705 | GC3220                                         | KC907M<br>KC914M<br>KC917M<br>KC924M<br>KCK15           | IC8080<br>IC4100<br>IC5100<br>IC9150<br>IC9080<br>IC520M | MK1500                  | MC5020     | ACK200   | GX2120           | WKP15<br>WKP25                    | CA420M  | TT6800   | JC605W<br>JC608X<br>JC610 | CTC3215<br>SR216<br>SR226+                     |
|                 | K20 | PH5320 | GC3220<br>GC3330<br>GC3040<br>GC4220<br>GC4230 | KC917M<br>KC924M<br>KCK15<br>KCPM20<br>KCPK30<br>KC927M | IC5100<br>IC9150<br>IC9080<br>IC520M<br>IC4050           | MK1500<br>MP1500        | MC5020     | ACK200   | GX2120<br>GX2140 | WKP15<br>WKP25<br>WKP35<br>WKP35S | CA420M  | TT6800   | JC605W<br>JC608X<br>JC610 | SR216<br>SR226+                                |
|                 | K30 | PH5740 | GC3330<br>GC3040<br>GC4220<br>GC4230<br>GC4240 | KCPM20<br>KCPK30<br>KC927M                              | IC520M<br>IC4050                                         | MK1500<br>MP1500        | MC5020     |          | GX2140           | WKP25<br>WKP35<br>WKP35S          |         |          | JC610                     |                                                |

UNCOATED GRADES | GRAUS NÃO REVESTIDOS | GRADOS SÍN RECUBRIMIENTO

| ISO      |     | Palbit | Sandvik      | Kennametal     | Iscar        | Seco             | Mitsubishi | Sumitomo   | Hitachi                   | Walter | Kyocera                   | Taegutec    | Dijet | Ceratizit |
|----------|-----|--------|--------------|----------------|--------------|------------------|------------|------------|---------------------------|--------|---------------------------|-------------|-------|-----------|
| Material |     |        |              |                |              |                  |            |            |                           |        |                           |             |       |           |
| N        | N01 | PH0910 | H10          | K115M<br>KC313 | IC20         |                  | HTi 10     | H1<br>G10E | PCS08M<br>CY100H          |        | PCS08M<br>CY100H          |             |       | H210T     |
|          | N10 | PH0910 | H13A<br>H10F | K115M<br>KC313 | IC08         | H15              | HTi 10     | H1<br>G10E | PCS08M<br>CY100H<br>CY10H | WK10   | PCS08M<br>CY100H<br>CY10H | K10<br>UF10 |       | H210T     |
|          | N20 | PH0910 | H13A<br>H10F | K125M          | IC08<br>IC28 | HX<br>H15<br>H25 | HTi 10     |            |                           |        |                           | K10         |       | H216T     |

ALUMINIUM

A

MILLING

Overview

Face milling

Hifeed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

Technical Data

End Mills

# CUTTING DATA CALCULATION

Cálculo de condições de corte | Cálculo de datos de corte

## Formulas

### Spindle Speed (rev/min)

$$n = \frac{v_c \cdot 1000}{\pi \cdot D_c}$$

### Cutting Speed (m/min)

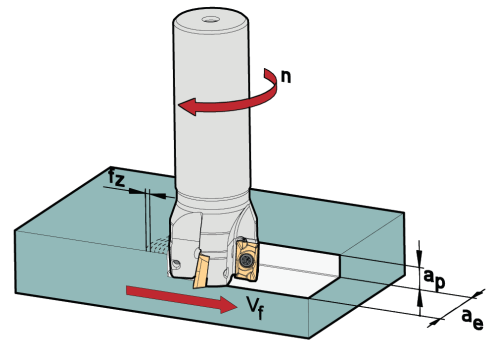
$$v_c = \frac{n \cdot \pi \cdot D_c}{1000}$$

### Feed Speed (mm/min)

$$v_f = n \cdot Z_n \cdot f_z$$

### Feed per Tooth (mm/tooth)

$$f_z = \frac{v_f}{n \cdot Z_n}$$



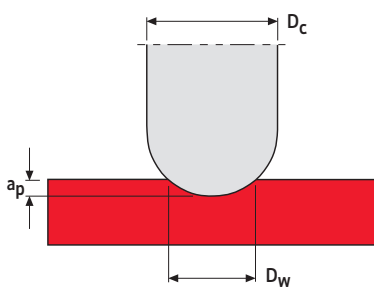
### Feed per Revolution (mm/rev)

$$f = Z_n \cdot f_z$$

### Metal removal Rate (cm³/min)

$$Q = \frac{a_e \cdot a_p \cdot v_f}{1000}$$

## Cutting Speed and Spindle Speed for Copying



$$v_c = \frac{n \cdot \pi \cdot D_w}{1000} \quad (\text{m/min})$$

$$n = \frac{v_c \cdot 1000}{\pi \cdot D_w} \quad (\text{RPM})$$

$$D_w = 2 \cdot \sqrt{a_p (D_c - a_p)} \quad (\text{mm})$$

## Nomenclature

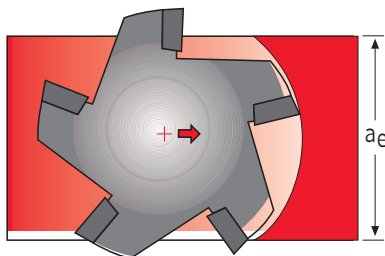
|       |                                       |            |
|-------|---------------------------------------|------------|
| $a_e$ | - Width of cut mm/radial depth of cut | (mm)       |
| $a_p$ | - Depth of cut mm/radial depth of cut | (mm)       |
| $D_c$ | - Cutter diameter                     | (mm)       |
| $D_w$ | - Effective diameter in cut           | (mm)       |
| $f$   | - Feed per Revolution                 | (mm/rev)   |
| $f_z$ | - Feed per Tooth                      | (mm/tooth) |
| $n$   | - Spindle Speed                       | (rev/min)  |
| $Q$   | - Material removal Rate               | (cm³/min)  |
| $V_c$ | - Cutting Speed                       | (m/min)    |
| $V_f$ | - Feed Speed                          | (mm/min)   |
| $Z_n$ | - N° of teeth                         |            |

# POWER REQUIREMENT CALCULATION

Cálculo de potência requerida | Cálculo del requerimiento de potencia

## Calculating the power demand

$$P_C = \frac{a_p \times a_e \times v_f}{6000000 \times \eta} \times k_C$$



- $P_C$  - Power (kW)
- $a_p$  - Depth of cut (mm)
- $a_e$  - Width of cut (mm)
- $v_f$  - Feed speed (mm/min)
- $\eta$  - Efficiency
- $k_C$  - Cutting force per mm<sup>2</sup>

## Calculating average chip thickness ( $h_m$ ) and cutting force per mm<sup>2</sup> ( $k_C$ )

$$h_m = \frac{360 \times f_z \times a_e}{\pi \times D_c \times \omega_e} \times \sin k_r$$

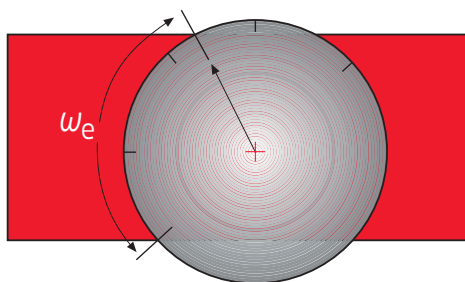
- $h_m$  - Average chip thickness (mm)
- $f_z$  - Feed per tooth (mm/tooth)
- $D_c$  - Cutter diameter (mm)
- $\omega_e$  - Engagement angle
- $k_r$  - Lead angle

$$k_C = \frac{1}{h_m^{m_C}} \times k_{Cx}$$

- $m_C^*$  - Exponent
- $k_{Cx}^*$  - Cutting force for 1 mm chip thickness (N/mm<sup>2</sup>)

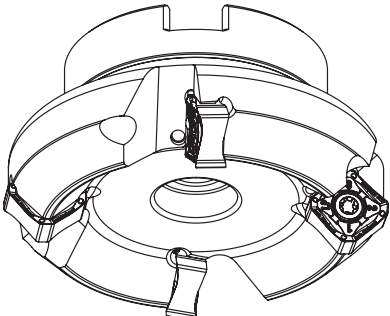
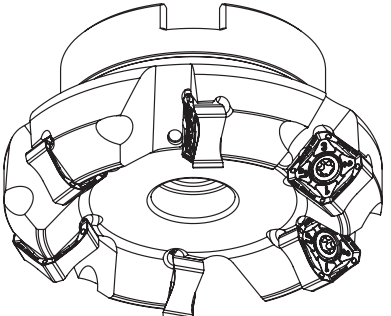
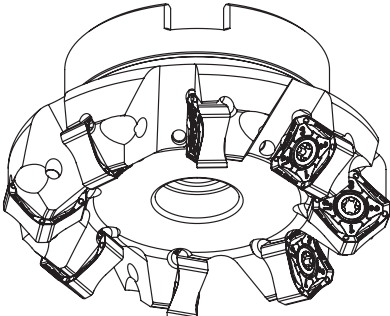
\* Please see these values on page 797.

## Engagement angle



| Engagement<br>$a_e / D_c$ | Engagement<br>angle $\omega_e$ |
|---------------------------|--------------------------------|
| 70%                       | 89°                            |
| 100%                      | 180°                           |

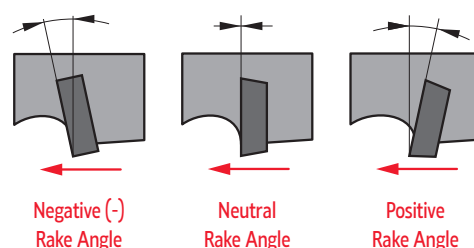
| Engagement<br>$a_e / D_c$ | Engagement<br>angle $\omega_e$ |
|---------------------------|--------------------------------|
| 5%                        | 26°                            |
| 10%                       | 37°                            |
| 75%                       | 60°                            |

| Coarse Pitch Type                                                                                                                                                                                                                                                          | Normal Pitch Type                                                                                                                                                                                                              | Fine Pitch Type                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>First choice for cutting aluminium (long-chipping material - ISO N).</p> <p>First choice for unstable operations due to lowest cutting forces.</p> <p>Smooth cutting allows longer overhang applications.</p> <p>First choice for deep cutting and high feed rates.</p> | <p>First choice for roughing in stable conditions.</p> <p>Good productivity.</p> <p>Good chip space for roughing in steels, stainless steel and super alloys.</p> <p>First choice for shallow cutting with low feed rates.</p> | <p>First choice for cast iron.</p> <p>First choice for high productivity with low width of cut (<math>A_e</math>).</p> <p>Roughing in super alloys materials in combination with round inserts.</p> <p>For cutting operations where chip discharge volume is small and high table feed is desired.</p> |
|                                                                                                                                                                                           |                                                                                                                                               |                                                                                                                                                                                                                     |

## Standard inserts

### Positive and Negative Rake Angle

- Insert shape whose cutting edge precedes is a positive rake angle.
- Insert shape whose cutting edge follows is a negative rake angle.



### Standard Cutting Edge Shape

| Standard Cutting Edge Combinations | (+) Axial Rake Angle            | (-) Axial Rake Angle               | (+) Axial Rake Angle               |
|------------------------------------|---------------------------------|------------------------------------|------------------------------------|
|                                    | Radial Rake Angle (+)           | Radial Rake Angle (-)              | Radial Rake Angle (-)              |
|                                    | Double Positive (DP Edge Type)  | Double Negative (DN Edge Type)     | Negative / Positive (NP Edge Type) |
| Axial Rake Angle $\gamma_p$        | Positive (+)                    | Negative (-)                       | Positive (+)                       |
| Radial Rake Angle $\gamma_f$       | Positive (+)                    | Negative (-)                       | Negative (-)                       |
| Insert Used                        | Positive Insert (One Sided Use) | Negative Insert (Double Sided Use) | Positive Insert (One Sided Use)    |
| Work Material                      | Steel                           | -                                  |                                    |
|                                    | Cast Iron                       |                                    |                                    |
|                                    | Aluminium Alloy                 | -                                  | -                                  |
|                                    | Hardened Materials              | -                                  |                                    |

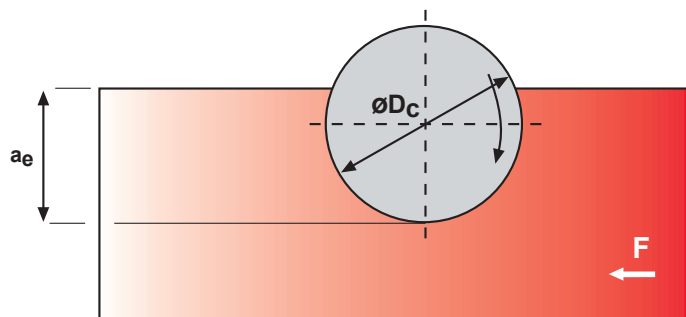
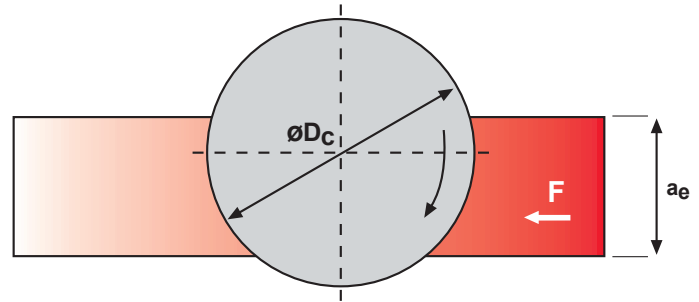
## Choosing Cutter Diameter

The Best Cutter Diameter ( $\varnothing D_c$ ) should be selected upon the workpiece dimensions

$$D_c = 1,3 - 1,5 a_e$$

If the machine power is limited or the workpiece is too wide, select a cutter diameter that takes more than two passes or that matches the power of machine. When the appropriate cutter diameter is not available, proper cutter position will give good results.

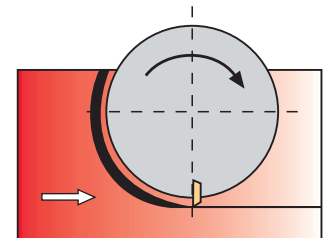
$$a_e = 3/4 D_c$$



## Cutter Position

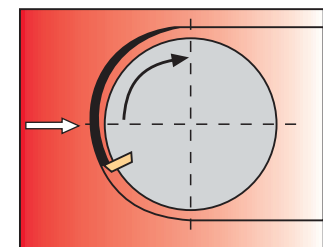
### Conventional Milling (Up Milling)

The feed direction of the workpiece is opposite to that of cutter rotation. The chip thickness starts at zero and increases to the maximum at the end of cut. In Up Milling, the insert wear is severe with excessive friction and high temperature caused by the rubbing or burnishing effect in the insert.



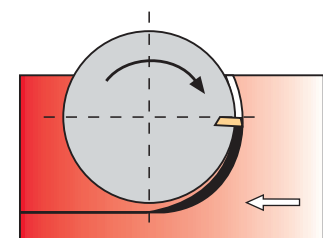
### Channel Milling (Up and Down Milling)

The cutter position is in the middle of the workpiece and the cutting force is alternately changed in the radial direction. It causes vibration when the spindle structure is weak. Channel Milling is a combination of conventional and climb milling. When Channel Milling is necessary use positive geometry cutters at reduced speeds and feeds with coolant.



### Climb Milling (Down Milling)

Climb Milling is normally recommended. The feed direction of workpiece is the same as that of cutter rotation. So the chip thickness starts from the maximum and decreases to zero at the end of cut. The tool life is long with less heat and minimum work hardening of workpiece.





# TROUBLESHOOTING

A

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

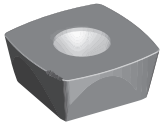
Spot face

Spare Parts

Technical Data

End Mills

## EDGE WEAR



### Corrective action:

- Increase feed rate
- Reduce cutting speed
- Use more wear resistant grade
- Apply coated grade

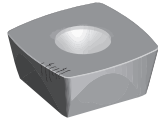
## HEAT DEFORMATION (UPSET)



### Corrective action:

- Reduce cutting speed
- Reduce feed
- Reduce depth of cut
- Use grade with higher hot hardness

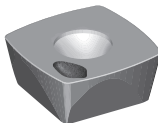
## THERMAL CRACKING



### Corrective action:

- Properly apply coolant
- Reduce cutting speed
- Reduce feed
- Apply coated grade

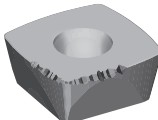
## CRATER



### Corrective action:

- Reduce feed rate
- Reduce speed
- Apply coated grades
- Apply coolant

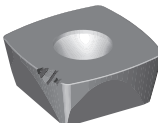
## CHIPPING



### Corrective action:

- Use a tougher grade
- Consider edge preparation
- Check rigidity of system
- Increase lead angle

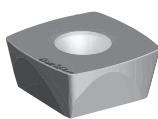
## DEPTH-OF-CUT NOTCHING



### Corrective action:

- Change lead angle
- Consider edge preparation
- Apply different grade
- Adjust feed

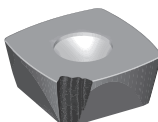
## BUILT-UP EDGE



### Corrective action:

- Increase cutting speed
- Increase feed rate
- Apply PVD coated grades
- Use coolant
- Edge preparation (smaller hone)

## CATASTROPHIC BREAKAGE



### Corrective action:

- Utilize stronger grade / geometry
- Reduce feed rate
- Reduce depth of cut
- Check rigidity of system
- Examine edge prep / nose radius

## DESGASTE DA ARESTA

### Possível solução:

- Aumentar o avanço
- Reduzir a Vc
- Usar grau mais resistente ao desgaste
- Aplicar grau revestido

## DEFORMAÇÃO ARESTA

### Possível solução:

- Reduzir a Vc
- Reduzir o avanço
- Reduzir a profundidade de corte
- Usar grau com maior dureza a quente

## FENDAS TÉRMICAS

### Possível solução:

- Aplicação correcta do fluido de corte
- Reduzir a Vc
- Reduzir o avanço
- Aplicar grau revestido

## CRATERA FACE ATAQUE

### Possível solução:

- Reduzir o avanço
- Reduzir a Vc
- Aplicar grau revestido
- Usar fluido de corte

## ESMILHAMENTO

### Possível solução:

- Usar um grau mais tenaz
- Considerar a preparação da aresta
- Verificar a rigidez do sistema
- Aumentar o ângulo de ataque

## FRACTURA

### Possível solução:

- Alterar o ângulo de ataque
- Considerar a preparação da aresta
- Aplicar outro grau
- Ajustar o avanço

## ARESTA POSTIÇA CORTE

### Possível solução:

- Aumentar a Vc
- Aumentar o avanço
- Aplicar grau revestido
- Usar fluido de corte
- Reduzir boleamento

## FRACTURA CATASTRÓFICA

### Possível solução:

- Aplicar grau / geometria mais resistente
- Reduzir o avanço
- Reduzir a profundidade de corte
- Aplicar grau revestido
- Usar fluido de corte

## DESGASTE DEL FLANCO

### Solución posible:

- Aumentar el avance
- Reduzca la velocidad de corte
- Seleccione una calidade más resistente al desgaste
- Utilice metales duros recubiertos

## DEFORMACIÓN PLÁSTICA

### Solución posible:

- Reduzca la velocidad de corte
- Seleccione una calidade más resistente al desgaste
- Reduzca el ap

## FISSURAS TÉRMICAS

### Solución posible:

- Preste atención al uso del refrigerante
- Reduzca la velocidad de corte
- Reduzca el avance
- Utilice metales duros recubiertos

## DESGASTE DE CRÁTER

### Solución posible:

- Reduzca el avance
- Reduzca la velocidad de corte
- Utilice metales duros recubiertos
- Preste atención al uso del refrigerante

## FILOS ASTILLADOS

### Solución posible:

- Seleccione una calidade más resistente al desgaste
- Utilice un inserto con una geometria de filo de corte más estable
- Modifique el ángulo de posicion
- Modifique la geometria de rompevirutas

## DESGASTE POR ENTALLA

### Solución posible:

- Escoja un ángulo de posición mas pequeño
- Ajuste el avance
- Cambie de calidad
- Utilice un inserto con una geometria de filo de corte más estable

## FILOS RECRECIDOS

### Solución posible:

- Aumentar la velocidad de corte
- Aumentar el avance
- Utilice metales duros recubiertos
- Aplique refrigerante con mayor concentración de aceite
- Seleccione una geometría de corte positiva

## ROTURA DE INSERTO

### Solución posible:

- Seleccione un material más tenaz
- Utilice insertos más robustos con ángulos de arista más grandes
- Seleccione una geometria de rompe virutas para secciones de corte más amplias
- Reduzca en avance

| PROBLEMS   PROBLEMAS   PROBLEMAS                                    |                                                      |                                                                                                                           | Possible causes and areas of investigation |    | Causas possíveis e áreas de intervenção |  | Posibles causas y las áreas de intervención |   | cutting speed   velocidade de corte   velocidad corte |   | feed   avanço |   | depth-of-cut   profundidade de corte   profundidad de corte |  | grade   grau da pastilha   calidad inserto |  | coolant   óleo de corte   refrigerante |  | rake angle   ângulo de ataque   ángulo de posición |  | edge preparation   preparação da aresta   preparación del filo |  | material (type / condition)   material (tipo / condições)   material |  | center height   altura do centro   altura al centro |  | geometry (insert)   geometria da pastilha   geometría del inserto |  | insert finish   acabamento na pastilha   acabado del inserto |  | insert thickness   espessura da pastilha   espesura inserto |  | nose radius   raio de canto   radio punta |  | lead angle   ângulo da aresta de ataque   ángulo filo corte |  | holder (type / condition)   suporte (tipo / condições)   soporte (condiciones) |  | machine condition   estado do equipamento - torno   condición de maquina |  | chip flow direction   direcção de fluxo da aparã   dirección de la viruta |  | horsepower   potência   fuerza |  | excessive overhang   excesso comprimento livre da ferramenta   sobreendamiento excesivo |  | spindle bearings   rolamentos do eixo   cojinetes del husillo |  | turret   torreta   torreta |  | machine anchored   fundações da máquina   anclada de la maquina |  | workholding   fixação da peça   sujeción pieza |  | rigidity   rigidez   estabilidad |  | chatter   vibração   vibraciones |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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-|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| • UNACCEPTABLE CHIPS<br>• APARA DESADEQUADA<br>• VIRUTA INACEPTABLE | • WORKPIECE CONCERNS<br><br>• MATERIAL<br>• MATERIAL | • stringer / ribbons (light silver color)<br>• demasiado longas (cor de prata suave)<br>• mucho larga (color plata suave) | P↑                                         | P↑ | ⊗                                       |  |                                             | ⊗ | ⊗                                                     | ⊗ | ⊗             | ⊗ |                                                             |  |                                            |  |                                        |  |                                                    |  |                                                                |  |                                                                      |  |                                                     |  |                                                                   |  |                                           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# CODIFICATION SYSTEM FOR PCD TIPPED END MILLS

Sistema de codificação para fresas de metal duro com pontas de PCD | Sistema de codificación para fresas de carburo con puntas de PCD

Straight Flute example:

| D | S | N | S | 2 | 050 | 080 | 010 | 060 |
|---|---|---|---|---|-----|-----|-----|-----|
| 1 | 2 | 3 | 4 | 5 | 6   | 7   | 8   | 9   |

## 1 - Tool type

D - Diamond (PCD tipped)

## 2 - Design

B - Ball nose  
S - Straight

## 3 - Application

N - Non-ferrous materials

## 4 - Length of Shank

S - Short length  
L - Long length  
XL - Extra long length

## 5 - Flutes number (Z)

Example: Z = 1 ; Z = 2 ; Z = 3

## 6 - Cutting diameter ( $\varnothing D_c$ )

Example: 120 = 12,0 mm ; 008 = 0,8 mm

## 7 - Max cutting depth (L2 - on straight flute solid carbide)

060 = 6 mm ; 080 = 8 mm

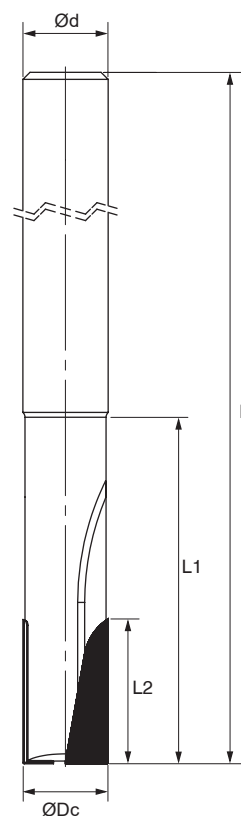
## 8 - Corner radius (Suppressed when it doesn't exist)

R... Example: R150 = 1,5 mm ; R015 = 0,15 mm

## 9 - Shank diameter (only on straight flute solid carbide)

Example: 060 = 6 mm

Straight Flute  
technical drawing example



|                   |                                 |
|-------------------|---------------------------------|
| $\varnothing D_c$ | Tool diameter                   |
| $\varnothing d$   | Shank diameter                  |
| L                 | Overall length                  |
| L2                | Tip length                      |
| r                 | Corner form (radius or chamfer) |

# PCD TIPPED END MILLS

Fresas de metal duro com pontas de PCD | Fresas de carburo con puntas de PCD



|                  |
|------------------|
| A                |
| MILLING          |
| Overview         |
| Face milling     |
| Hi-feed milling  |
| Shoulder milling |
| Profile milling  |
| Hardmill         |
| Center & Chamfer |
| Spot face        |
| Spare Parts      |
| Technical Data   |
| End Mills        |

HARDMILL BALL NOSE

A

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

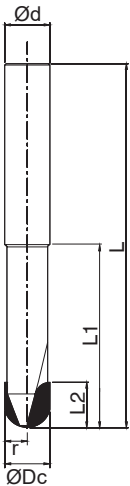
Center & Chamfer

Spot face

Spare Parts

Technical Data

End Mills



| (1)<br>Geometry<br>code | (2) Grade code         |   | N<br>PCD<br>D6<br>PDP410 | Dimensions   Dimensões   Dimensiones (mm) |    |     |    |    |      |
|-------------------------|------------------------|---|--------------------------|-------------------------------------------|----|-----|----|----|------|
|                         |                        |   |                          |                                           |    |     |    |    |      |
|                         |                        |   |                          | ØDc                                       | Ød | L   | L1 | L2 | r    |
| 1180079                 | DBNS 1 030 050 150 060 | 1 |                          | 3                                         | 3  | 60  | 30 | 5  | 1,50 |
| 1180080                 | DBNS 1 040 100 200 040 | 1 |                          | 4                                         | 4  | 60  | 30 | 10 | 2,00 |
| 1180081                 | DBNS 2 060 100 300 060 | 2 |                          | 6                                         | 6  | 80  | 40 | 10 | 3,00 |
| 1180082                 | DBNS 2 080 100 400 080 | 2 |                          | 8                                         | 8  | 80  | 40 | 10 | 4,00 |
| 1180083                 | DBNS 2 100 100 500 100 | 2 |                          | 10                                        | 10 | 80  | 40 | 10 | 5,00 |
| 1180084                 | DBNS 2 120 100 600 120 | 2 |                          | 12                                        | 12 | 100 | 60 | 10 | 6,00 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

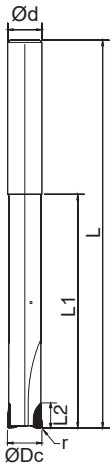
Order code = (1) Geometry Code + (2) Grade Code

| Material Group                      | Correction factor | V <sub>C</sub> (m/min) |
|-------------------------------------|-------------------|------------------------|
| Aluminium cast alloys 5% < Si ≤ 12% | 1,6               | 790-1000               |
| Aluminium cast alloys 12% < Si      | 1,5               | 790-1000               |
| Fibre-reinforced synthetics         | 1,0               | 400-500                |
| Graphite                            | 1,0               | 700-850                |

| ØD |                       |                       |
|----|-----------------------|-----------------------|
|    | f <sub>Z</sub> (mm/t) | f <sub>Z</sub> (mm/t) |
| 3  | 0,020                 | 0,022                 |
| 4  | 0,025                 | 0,028                 |
| 6  | 0,035                 | 0,040                 |
| 8  | 0,050                 | 0,055                 |
| 10 | 0,060                 | 0,070                 |
| 12 | 0,075                 | 0,078                 |

Please note that the value fz from the table above must be multiplied with the corresponding correction factor.

HARDMILL BULL NOSE



|                         |                        |   | N                                                                                  | Dimensions   Dimensões   Dimensiones (mm) |    |     |     |    |      |
|-------------------------|------------------------|---|------------------------------------------------------------------------------------|-------------------------------------------|----|-----|-----|----|------|
|                         |                        |   | PCD                                                                                |                                           |    |     |     |    |      |
| (1)<br>Geometry<br>code | (2)Grade code          |   | D6                                                                                 |                                           |    |     |     |    |      |
|                         |                        |   | PDP410                                                                             | ØDc                                       | Ød | L   | L1  | L2 | r    |
| 1180073                 | DSNS 1 030 050 030 040 | 1 |   | 3                                         | 4  | 60  | 30  | 5  | 0,30 |
| 1180075                 | DSNL 2 040 050 030 040 | 2 |   | 4                                         | 4  | 75  | 45  | 5  | 0,30 |
| 1180076                 | DSNL 2 060 060 030 060 | 2 |   | 6                                         | 6  | 100 | 60  | 6  | 0,30 |
| 1180077                 | DSNL 2 080 060 030 080 | 2 |   | 8                                         | 8  | 125 | 80  | 6  | 0,30 |
| 1180074                 | DSNL 2 100 060 050 100 | 2 |   | 10                                        | 10 | 150 | 100 | 6  | 0,30 |
| 1180078                 | DSNL 2 120 070 050 120 | 2 |  | 12                                        | 12 | 150 | 100 | 7  | 0,30 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Order code = (1) Geometry Code + (2) Grade Code

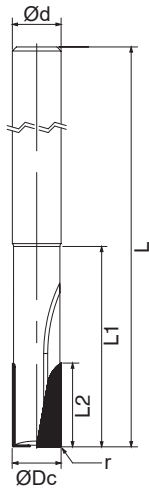
| Material Group                      | Correction factor | V <sub>C</sub> (m/min) |
|-------------------------------------|-------------------|------------------------|
| Aluminium cast alloys 5% < Si ≤ 12% | 1,6               | 790-1000               |
| Aluminium cast alloys 12% < Si      | 1,5               | 790-1000               |
| Fibre-reinforced synthetics         | 1,0               | 400-500                |
| Graphite                            | 1,0               | 700-850                |

| ØD | <br>a <sub>e</sub> = 0.2 x ØDc<br>a <sub>p</sub> = 0.1 x ØDc | <br>a <sub>p</sub> = 0.05 x ØDc |
|----|--------------------------------------------------------------|---------------------------------|
|    | f <sub>z</sub> (mm/t)                                        | f <sub>z</sub> (mm/t)           |
| 3  | 0,020                                                        | 0,022                           |
| 4  | 0,025                                                        | 0,028                           |
| 6  | 0,035                                                        | 0,040                           |
| 8  | 0,050                                                        | 0,055                           |
| 10 | 0,060                                                        | 0,070                           |
| 12 | 0,075                                                        | 0,078                           |

Please note that the value fz from the table above must be multiplied with the corresponding correction factor.

# HARDMILL STRAIGHT EDGE

NEW



|                              |                                       |   | N      | Dimensions   Dimensões   Dimensiones (mm) |    |     |      |    |      |
|------------------------------|---------------------------------------|---|--------|-------------------------------------------|----|-----|------|----|------|
|                              | <sup>(2)</sup> Grade code             |   | PCD    |                                           |    |     |      |    |      |
| <sup>(1)</sup> Geometry code | Reference<br>Referência<br>Referencia |   | D6     | ØDc                                       | Ød | L   | L1   | L2 | r    |
|                              |                                       |   | PDP410 |                                           |    |     |      |    |      |
| 1180011                      | DSNS 2 040 060 010 060                | 2 |        | 4                                         | 6  | 51  | 6,40 | 6  | 0,10 |
| 1180012                      | DSNS 2 050 080 010 060                | 2 |        | 5                                         | 6  | 51  | 8,40 | 8  | 0,10 |
| 1180006                      | DSNS 2 060 080 010 060                | 2 |        | 6                                         | 6  | 63  | 21   | 8  | 0,10 |
| 1180013                      | DSNS 2 080 080 010 080                | 2 |        | 8                                         | 8  | 63  | 27   | 8  | 0,10 |
| 1180014                      | DSNS 2 080 120 010 080                | 2 |        | 8                                         | 8  | 63  | 27   | 12 | 0,10 |
| 1180015                      | DSNS 2 100 080 010 100                | 2 |        | 10                                        | 10 | 72  | 32   | 8  | 0,10 |
| 1180016                      | DSNS 2 100 160 010 100                | 2 |        | 10                                        | 10 | 72  | 32   | 16 | 0,10 |
| 1180017                      | DSNS 2 120 080 010 120                | 2 |        | 12                                        | 12 | 83  | 38   | 8  | 0,10 |
| 1180018                      | DSNS 2 120 160 010 120                | 2 |        | 12                                        | 12 | 83  | 38   | 16 | 0,10 |
| 1180019                      | DSNS 3 140 080 010 140                | 3 |        | 14                                        | 14 | 83  | 38   | 8  | 0,10 |
| 1180020                      | DSNS 3 140 160 010 140                | 3 |        | 14                                        | 14 | 83  | 38   | 16 | 0,10 |
| 1180021                      | DSNS 3 160 120 010 160                | 3 |        | 16                                        | 16 | 100 | 52   | 12 | 0,10 |
| 1180022                      | DSNS 3 160 200 010 160                | 3 |        | 16                                        | 16 | 100 | 52   | 20 | 0,10 |

Stock item | Produto de stock | Itens de stock Available under request | Disponível sobre consulta | Disponible bajo consulta order code = (1) Geometry Code + (2) Grade Code

## NON-FERROUS MATERIALS | Materiais não ferrosos | Materiales no ferrosos

| ISO | Workpiece Material   | Vc (m/min) |      | fz (mm/t) |      | Coolant        |
|-----|----------------------|------------|------|-----------|------|----------------|
|     |                      | min        | max  | min       | max  |                |
| N   | Aluminium <6%Si      | 200        | 6000 | 0,05      | 0,30 | Emulsion / MQL |
|     | Aluminium <12%Si     | 200        | 4000 | 0,05      | 0,25 |                |
|     | Aluminium >12%Si     | 200        | 2000 | 0,05      | 0,20 |                |
|     | Cooper/Cooper Alloys | 250        | 3000 | 0,03      | 0,30 |                |

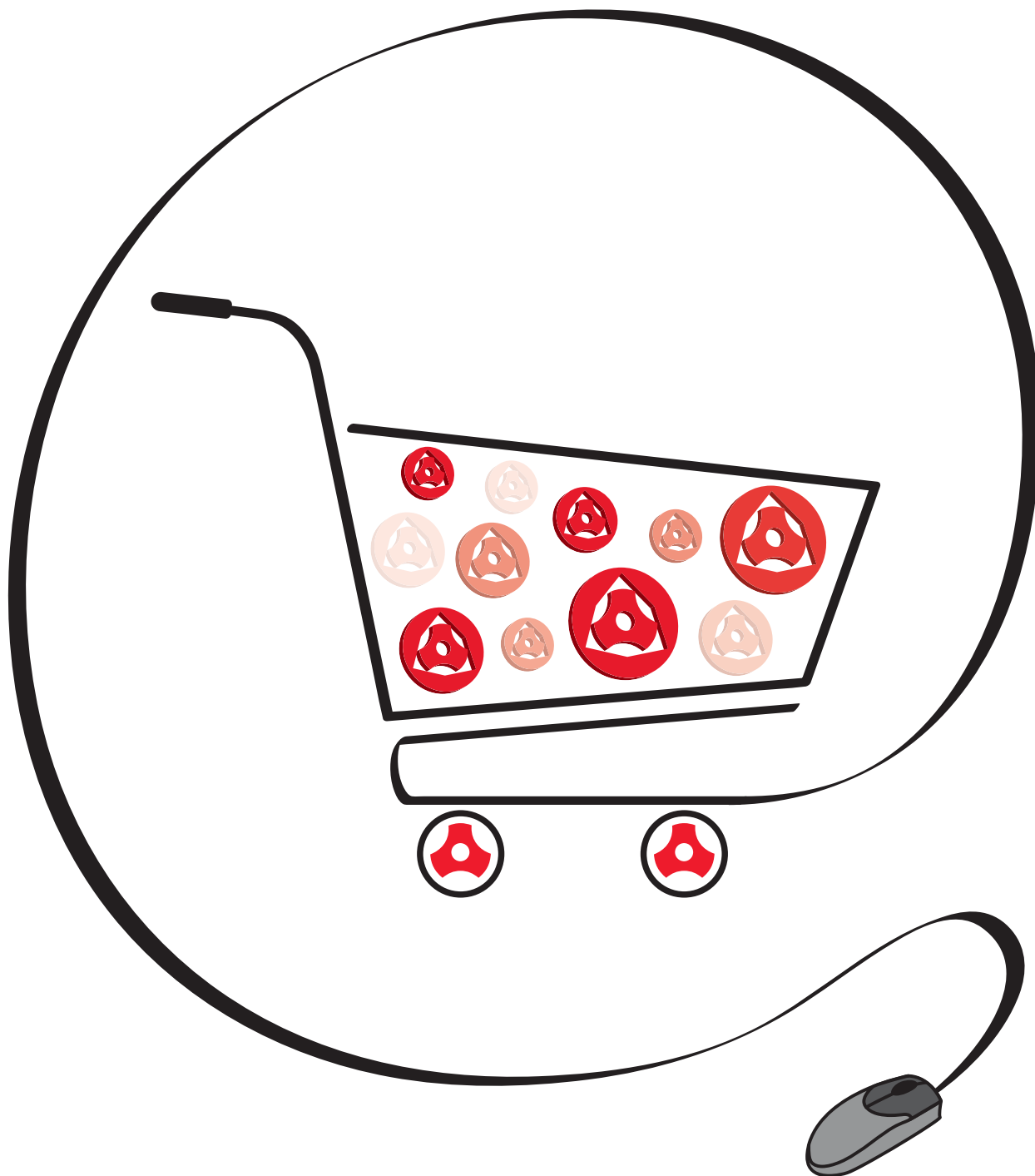
## SYNTHETICS MATERIALS | Materiais sintéticos | Materiales sintéticos

| ISO | Workpiece Material         | Vc (m/min) |      | fz (mm/t) |      | Coolant       |
|-----|----------------------------|------------|------|-----------|------|---------------|
|     |                            | min        | max  | min       | max  |               |
| N   | Graphit                    | 150        | 2500 | 0,05      | 0,40 | Dry/ Air      |
|     | GFRP, CFRP                 | 200        | 3000 | 0,05      | 0,40 | Dry/ Air      |
|     | Plastics (Termo/Duroplast) | 100        | 2500 | 0,05      | 0,30 | Emulsion/MQL  |
|     | Acrylic (PMMA)             | 100        | 1200 | 0,01      | 0,25 | Emulsion /MQL |
|     | Laminate                   | 100        | 1200 | 0,02      | 0,50 | Dry/Air       |

These recommended parameters are only approximate values. It can be necessary to adjust them regarding to the specific machining operation.

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# CODIFICATION SYSTEM FOR SOLID CARBIDE END MILLS

A

Sistema de codificação para fresas de metal duro para acabamento | Sistema de codificación para fresas de carburo para acabado

MILLING

Straight Flute example:

| H | F | 30 | G | S | 4 | 120 | 32 | R050 | - | W  |
|---|---|----|---|---|---|-----|----|------|---|----|
| 1 | 2 | 3  | 4 | 5 | 6 | 7   | 8  | 9    |   | 10 |

Integral Solid Carbide example:

Overview

## 1 - Tool type

H - Solid carbide end mill (Hard metal)

Face milling

## 2 - Design

F - Square form (Flat top)  
R - Square form with corner radius  
C - Square form with corner chamfer  
B - Ball nose  
CH - Conical Top  
XC - Conical Segment  
XT - Tangential Segment  
RO - Rougher

Hi-feed milling

Shoulder milling

## 3 - Helix Angle (Suppressed when it is 90°)

... - Degree of helix rounded to nearest 5 degree

Profile milling

## 4 - Application

A - Aluminium  
G - General application  
F - Finishing  
M - Steel  
S - Stainless steel  
H - Hard materials  
TSP - Trochoidal milling  
MIN - Micro milling

Hardmill

## 5 - Length of Shank

S - Short length  
L - Long length  
XL - Extra long length

Center & Chamfer

## 6 - Flutes number (Z)

Example: Z = 1 ; Z = 2 ; Z = 3 ;

Spot face

## 7 - Cutting diameter (ØDc)

Example: 120 = 12,0 mm ; 008 = 0,8 mm

Spare Parts

## 8 - Max cutting depth (ap)

Example: 04 = 4 mm ; 06 = 6 mm

Technical Data

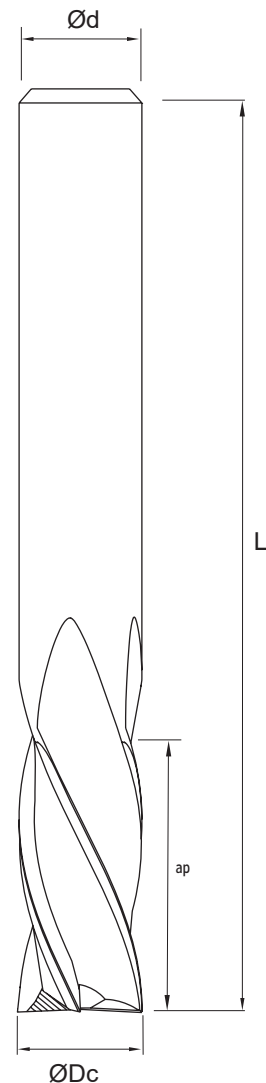
## 9 - Shank diameter (only on straight flute solid carbide)

Example for corner radius: R150 = 1,5 mm ; R015 = 0,15 mm  
Example for conical segment: 18RM120 -  $\alpha/2 = 18^\circ$  , RM = 1200 mm  
Example for tangential segment: RM090 - RM = 90 mm

End Mills

## 10 - Weldon (Suppressed when it doesn't exist)

Integral Solid Carbide  
technical drawing example



# SOLID CARBIDE END MILLS

Fresas de metal duro integral | Fresas de carburo monobloque



A

MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

Technical Data

End Mills

# SELECTION GUIDE FOR SOLID CARBIDE ENDMILLS

|                                                                                   | INTEG                                                                                         |                                                                                               |                                                                                               |                                                                                                       |                                                                                                    |                                                                                                    |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
|                                                                                   | General Purpose Endmills                                                                      |                                                                                               |                                                                                               |                                                                                                       |                                                                                                    |                                                                                                    |
|                                                                                   |              |              |              |                     |                 |                 |
|                                                                                   | HF30GS 2                                                                                      | HF30GS 4                                                                                      | HF30GXL 4                                                                                     | HR30GS 4                                                                                              | HB30GS 2                                                                                           | HB30GL 2                                                                                           |
| ØDc                                                                               | 2 - 20                                                                                        | 2 - 20                                                                                        | 2 - 12                                                                                        | 3 - 20                                                                                                | 2 - 12                                                                                             | 4 - 12                                                                                             |
|  | 2                                                                                             | 4                                                                                             | 4                                                                                             | 4                                                                                                     | 2                                                                                                  | 2                                                                                                  |
| Helix angle                                                                       | 30                                                                                            | 30                                                                                            | 30                                                                                            | 30                                                                                                    | 30                                                                                                 | 30                                                                                                 |
| Geometry                                                                          | <br>Square | <br>Square | <br>Square | <br>Corner radius | <br>Ball nose | <br>Ball nose |
| Grade                                                                             | PHP920                                                                                        | PHP920                                                                                        | PHP920                                                                                        | PHP920                                                                                                | PHP920                                                                                             | PHP920                                                                                             |
| Finishing                                                                         |            |            |            |                   |               |               |
| Roughing                                                                          |            |            |            |                   |               |               |
| P                                                                                 |            |            |            |                    |               |               |
| M                                                                                 |            |            |            |                    |               |               |
| K                                                                                 |            |            |            |                    |               |               |
| N                                                                                 |                                                                                               |                                                                                               |                                                                                               |                                                                                                       |                                                                                                    |                                                                                                    |
| S                                                                                 |                                                                                               |                                                                                               |                                                                                               |                                                                                                       |                                                                                                    |                                                                                                    |
| H                                                                                 |                                                                                               |                                                                                               |                                                                                               |                                                                                                       |                                                                                                    |                                                                                                    |
| Page                                                                              | A - 268                                                                                       | A - 269                                                                                       | A - 270                                                                                       | A - 271                                                                                               | A - 272                                                                                            | A - 272                                                                                            |

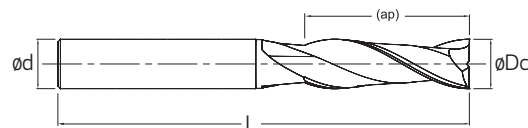
| INTEG                                                                               |                                                                                     |                                                                                     | FIN-INTEG                                                                           | MIN-INTEG                                                                             | CHAMF<br>INTEG                                                                        |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| General Purpose Endmills                                                            |                                                                                     |                                                                                     | Finishing<br>Endmills                                                               | Endmills for<br>Micro Machining                                                       | Endmills for<br>Chamferings                                                           |
|    |    |    |    |    |    |
| HB30GS 4                                                                            | HB30GL 4                                                                            | HRO45GS                                                                             | HC45FL                                                                              | HB30MINS                                                                              | HCHGS                                                                                 |
| 2 - 12                                                                              | 2 - 20                                                                              | 3 - 12                                                                              | 3 - 20                                                                              | 0,4 - 3,0                                                                             | 3 - 20                                                                                |
| 4                                                                                   | 4                                                                                   | 3 - 6                                                                               | 6                                                                                   | 2                                                                                     | 4                                                                                     |
| 30                                                                                  | 30                                                                                  | 45                                                                                  | 43 - 45                                                                             | 30                                                                                    | -                                                                                     |
|  |  |  |  |  |  |
| Ball nose                                                                           | Ball nose                                                                           | Rougher                                                                             | Corner chamfer                                                                      | Ball nose                                                                             | Conical Top                                                                           |
| PHP920                                                                              | PHP920                                                                              | PHU920                                                                              | PHP603   PHP920                                                                     | PHH603                                                                                | PHU920                                                                                |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |                                                                                       |
|                                                                                     |                                                                                     |                                                                                     |  |  |                                                                                       |
| A - 273                                                                             | A - 273                                                                             | A - 275                                                                             | A - 276                                                                             | A - 278                                                                               | A - 281                                                                               |

# SELECTION GUIDE FOR SOLID CARBIDE ENDMILLS

|                                                                                   | RAD-INTEG                                                                                             |                                                                                                       | DYN-INTEG                                                                                             | STEEL-INTEG                                                                                             |                                                                                                        |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|                                                                                   | Radial Segment Endmills                                                                               |                                                                                                       | Trochoidal Milling                                                                                    | Steel Specialized Endmills                                                                              |                                                                                                        |
|                                                                                   |                      |                      |                      |                      |                     |
|                                                                                   | HXC30GL                                                                                               | HXT30GL                                                                                               | HC40TSPL                                                                                              | HC35ML                                                                                                  | HR35GL                                                                                                 |
| ØDc                                                                               | 8 - 16                                                                                                | 6 - 16                                                                                                | 6 - 20                                                                                                | 1 - 20                                                                                                  | 12 - 20                                                                                                |
|  | 4                                                                                                     | 4                                                                                                     | 5                                                                                                     | 4                                                                                                       | 4                                                                                                      |
| Helix angle                                                                       | 30                                                                                                    | 30                                                                                                    | 40 - 41 - 42                                                                                          | 35 - 38                                                                                                 | 35 - 38                                                                                                |
| Geometry                                                                          | <br>Radial Segment | <br>Radial Segment | <br>Corner chamfer | <br>Corner chamfer | <br>Corner radius |
| Grade                                                                             | PHP920   PHH920                                                                                       | PHP920   PHH920                                                                                       | PHP920                                                                                                | PHP920                                                                                                  | PHP920                                                                                                 |
| Finishing                                                                         |                    |                    |                    |                    |                   |
| Roughing                                                                          |                    |                    |                    |                    |                   |
| P                                                                                 |                    |                    |                    |                    |                   |
| M                                                                                 |                    |                    |                                                                                                       |                                                                                                         |                                                                                                        |
| K                                                                                 |                    |                    |                    |                    |                   |
| N                                                                                 |                                                                                                       |                                                                                                       |                                                                                                       |                                                                                                         |                                                                                                        |
| S                                                                                 |                    |                    |                                                                                                       |                                                                                                         |                                                                                                        |
| H                                                                                 |                                                                                                       |                                                                                                       |                                                                                                       |                                                                                                         |                                                                                                        |
| Page                                                                              | A - 282                                                                                               | A - 282                                                                                               | A - 284                                                                                               | A - 285                                                                                                 | A - 286                                                                                                |

| INOX-INTEG                                                                                            |                                                                                                | AL-INTEG                                                                                              |                                                                                               | HARD-INTEG                                                                                      |                                                                                                    |
|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Stainless Steel Specialized Endmills                                                                  |                                                                                                | Aluminium Specialized Endmills                                                                        |                                                                                               | We Make It Hard                                                                                 |                                                                                                    |
|                      |               |                      |              |              |                 |
| HC40SS                                                                                                | HRO40SS                                                                                        | HC38AS                                                                                                | HF30AS                                                                                        | HF30HL                                                                                          | HB30HL                                                                                             |
| 2 - 20                                                                                                | 4 - 20                                                                                         | 2 - 20                                                                                                | 2 - 12                                                                                        | 4 - 12                                                                                          | 2 - 12                                                                                             |
| 4                                                                                                     | 4                                                                                              | 3                                                                                                     | 1                                                                                             | 4                                                                                               | 2                                                                                                  |
| 40 - 41                                                                                               | 39 - 41                                                                                        | 38                                                                                                    | 30                                                                                            | 30                                                                                              | 30                                                                                                 |
| <br>Corner chamfer | <br>Rougher | <br>Corner chamfer | <br>Square | <br>Square | <br>Ball nose |
| PHU920                                                                                                | PHU920                                                                                         | PH0920                                                                                                | PH0920                                                                                        | PHH603                                                                                          | PHH603                                                                                             |
|                    |             |                    |            |            |               |
|                    |             |                    |           |            |               |
|                                                                                                       |                                                                                                |                                                                                                       |                                                                                               |                                                                                                 |                                                                                                    |
|                    |             |                                                                                                       |                                                                                               |                                                                                                 |                                                                                                    |
|                                                                                                       |                                                                                                |                                                                                                       |                                                                                               |                                                                                                 |                                                                                                    |
|                                                                                                       |                                                                                                |                    |            |                                                                                                 |                                                                                                    |
|                                                                                                       |                                                                                                |                                                                                                       |                                                                                               |                                                                                                 |                                                                                                    |
|                                                                                                       |                                                                                                |                                                                                                       |                                                                                               |            |               |
| A - 287                                                                                               | A - 288                                                                                        | A - 289                                                                                               | A - 290                                                                                       | A - 291                                                                                         | A - 292                                                                                            |

## HF30GS 2 Flat top endmill



|                  |             | (2) Grade code                        |   | T1<br>PHP920 | Dimensions   Dimensões   Dimensiones (mm) |         |                   |     |
|------------------|-------------|---------------------------------------|---|--------------|-------------------------------------------|---------|-------------------|-----|
| (1) Order code   |             | Reference<br>Referência<br>Referencia |   |              |                                           |         |                   |     |
| HA (Cylindrical) | HB (Weldon) |                                       |   |              | ØDc                                       | Ød (h6) | ap <sub>max</sub> | L   |
| 1180587          | -           | HF30GS 2 020 06                       | 2 |              | 2                                         | 4       | 6                 | 38  |
| 1180588          | -           | HF30GS 2 030 12                       | 2 |              | 3                                         | 4       | 12                | 38  |
| 1180589          | -           | HF30GS 2 040 14                       | 2 |              | 4                                         | 4       | 14                | 50  |
| 1180590          | -           | HF30GS 2 050 16                       | 2 |              | 5                                         | 6       | 16                | 50  |
| 1180591          | -           | HF30GS 2 060 19                       | 2 |              | 6                                         | 6       | 19                | 50  |
| 1180592          | 1180532     | HF30GS 2 080 20                       | 2 |              | 8                                         | 8       | 20                | 63  |
| 1180593          | 1180533     | HF30GS 2 100 22                       | 2 |              | 10                                        | 10      | 22                | 75  |
| 1180594          | 1180534     | HF30GS 2 120 25                       | 2 |              | 12                                        | 12      | 25                | 75  |
| 1180595          | 1180535     | HF30GS 2 140 26                       | 2 |              | 14                                        | 14      | 26                | 83  |
| 1180596          | 1180536     | HF30GS 2 160 32                       | 2 |              | 16                                        | 16      | 32                | 89  |
| 1180597          | 1180537     | HF30GS 2 180 32                       | 2 |              | 18                                        | 18      | 32                | 92  |
| 1180598          | 1180538     | HF30GS 2 200 38                       | 2 |              | 20                                        | 20      | 38                | 104 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## HF30GS 4 Flat top endmill



|                  |             | (2) Grade code                        |   | T1<br>PHP920 | Dimensions   Dimensões   Dimensiones (mm) |         |                   |     |
|------------------|-------------|---------------------------------------|---|--------------|-------------------------------------------|---------|-------------------|-----|
| (1) Order code   |             | Reference<br>Referência<br>Referencia |   |              | ØDc                                       | Ød (h6) | ap <sub>max</sub> | L   |
| HA (Cylindrical) | HB (Weldon) |                                       |   |              |                                           |         |                   |     |
| 1180262          | -           | HF30GS 4 020 06                       | 4 | ⊗            | 2                                         | 4       | 6                 | 38  |
| 1180219          | -           | HF30GS 4 030 12                       | 4 | ⊗            | 3                                         | 4       | 12                | 38  |
| 1180215          | -           | HF30GS 4 040 14                       | 4 | ⊗            | 4                                         | 4       | 14                | 50  |
| 1180195          | -           | HF30GS 4 050 16                       | 4 | ⊗            | 5                                         | 6       | 16                | 50  |
| 1180263          | -           | HF30GS 4 060 19                       | 4 | ⊗            | 6                                         | 6       | 19                | 50  |
| 1180223          | 1180605     | HF30GS 4 070 19                       | 4 | ○            | 7                                         | 8       | 19                | 63  |
| 1180202          | 1180544     | HF30GS 4 080 20                       | 4 | ⊗            | 8                                         | 8       | 20                | 63  |
| 1180224          | 1180606     | HF30GS 4 090 22                       | 4 | ○            | 9                                         | 10      | 22                | 75  |
| 1180216          | 1180545     | HF30GS 4 100 22                       | 4 | ⊗            | 10                                        | 10      | 22                | 75  |
| 1180264          | 1180546     | HF30GS 4 120 25                       | 4 | ⊗            | 12                                        | 12      | 25                | 75  |
| 1180220          | 1180547     | HF30GS 4 140 26                       | 4 | ⊗            | 14                                        | 14      | 26                | 83  |
| 1180129          | 1180548     | HF30GS 4 160 32                       | 4 | ⊗            | 16                                        | 16      | 32                | 89  |
| 1180221          | 1180549     | HF30GS 4 180 32                       | 4 | ⊗            | 18                                        | 18      | 32                | 92  |
| 1180222          | 1180550     | HF30GS 4 200 38                       | 4 | ⊗            | 20                                        | 20      | 38                | 104 |

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request | Disponível sobre consulta | Disponible bajo consulta

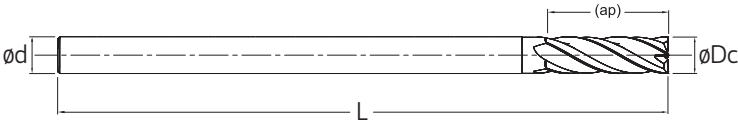
Endmill order code = (1) Geometry Code + (2) Grade Code



HF30GXL 4 Flat top endmill



All order codes are cylindrical shank.  
Weldon shank available under request.



| (1)<br>Geometry code | (2) Grade code                        |   | T1     |        | Dimensions   Dimensões   Dimensiones (mm) |         |                   |     |
|----------------------|---------------------------------------|---|--------|--------|-------------------------------------------|---------|-------------------|-----|
|                      | Reference<br>Referência<br>Referencia |   | PHP920 | PH7920 | ØDc                                       | Ød (h6) | ap <sub>max</sub> | L   |
|                      |                                       |   |        |        |                                           |         |                   |     |
| 1180708              | HF30GXL 4 020 09                      | 4 |        |        | 2                                         | 4       | 9                 | 100 |
| 1180265              | HF30GXL 4 030 12                      | 4 |        |        | 3                                         | 6       | 12                | 100 |
| 1180266              | HF30GXL 4 040 16                      | 4 |        |        | 4                                         | 6       | 16                | 100 |
| 1180267              | HF30GXL 4 050 20                      | 4 |        |        | 5                                         | 6       | 20                | 100 |
| 1180268              | HF30GXL 4 060 20                      | 4 |        |        | 6                                         | 6       | 20                | 100 |
| 1180269              | HF30GXL 4 080 20                      | 4 |        |        | 8                                         | 8       | 20                | 120 |
| 1180270              | HF30GXL 4 100 25                      | 4 |        |        | 10                                        | 10      | 25                | 120 |
| 1180057              | HF30GXL 4 120 30                      | 4 |        |        | 12                                        | 12      | 30                | 120 |

Stock item | Produto de stock  
Itens de stock      Stock available until sold out | Stock disponível até acabar o stock  
Stock disponible hasta acabar el stock      Available under request | Disponível sobre consulta  
Disponível bajo consulta      Endmill order code = (1) Geometry Code + (2) Grade Code

## HR30GS 4 Round corner endmill



All order codes are cylindrical shank.  
Weldon shank available under request.

| (1)<br>Geometry code | (2) Grade code                        |   | T1<br>PHP920 | Dimensions   Dimensões   Dimensiones (mm) |         |        |      |     |
|----------------------|---------------------------------------|---|--------------|-------------------------------------------|---------|--------|------|-----|
|                      | Reference<br>Referência<br>Referencia |   |              | ØDc                                       | Ød (h6) | ap max | R    | L   |
| 1180231              | HR30GS 4 030 12 R025                  | 4 | ○            | 3                                         | 4       | 12     | 0,25 | 50  |
| 1180232              | HR30GS 4 030 12 R050                  | 4 | ○            | 3                                         | 4       | 12     | 0,5  | 50  |
| 1180233              | HR30GS 4 040 14 R025                  | 4 | ○            | 4                                         | 4       | 14     | 0,25 | 50  |
| 1180234              | HR30GS 4 040 14 R050                  | 4 | ○            | 4                                         | 4       | 14     | 0,5  | 50  |
| 1180235              | HR30GS 4 050 16 R025                  | 4 | ○            | 5                                         | 6       | 16     | 0,25 | 50  |
| 1180236              | HR30GS 4 050 16 R050                  | 4 | ○            | 5                                         | 6       | 16     | 0,5  | 50  |
| 1180237              | HR30GS 4 060 19 R050                  | 4 | ⊗            | 6                                         | 6       | 19     | 0,5  | 50  |
| 1180238              | HR30GS 4 060 19 R100                  | 4 | ⊗            | 6                                         | 6       | 19     | 1    | 50  |
| 1180239              | HR30GS 4 070 19 R050                  | 4 | ○            | 7                                         | 8       | 19     | 0,5  | 63  |
| 1180240              | HR30GS 4 070 19 R100                  | 4 | ○            | 7                                         | 8       | 19     | 1    | 63  |
| 1180241              | HR30GS 4 080 20 R050                  | 4 | ⊗            | 8                                         | 8       | 20     | 0,5  | 63  |
| 1180242              | HR30GS 4 080 20 R100                  | 4 | ⊗            | 8                                         | 8       | 20     | 1    | 63  |
| 1180243              | HR30GS 4 090 22 R050                  | 4 | ○            | 9                                         | 10      | 22     | 0,5  | 75  |
| 1180244              | HR30GS 4 090 22 R100                  | 4 | ○            | 9                                         | 10      | 22     | 1    | 75  |
| 1180245              | HR30GS 4 100 22 R100                  | 4 | ⊗            | 10                                        | 10      | 22     | 1    | 75  |
| 1180246              | HR30GS 4 100 22 R200                  | 4 | ⊗            | 10                                        | 10      | 22     | 2    | 75  |
| 1180247              | HR30GS 4 120 25 R100                  | 4 | ⊗            | 12                                        | 12      | 25     | 1    | 75  |
| 1180248              | HR30GS 4 120 25 R200                  | 4 | ⊗            | 12                                        | 12      | 25     | 2    | 75  |
| 1180249              | HR30GS 4 140 26 R100                  | 4 | ○            | 14                                        | 14      | 26     | 1    | 83  |
| 1180250              | HR30GS 4 140 26 R200                  | 4 | ○            | 14                                        | 14      | 26     | 2    | 83  |
| 1180251              | HR30GS 4 160 32 R100                  | 4 | ⊗            | 16                                        | 16      | 32     | 1    | 89  |
| 1180252              | HR30GS 4 160 32 R200                  | 4 | ⊗            | 16                                        | 16      | 32     | 2    | 89  |
| 1180253              | HR30GS 4 180 32 R100                  | 4 | ○            | 18                                        | 18      | 32     | 1    | 92  |
| 1180254              | HR30GS 4 180 32 R200                  | 4 | ○            | 18                                        | 18      | 32     | 2    | 92  |
| 1180255              | HR30GS 4 200 38 R100                  | 4 | ⊗            | 20                                        | 20      | 38     | 1    | 104 |
| 1180256              | HR30GS 4 200 38 R200                  | 4 | ⊗            | 20                                        | 20      | 38     | 2    | 104 |

⊗ Stock item | Produto de stock | Itens de stock      ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## HB30GS 2 Ball nose endmill



P M K



Short



2



30°

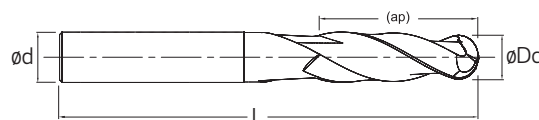


Ball nose



< 45 HRC

All order codes are cylindrical shank.  
Weldon shank available under request.



|                   | (2) Grade code                        |   | T1     | G4     | Dimensions   Dimensões   Dimensiones (mm) |         |        |    |
|-------------------|---------------------------------------|---|--------|--------|-------------------------------------------|---------|--------|----|
| (1) Geometry code | Reference<br>Referência<br>Referencia |   | PHP920 | PH7920 | ØDc                                       | Ød (h6) | ap max | L  |
| 1180278           | HB30GS 2 020 06                       | 2 | ○      | △      | 2                                         | 3       | 6      | 38 |
| 1180279           | HB30GS 2 030 12                       | 2 | ○      | △      | 3                                         | 3       | 12     | 38 |
| 1180280           | HB30GS 2 040 14                       | 2 | ○      | △      | 4                                         | 4       | 14     | 50 |
| 1180281           | HB30GS 2 050 16                       | 2 | ⊗      |        | 5                                         | 6       | 16     | 50 |
| 1180282           | HB30GS 2 060 19                       | 2 | ○      | △      | 6                                         | 6       | 19     | 50 |
| 1180283           | HB30GS 2 080 20                       | 2 | ⊗      |        | 8                                         | 8       | 20     | 63 |
| 1180284           | HB30GS 2 100 22                       | 2 | ⊗      |        | 10                                        | 10      | 22     | 75 |
| 1180285           | HB30GS 2 120 25                       | 2 | ⊗      |        | 12                                        | 12      | 25     | 75 |

△ Stock item | Produto de stock  
Itens de stock

△ Stock available until sold out | Stock disponível até acabar o stock  
Stock disponible hasta acabar el stock

○ Available under request | Disponível sobre consulta  
Disponível bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## HB30GL 2 Ball nose endmill



P M K



Long



2



30°

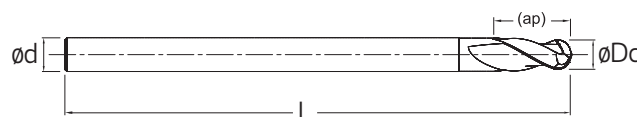


Ball nose



< 45 HRC

All order codes are cylindrical shank.  
Weldon shank available under request.



|                   | (2) Grade code                        |   | T1     | Dimensions   Dimensões   Dimensiones (mm) |         |        |     |
|-------------------|---------------------------------------|---|--------|-------------------------------------------|---------|--------|-----|
| (1) Geometry code | Reference<br>Referência<br>Referencia |   | PHP920 | ØDc                                       | Ød (h6) | ap max | L   |
| 1180286           | HB30GL 2 040 08                       | 2 | ⊗      | 4                                         | 6       | 8      | 70  |
| 1180128           | HB30GL 2 060 12                       | 2 | ⊗      | 6                                         | 6       | 12     | 75  |
| 1180029           | HB30GL 2 080 14                       | 2 | ⊗      | 8                                         | 8       | 14     | 100 |
| 1180030           | HB30GL 2 100 18                       | 2 | ⊗      | 10                                        | 10      | 18     | 100 |
| 1180031           | HB30GL 2 120 22                       | 2 | ⊗      | 12                                        | 12      | 22     | 100 |

△ Stock item | Produto de stock  
Itens de stock

△ Stock available until sold out | Stock disponível até acabar o stock  
Stock disponible hasta acabar el stock

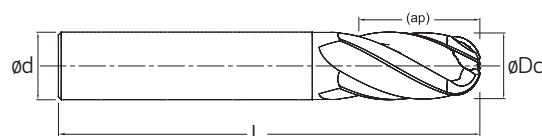
○ Available under request | Disponível sobre consulta  
Disponível bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## HB30GS 4 Ball nose endmill



All order codes are cylindrical shank.  
Weldon shank available under request.



| (1)<br>Geometry code | (2) Grade code                        |   | T1<br>PHP920 | Dimensions   Dimensões   Dimensiones (mm) |         |        |    |
|----------------------|---------------------------------------|---|--------------|-------------------------------------------|---------|--------|----|
|                      | Reference<br>Referência<br>Referencia |   |              | ØDc                                       | Ød (h6) | ap max | L  |
| 1180156              | HB30GS 4 020 03                       | 4 | ⊗            | 2                                         | 4       | 3      | 50 |
| 1180157              | HB30GS 4 030 05                       | 4 | ⊗            | 3                                         | 4       | 5      | 50 |
| 1180068              | HB30GS 4 040 06                       | 4 | ⊗            | 4                                         | 6       | 6      | 60 |
| 1180272              | HB30GS 4 060 09                       | 4 | ⊗            | 6                                         | 6       | 9      | 60 |
| 1180066              | HB30GS 4 080 16                       | 4 | ⊗            | 8                                         | 8       | 16     | 63 |
| 1180432              | HB30GS 4 100 20                       | 4 | ⊗            | 10                                        | 10      | 20     | 75 |
| 1180287              | HB30GS 4 120 25                       | 4 | ⊗            | 12                                        | 12      | 25     | 75 |

⊗ Stock item | Produto de stock | Itens de stock

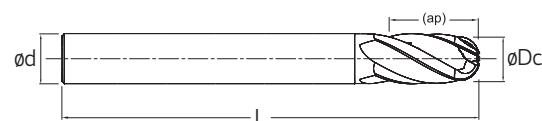
○ Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## HB30GL 4 Ball nose endmill



All order codes are cylindrical shank.  
Weldon shank available under request.



| (1)<br>Geometry code | (2) Grade code                        |   | T1<br>PHP920 | Dimensions   Dimensões   Dimensiones (mm) |         |        |     |
|----------------------|---------------------------------------|---|--------------|-------------------------------------------|---------|--------|-----|
|                      | Reference<br>Referência<br>Referencia |   |              | ØDc                                       | Ød (h6) | ap max | L   |
| 1180273              | HB30GL 4 020 04                       | 4 | ⊗            | 2                                         | 4       | 4      | 75  |
| 1180274              | HB30GL 4 030 08                       | 4 | ⊗            | 3                                         | 4       | 8      | 75  |
| 1180275              | HB30GL 4 040 11                       | 4 | ○            | 4                                         | 4       | 11     | 75  |
| 1180150              | HB30GL 4 050 13                       | 4 | ⊗            | 5                                         | 6       | 13     | 75  |
| 1180032              | HB30GL 4 060 13                       | 4 | ⊗            | 6                                         | 6       | 13     | 75  |
| 1180064              | HB30GL 4 080 16                       | 4 | ⊗            | 8                                         | 8       | 16     | 100 |
| 1180065              | HB30GL 4 100 16                       | 4 | ⊗            | 10                                        | 10      | 16     | 100 |
| 1180071              | HB30GL 4 120 25                       | 4 | ⊗            | 12                                        | 12      | 25     | 100 |
| 1180276              | HB30GL 4 160 32                       | 4 | ⊗            | 16                                        | 16      | 32     | 120 |
| 1180277              | HB30GL 4 200 38                       | 4 | ⊗            | 20                                        | 20      | 38     | 120 |

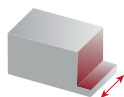
⊗ Stock item | Produto de stock | Itens de stock

○ Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

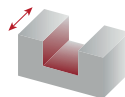
## CUTTING PARAMETERS || Parâmetros de corte | Parámetros de corte

### Side Milling



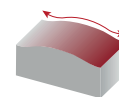
Finishing:  $a_e < 0,15 \times D_c$   
Semi-finishing:  $0,15 \times D_c < a_e < 0,3 \times D_c$   
Roughing:  $a_e > 0,3 \times D_c$

### Slotting



$a_e = 100\% \times D_c$

### Copying



Finishing:  $a_e < 0,20 \times D_c$   
 $a_p < 0,03 \times D_c$   
Semi-finishing:  $0,20 \times D_c < a_e < 0,40 \times D_c$   
 $0,03 \times D_c < a_p < 0,10 \times D_c$   
Roughing:  $a_e > 0,40 \times D_c$   
 $a_p > 0,10 \times D_c$

$\alpha$ : Surface inclination angle.

| ISO | Material                                     | fz (mm/t)          |                    |                    |                    |                     |                     |
|-----|----------------------------------------------|--------------------|--------------------|--------------------|--------------------|---------------------|---------------------|
|     |                                              | Side Milling       |                    |                    | Slotting           | Copying             |                     |
|     |                                              | $a_e = 12,5\%$     | $a_e = 25\%$       | $a_e = 50\%$       | $a_e = 100\%$      | $\alpha < 15^\circ$ | $\alpha > 15^\circ$ |
| P   | Unalloyed Steel                              | $0,009 \times D_c$ | $0,008 \times D_c$ | $0,005 \times D_c$ | $0,004 \times D_c$ | $0,012 \times D_c$  | $0,004 \times D_c$  |
|     | Low-Alloyed Steel                            | $0,008 \times D_c$ | $0,007 \times D_c$ | $0,004 \times D_c$ | $0,003 \times D_c$ | $0,010 \times D_c$  | $0,003 \times D_c$  |
|     | High-Alloyed Steel                           | $0,007 \times D_c$ | $0,006 \times D_c$ | $0,004 \times D_c$ | $0,003 \times D_c$ | $0,009 \times D_c$  | $0,003 \times D_c$  |
| M   | Stainless Steel (Ferritic / Martensitic)     | $0,007 \times D_c$ | $0,006 \times D_c$ | $0,004 \times D_c$ | $0,003 \times D_c$ | $0,009 \times D_c$  | $0,003 \times D_c$  |
|     | Stainless Steel (Austenitic)                 | $0,005 \times D_c$ | $0,005 \times D_c$ | $0,003 \times D_c$ | $0,002 \times D_c$ | $0,007 \times D_c$  | $0,002 \times D_c$  |
|     | Stainless Steel (Austenitic/Ferritic/Duplex) | $0,004 \times D_c$ | $0,004 \times D_c$ | $0,002 \times D_c$ | $0,002 \times D_c$ | $0,006 \times D_c$  | $0,002 \times D_c$  |
| K   | Malleable Cast Iron                          | $0,009 \times D_c$ | $0,008 \times D_c$ | $0,005 \times D_c$ | $0,004 \times D_c$ | $0,012 \times D_c$  | $0,004 \times D_c$  |
|     | Grey Cast Iron                               | $0,009 \times D_c$ | $0,008 \times D_c$ | $0,005 \times D_c$ | $0,004 \times D_c$ | $0,012 \times D_c$  | $0,004 \times D_c$  |
|     | Nodular Cast Iron                            | $0,008 \times D_c$ | $0,008 \times D_c$ | $0,004 \times D_c$ | $0,004 \times D_c$ | $0,011 \times D_c$  | $0,004 \times D_c$  |

(Note 1) Side milling and slotting feed valid for when the endmill works with its whole  $a_p$ , for when the endmill is working with lower depths of cut consider increasing the feed up to 25%.

(Note 2) Copying feed valid for low  $a_p$  ( $a_p / D < 0,1$ ), for higher  $a_p$  consider decreasing the feed by 50%.

| ISO | Material                                     | Vc (m/min)     |              |              |               |                                             |                                           |                                             |                                             |
|-----|----------------------------------------------|----------------|--------------|--------------|---------------|---------------------------------------------|-------------------------------------------|---------------------------------------------|---------------------------------------------|
|     |                                              | Side Milling   |              |              | Slotting      | Copying                                     |                                           |                                             |                                             |
|     |                                              | $a_e = 12,5\%$ | $a_e = 25\%$ | $a_e = 50\%$ | $a_e = 100\%$ | $a_p = 0,05\phi D_c$<br>$\alpha < 15^\circ$ | $a_p = 0,25\phi D$<br>$\alpha < 15^\circ$ | $a_p = 0,05\phi D_c$<br>$\alpha > 15^\circ$ | $a_p = 0,25\phi D_c$<br>$\alpha > 15^\circ$ |
| P   | Unalloyed Steel                              | 200            | 190          | 180          | 150           | 480                                         | 240                                       | 320                                         | 160                                         |
|     | Low-Alloyed Steel                            | 190            | 180          | 160          | 130           | 440                                         | 220                                       | 290                                         | 150                                         |
|     | High-Alloyed Steel                           | 170            | 160          | 150          | 120           | 400                                         | 200                                       | 260                                         | 130                                         |
| M   | Stainless Steel (Ferritic / Martensitic)     | 150            | 140          | 130          | 110           | 360                                         | 180                                       | 240                                         | 120                                         |
|     | Stainless Steel (Austenitic)                 | 120            | 110          | 100          | 80            | 290                                         | 140                                       | 190                                         | 100                                         |
|     | Stainless Steel (Austenitic/Ferritic/Duplex) | 100            | 100          | 80           | 70            | 250                                         | 120                                       | 160                                         | 80                                          |
| K   | Malleable Cast Iron                          | 240            | 230          | 220          | 170           | 580                                         | 290                                       | 380                                         | 190                                         |
|     | Grey Cast Iron                               | 230            | 230          | 210          | 170           | 560                                         | 280                                       | 380                                         | 190                                         |
|     | Nodular Cast Iron                            | 220            | 210          | 190          | 160           | 520                                         | 260                                       | 350                                         | 170                                         |

(Note 3) Table valid for PHP920 grade, for PH7920 consider reducing the cutting velocity by 10 m/min.

(Note 4) Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.

(Note 5) For copying, spindle speed is calculated as follows:  $n = \frac{V_c \times 1000}{\pi \times 2 \sqrt{a_p(D_c - a_p)}}$

## HRO45GS Rougher endmill



Short



3 - 6



Helix 45°



Reduced Neck Ø



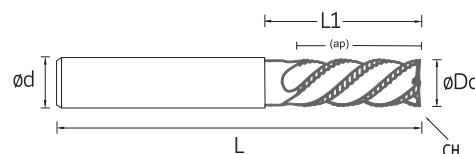
Rougher



Corner Chamfer



&lt; 45 HRC



|                           |             | <sup>(2)</sup> Grade code             |   | Z9     | Dimensions   Dimensões   Dimensiones (mm) |    |        |            |    |     |
|---------------------------|-------------|---------------------------------------|---|--------|-------------------------------------------|----|--------|------------|----|-----|
| <sup>(1)</sup> Order code |             | Reference<br>Referência<br>Referencia |   | PHU920 |                                           |    |        |            |    |     |
| HA (Cylindrical)          | HB (Weldon) |                                       |   |        | ØDc                                       | Ød | ap max | CH         | L1 | L   |
| 1180557                   | 1180558     | HRO45GS 3 030 08                      | 3 |        | 3                                         | 6  | 8      | 0,15 x 45° | 15 | 57  |
| 1180559                   | 1180560     | HRO45GS 4 040 11                      | 4 |        | 4                                         | 6  | 11     | 0,15 x 45° | 17 | 57  |
| 1180561                   | 1180562     | HRO45GS 4 050 13                      | 4 |        | 5                                         | 6  | 13     | 0,15 x 45° | 19 | 57  |
| 1180439                   | 1180563     | HRO45GS 4 060 13                      | 4 |        | 6                                         | 6  | 13     | 0,15 x 45° | 21 | 57  |
| 1180440                   | 1180564     | HRO45GS 4 080 19                      | 4 |        | 8                                         | 8  | 19     | 0,15 x 45° | 27 | 63  |
| 1180441                   | 1180565     | HRO45GS 4 100 22                      | 4 |        | 10                                        | 10 | 22     | 0,20 x 45° | 32 | 72  |
| 1180374                   | 1180465     | HRO45GS 4 120 26                      | 4 |        | 12                                        | 12 | 26     | 0,20 x 45° | 38 | 83  |
| 1180566                   | 1180567     | HRO45GS 5 160 32                      | 5 |        | 16                                        | 16 | 32     | 0,35 x 45° | 44 | 92  |
| 1180568                   | 1180569     | HRO45GS 6 200 38                      | 6 |        | 20                                        | 20 | 38     | 0,60 x 45° | 54 | 104 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | Material                                     | fz (mm/t)   |             |             | Vc (m/min) |          |           |
|-----|----------------------------------------------|-------------|-------------|-------------|------------|----------|-----------|
|     |                                              | ae = 25%    | ae = 50%    | ae = 100%   | ae = 25%   | ae = 50% | ae = 100% |
| P   | Unalloyed Steel                              | 0,008 x ØDc | 0,007 x ØDc | 0,005 x ØDc | 170        | 160      | 140       |
|     | Low-Alloyed Steel                            | 0,007 x ØDc | 0,006 x ØDc | 0,004 x ØDc | 150        | 140      | 120       |
|     | High-Alloyed Steel                           | 0,006 x ØDc | 0,005 x ØDc | 0,004 x ØDc | 130        | 120      | 100       |
| M   | Stainless Steel (Ferritic / Martensitic)     | 0,006 x ØDc | 0,005 x ØDc | 0,004 x ØDc | 110        | 110      | 90        |
|     | Stainless Steel (Austenitic)                 | 0,005 x ØDc | 0,004 x ØDc | 0,003 x ØDc | 100        | 90       | 80        |
|     | Stainless Steel (Austenitic/Ferritic/Duplex) | 0,004 x ØDc | 0,003 x ØDc | 0,002 x ØDc | 80         | 80       | 70        |
| K   | Malleable Cast Iron                          | 0,008 x ØDc | 0,007 x ØDc | 0,005 x ØDc | 200        | 190      | 170       |
|     | Grey Cast Iron                               | 0,008 x ØDc | 0,007 x ØDc | 0,005 x ØDc | 200        | 190      | 160       |
|     | Nodular Cast Iron                            | 0,008 x ØDc | 0,007 x ØDc | 0,004 x ØDc | 180        | 170      | 150       |

## HC45FL Corner chamfer finishing endmills



Long



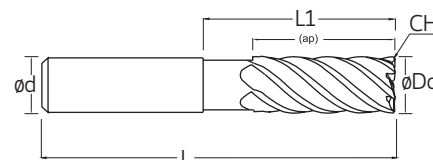
6

Variable Helix  
43° - 45°Reduced  
Neck Ø

Corner Chamfer



&lt; 60 HRC



All order codes are cylindrical shank.  
Weldon shank available under request.

| (1)<br>Geometry code | (2) Grade code                        |   | T1     |              | Dimensions   Dimensões   Dimensiones (mm) |         |                   |            |    |     |
|----------------------|---------------------------------------|---|--------|--------------|-------------------------------------------|---------|-------------------|------------|----|-----|
|                      | Reference<br>Referência<br>Referencia |   | PHP920 | X7<br>PHP603 | ØDc                                       | Ød (h6) | ap <sub>max</sub> | CH         | L1 | L   |
|                      |                                       |   |        |              |                                           |         |                   |            |    |     |
| 1180845              | HC45FL 6 030 08                       | 6 |        |              | 3                                         | 6       | 8                 | 0,15 x 45° | 15 | 57  |
| 1180846              | HC45FL 6 040 11                       | 6 |        |              | 4                                         | 6       | 11                | 0,15 x 45° | 17 | 57  |
| 1180847              | HC45FL 6 050 13                       | 6 |        |              | 5                                         | 6       | 13                | 0,15 x 45° | 19 | 57  |
| 1180342              | HC45FL 6 060 13                       | 6 |        |              | 6                                         | 6       | 13                | 0,15 x 45° | 21 | 57  |
| 1180062              | HC45FL 6 080 19                       | 6 |        |              | 8                                         | 8       | 19                | 0,15 x 45° | 28 | 63  |
| 1180344              | HC45FL 6 100 22                       | 6 |        |              | 10                                        | 10      | 22                | 0,20 x 45° | 30 | 72  |
| 1180343              | HC45FL 6 120 26                       | 6 |        |              | 12                                        | 12      | 26                | 0,20 x 45° | 34 | 83  |
| 1180848              | HC45FL 6 160 32                       | 6 |        |              | 16                                        | 16      | 32                | 0,35 x 45° | 44 | 92  |
| 1180849              | HC45FL 6 200 38                       | 6 |        |              | 20                                        | 20      | 38                | 0,60 x 45° | 54 | 104 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code



PDF



VIDEO

## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | Material                                     | Grades |        |
|-----|----------------------------------------------|--------|--------|
|     |                                              | PHP603 | PHP920 |
| P   | Unalloyed Steel                              | Ⓐ      | Ⓐ      |
|     | Low-Alloyed Steel                            | Ⓐ      | Ⓐ      |
|     | High-Alloyed Steel                           | Ⓐ      | Ⓐ      |
| M   | Stainless Steel (Ferritic / Martensitic)     | Ⓐ      | Ⓐ      |
|     | Stainless Steel (Austenitic)                 | Ⓐ      | Ⓐ      |
|     | Stainless Steel (Austenitic/Ferritic/Duplex) | Ⓐ      | Ⓐ      |
| K   | Malleable Cast Iron                          | Ⓐ      | Ⓐ      |
|     | Grey Cast Iron                               | Ⓐ      | Ⓐ      |
|     | Nodular Cast Iron                            | Ⓐ      | Ⓐ      |
| H   | Hardened Steels                              | Ⓐ      |        |

Ⓐ First choice | 1ª Escolha | 1ª Opción

Ⓐ Suitable | Adequado | Adecuado

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | Material                                     | Vc (m/min) |        | fz (mm/t)   |
|-----|----------------------------------------------|------------|--------|-------------|
|     |                                              | PHP603     | PHP920 |             |
| P   | Unalloyed Steel                              | 200        | 190    | 0,009 x ØDc |
|     | Low-Alloyed Steel                            | 170        | 160    | 0,007 x ØDc |
|     | High-Alloyed Steel                           | 140        | 130    | 0,005 x ØDc |
| M   | Stainless Steel (Ferritic / Martensitic)     | 130        | 120    | 0,006 x ØDc |
|     | Stainless Steel (Austenitic)                 | 120        | 110    | 0,005 x ØDc |
|     | Stainless Steel (Austenitic/Ferritic/Duplex) | 90         | 90     | 0,004 x ØDc |
| K   | Malleable Cast Iron                          | 240        | 230    | 0,009 x ØDc |
|     | Grey Cast Iron                               | 240        | 230    | 0,009 x ØDc |
|     | Nodular Cast Iron                            | 200        | 190    | 0,008 x ØDc |
| H   | Hardened Steels                              | 80         |        | 0,004 x ØDc |

Note<sup>1</sup>: Feed valid for when the endmill works with its whole ap, for when the endmill is working with lower depths of cut consider increasing the feed up to 25%.

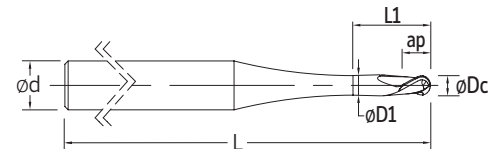
Note<sup>2</sup>: Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.



## HB30MINS Short neck endmills for micro machining



All order codes are cylindrical shank.  
Weldon shank available under request.



| (1)<br>Geometry code | (2) Grade code                        |   | X4 | Dimensions   Dimensões   Dimensiones (mm) |         |      |     |     |    |
|----------------------|---------------------------------------|---|----|-------------------------------------------|---------|------|-----|-----|----|
|                      | Reference<br>Referência<br>Referencia |   |    | ØDc                                       | Ød (h6) | D1   | ap  | L1  | L  |
| 1180769              | HB30MINS 2 004 01 020                 | 2 | ⊗  | 0,4                                       | 4       | 0,37 | 0,4 | 1,0 | 50 |
| 1180297              | HB30MINS 2 005 01 015                 | 2 | ⊗  | 0,5                                       | 4       | 0,45 | 0,6 | 1,5 | 50 |
| 1180288              | HB30MINS 2 006 01 020                 | 2 | ⊗  | 0,6                                       | 4       | 0,58 | 0,6 | 2   | 50 |
| 1180289              | HB30MINS 2 008 01 020                 | 2 | ⊗  | 0,8                                       | 4       | 0,78 | 0,8 | 2   | 50 |
| 1180298              | HB30MINS 2 010 02 025                 | 2 | ⊗  | 1                                         | 4       | 0,95 | 1,3 | 2,5 | 50 |
| 1180290              | HB30MINS 2 010 01 030                 | 2 | ⊗  | 1                                         | 4       | 0,95 | 1   | 3   | 50 |
| 1180291              | HB30MINS 2 012 02 030                 | 2 | ⊗  | 1,2                                       | 4       | 1,15 | 1,2 | 3   | 50 |
| 1180292              | HB30MINS 2 016 02 040                 | 2 | ⊗  | 1,6                                       | 4       | 1,55 | 1,6 | 4   | 50 |
| 1180293              | HB30MINS 2 020 02 040                 | 2 | ⊗  | 2                                         | 4       | 1,94 | 2   | 4   | 50 |
| 1180307              | HB30MINS 2 020 03 050                 | 2 | ⊗  | 2                                         | 4       | 1,95 | 2,5 | 5   | 50 |
| 1180299              | HB30MINS 2 025 03 060                 | 2 | ⊗  | 2,5                                       | 6       | 2,45 | 3   | 6   | 60 |
| 1180309              | HB30MINS 2 030 04 075                 | 2 | ⊗  | 3                                         | 6       | 2,95 | 4   | 7,5 | 60 |

⊗ Stock item | Produto de stock | Itens de stock      ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## HB30MINS Medium neck endmills for micro machining



Short



2



30°



Reduced Neck Ø

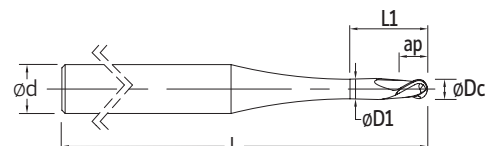


Ball nose



&lt; 70 HRC

All order codes are cylindrical shank.  
Weldon shank available under request.



| (1)<br>Geometry code | (2) Grade code                        |   | X4<br>PHH603 | Dimensions   Dimensões   Dimensiones (mm) |         |      |     |      |    |
|----------------------|---------------------------------------|---|--------------|-------------------------------------------|---------|------|-----|------|----|
|                      | Reference<br>Referência<br>Referencia |   |              | ØDc                                       | Ød (h6) | D1   | ap  | L1   | L  |
| 1180305              | HB30MINS 2 005 01 025                 | 2 | ⊗            | 0,5                                       | 4       | 0,45 | 0,4 | 2,5  | 50 |
| 1180308              | HB30MINS 2 010 02 050                 | 2 | ⊗            | 1                                         | 4       | 0,95 | 1,3 | 5    | 50 |
| 1180336              | HB30MINS 2 016 02 080                 | 2 | ⊗            | 1,6                                       | 4       | 1,55 | 1,6 | 8    | 50 |
| 1180310              | HB30MINS 2 020 03 100                 | 2 | ⊗            | 2                                         | 4       | 1,95 | 2,5 | 10   | 50 |
| 1180311              | HB30MINS 2 025 03 125                 | 2 | ⊗            | 2,5                                       | 6       | 2,45 | 3   | 12,5 | 60 |
| 1180301              | HB30MINS 2 030 04 150                 | 2 | ⊗            | 3                                         | 6       | 2,95 | 4   | 15   | 60 |

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## HB30MINS Long neck endmills for micro machining



Short



2



30°



Reduced Neck Ø

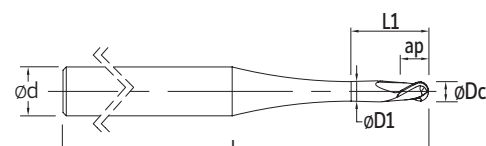


Ball nose



&lt; 70 HRC

All order codes are cylindrical shank.  
Weldon shank available under request.



| (1)<br>Geometry code | (2) Grade code                        |   | X4<br>PHH603 | Dimensions   Dimensões   Dimensiones (mm) |         |      |     |      |    |
|----------------------|---------------------------------------|---|--------------|-------------------------------------------|---------|------|-----|------|----|
|                      | Reference<br>Referência<br>Referencia |   |              | ØDc                                       | Ød (h6) | D1   | ap  | L1   | L  |
| 1180306              | HB30MINS 2 005 01 040                 | 2 | ⊗            | 0,5                                       | 4       | 0,45 | 0,6 | 4    | 50 |
| 1180300              | HB30MINS 2 010 02 080                 | 2 | ⊗            | 1                                         | 4       | 0,95 | 1,3 | 8    | 50 |
| 1180337              | HB30MINS 2 016 02 128                 | 2 | ⊗            | 1,6                                       | 4       | 1,55 | 1,6 | 12,8 | 50 |
| 1180302              | HB30MINS 2 020 03 160                 | 2 | ⊗            | 2                                         | 4       | 1,95 | 2,5 | 16   | 50 |
| 1180312              | HB30MINS 2 025 03 200                 | 2 | ⊗            | 2,5                                       | 6       | 2,45 | 3   | 20   | 60 |
| 1180313              | HB30MINS 2 030 04 240                 | 2 | ⊗            | 3                                         | 6       | 2,95 | 4   | 24   | 60 |

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request | Disponível sobre consulta | Disponible bajo consulta

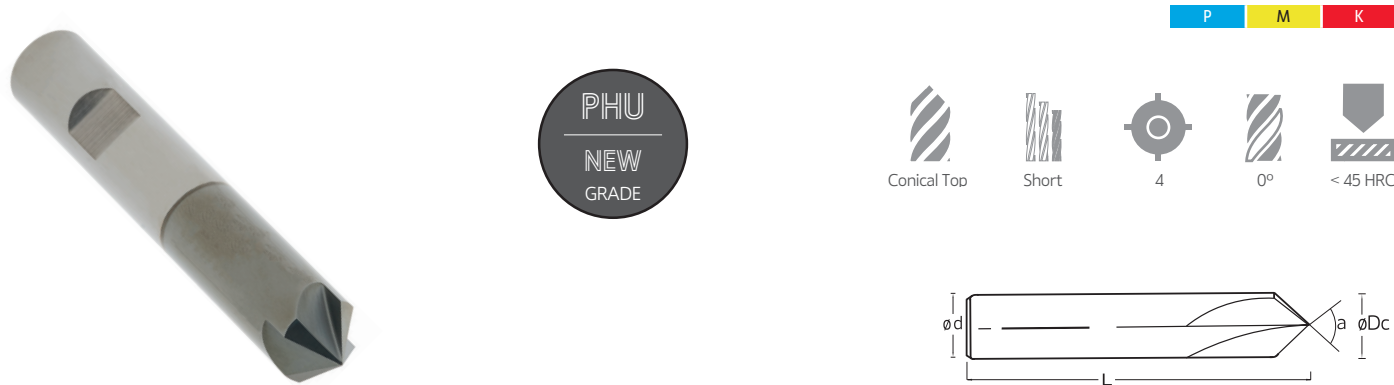
Endmill order code = (1) Geometry Code + (2) Grade Code

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | Material                                     | Copying                        |                                |                                                              |                                                            |                                                              |                                                            |
|-----|----------------------------------------------|--------------------------------|--------------------------------|--------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------|
|     |                                              | fz (mm/t)                      |                                | Vc (m/min)                                                   |                                                            |                                                              |                                                            |
|     |                                              | $\alpha < 15^\circ$            | $\alpha > 15^\circ$            | $a_p = 0,05 \text{ } \varnothing D_c$<br>$\alpha < 15^\circ$ | $a_p = 0,25 \text{ } \varnothing D$<br>$\alpha < 15^\circ$ | $a_p = 0,05 \text{ } \varnothing D_c$<br>$\alpha > 15^\circ$ | $a_p = 0,25 \text{ } \varnothing D$<br>$\alpha > 15^\circ$ |
| P   | Unalloyed Steel                              | $0,01 \times \varnothing D_c$  | $0,003 \times \varnothing D_c$ | 700                                                          | 340                                                        | 460                                                          | 220                                                        |
|     | Low-Alloyed Steel                            | $0,009 \times \varnothing D_c$ | $0,003 \times \varnothing D_c$ | 650                                                          | 320                                                        | 430                                                          | 210                                                        |
|     | High-Alloyed Steel                           | $0,008 \times \varnothing D_c$ | $0,003 \times \varnothing D_c$ | 590                                                          | 290                                                        | 390                                                          | 190                                                        |
| M   | Stainless Steel (Ferritic / Martensitic)     | $0,009 \times \varnothing D_c$ | $0,003 \times \varnothing D_c$ | 600                                                          | 300                                                        | 400                                                          | 200                                                        |
|     | Stainless Steel (Austenitic)                 | $0,008 \times \varnothing D_c$ | $0,003 \times \varnothing D_c$ | 560                                                          | 280                                                        | 370                                                          | 190                                                        |
|     | Stainless Steel (Austenitic/Ferritic/Duplex) | $0,007 \times \varnothing D_c$ | $0,002 \times \varnothing D_c$ | 540                                                          | 270                                                        | 360                                                          | 180                                                        |
| K   | Malleable Cast Iron                          | $0,008 \times \varnothing D_c$ | $0,003 \times \varnothing D_c$ | 650                                                          | 320                                                        | 430                                                          | 210                                                        |
|     | Grey Cast Iron                               | $0,008 \times \varnothing D_c$ | $0,003 \times \varnothing D_c$ | 640                                                          | 310                                                        | 420                                                          | 200                                                        |
|     | Nodular Cast Iron                            | $0,007 \times \varnothing D_c$ | $0,002 \times \varnothing D_c$ | 600                                                          | 300                                                        | 400                                                          | 190                                                        |
| S   | Heat Resistant Super Alloys                  | $0,007 \times \varnothing D_c$ | $0,002 \times \varnothing D_c$ | 230                                                          | 110                                                        | 150                                                          | 80                                                         |
| H   | Hardened Steels                              | $0,008 \times \varnothing D_c$ | $0,003 \times \varnothing D_c$ | 460                                                          | 230                                                        | 310                                                          | 150                                                        |

Note: Since some of the endmills have low  $\varnothing D_c$  the above Vc cannot be achieved by any conventional machining center. The endmills still work at much lower Vc.

HCHGS Chamfering endmill



|                           |             | <sup>(2)</sup> Grade code             |                                                                                   | Z9                                                                                  | Dimensions   Dimensões   Dimensiones (mm) |         |    |     |
|---------------------------|-------------|---------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------|---------|----|-----|
| <sup>(1)</sup> Order code |             | Reference<br>Referência<br>Referencia |  | PHU920                                                                              |                                           |         |    |     |
| HA (Cylindrical)          | HB (Weldon) |                                       |                                                                                   |                                                                                     | ØDc                                       | Ød (h6) | a  | L   |
| 1180366                   | 1180552     | HCHGS 4 030 02 90                     | 4                                                                                 |    | 3                                         | 3       | 90 | 38  |
| 1180367                   | 1180495     | HCHGS 4 040 02 90                     | 4                                                                                 |    | 4                                         | 4       | 90 | 50  |
| 1180368                   | 1180496     | HCHGS 4 060 03 90                     | 4                                                                                 |    | 6                                         | 6       | 90 | 57  |
| 1180369                   | 1180497     | HCHGS 4 080 04 90                     | 4                                                                                 |   | 8                                         | 8       | 90 | 63  |
| 1180370                   | 1180498     | HCHGS 4 100 05 90                     | 4                                                                                 |  | 10                                        | 10      | 90 | 72  |
| 1180371                   | 1180499     | HCHGS 4 120 06 90                     | 4                                                                                 |  | 12                                        | 12      | 90 | 83  |
| 1180372                   | 1180500     | HCHGS 4 160 08 90                     | 4                                                                                 |  | 16                                        | 16      | 90 | 92  |
| 1180373                   | 1180553     | HCHGS 4 200 10 90                     | 4                                                                                 |  | 20                                        | 20      | 90 | 104 |

 Stock item | Produto de stock | Itens de stock

 Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

Note: For HB (weldon) endmills, the reference ends with "-W"

RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

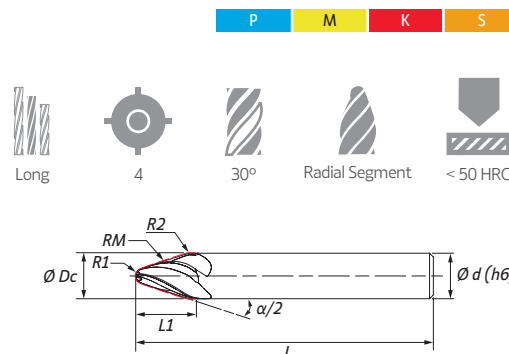
| ISO | Material                                     | Chamfering  |            |
|-----|----------------------------------------------|-------------|------------|
|     |                                              | fz (mm/t)   | Vc (m/min) |
| P   | Unalloyed Steel                              | 0,008 x ØDc | 180        |
|     | Low-Alloyed Steel                            | 0,007 x ØDc | 160        |
|     | High-Alloyed Steel                           | 0,006 x ØDc | 140        |
| M   | Stainless Steel (Ferritic / Martensitic)     | 0,007 x ØDc | 150        |
|     | Stainless Steel (Austenitic)                 | 0,006 x ØDc | 130        |
|     | Stainless Steel (Austenitic/Ferritic/Duplex) | 0,004 x ØDc | 110        |
| K   | Malleable Cast Iron                          | 0,008 x ØDc | 210        |
|     | Grey Cast Iron                               | 0,008 x ØDc | 210        |
|     | Nodular Cast Iron                            | 0,008 x ØDc | 190        |



# RAD-INTEG = Conical and Tangential Segment Endmills

NEW

## HXC30GL Conical



All order codes are cylindrical shank.  
Weldon shank available under request.

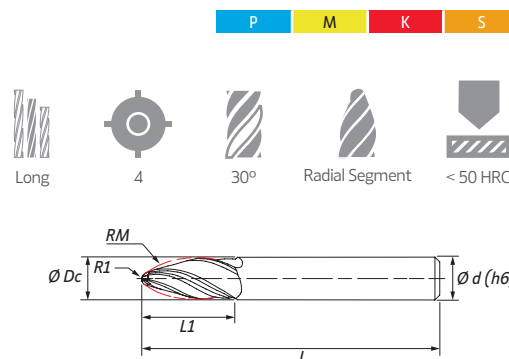
|                                 | <sup>(2)</sup> Grade code             |                                                                                   | T1                                                                                | Y3                                                                                | Dimensions   Dimensões   Dimensiones (mm) |         |     |      |    |    |    |     |
|---------------------------------|---------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------|---------|-----|------|----|----|----|-----|
| <sup>(1)</sup><br>Geometry code | Reference<br>Referência<br>Referencia |  | PHP920                                                                            | PHH920                                                                            |                                           |         |     |      |    |    |    |     |
|                                 |                                       |                                                                                   |                                                                                   |                                                                                   | ØDc                                       | Ød (h6) | α/2 | RM   | R1 | R2 | L1 | L   |
| 1180046                         | HXC30GL 4 080 10 18RM030              | 4                                                                                 |  |  | 8                                         | 8       | 18  | 300  | 1  | 1  | 10 | 75  |
| 1180047                         | HXC30GL 4 120 14 18RM045              | 4                                                                                 |  |  | 12                                        | 12      | 18  | 450  | 2  | 2  | 14 | 83  |
| 1180048                         | HXC30GL 4 160 18 18RM120              | 4                                                                                 |  |  | 16                                        | 16      | 18  | 1200 | 3  | 3  | 18 | 95  |
| 1180049                         | HXC30GL 4 160 12 28RM080              | 4                                                                                 |  |  | 16                                        | 16      | 28  | 800  | 3  | 3  | 12 | 95  |
| 1180050                         | HXC30GL 4 160 16 18RM120              | 4                                                                                 |  |  | 16                                        | 16      | 18  | 1200 | 4  | 4  | 16 | 110 |
| 1180051                         | HXC30GL 4 160 11 28RM080              | 4                                                                                 |  |  | 16                                        | 16      | 28  | 800  | 4  | 4  | 11 | 110 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## HXT30GL Tangential



All order codes are cylindrical shank.  
Weldon shank available under request.

|                                 | <sup>(2)</sup> Grade code             |                                                                                     | T1                                                                                  | Y3                                                                                  | Dimensions   Dimensões   Dimensiones (mm) |         |    |    |    |     |
|---------------------------------|---------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------|---------|----|----|----|-----|
| <sup>(1)</sup><br>Geometry code | Reference<br>Referência<br>Referencia |  | PHP920                                                                              | PHH920                                                                              |                                           |         |    |    |    |     |
| 1180045                         | HXT30GL 3 060 22 RM095                | 4                                                                                   |  |  | ØDc                                       | Ød (h6) | RM | R1 | L1 | L   |
| 1180037                         | HXT30GL 4 080 24 RM095                | 4                                                                                   |  |  | 6                                         | 6       | 95 | 1  | 22 | 63  |
| 1180038                         | HXT30GL 4 100 28 RM085                | 4                                                                                   |  |  | 8                                         | 8       | 95 | 1  | 24 | 70  |
| 1180039                         | HXT30GL 4 120 28 RM090                | 4                                                                                   |  |  | 10                                        | 10      | 85 | 2  | 28 | 72  |
| 1180691                         | HXT30GL 4 160 30 RM080                | 4                                                                                   |  |  | 12                                        | 12      | 90 | 2  | 28 | 83  |
|                                 |                                       |                                                                                     |                                                                                     |                                                                                     | 16                                        | 16      | 80 | 3  | 30 | 110 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta  
Disponible bajo consulta

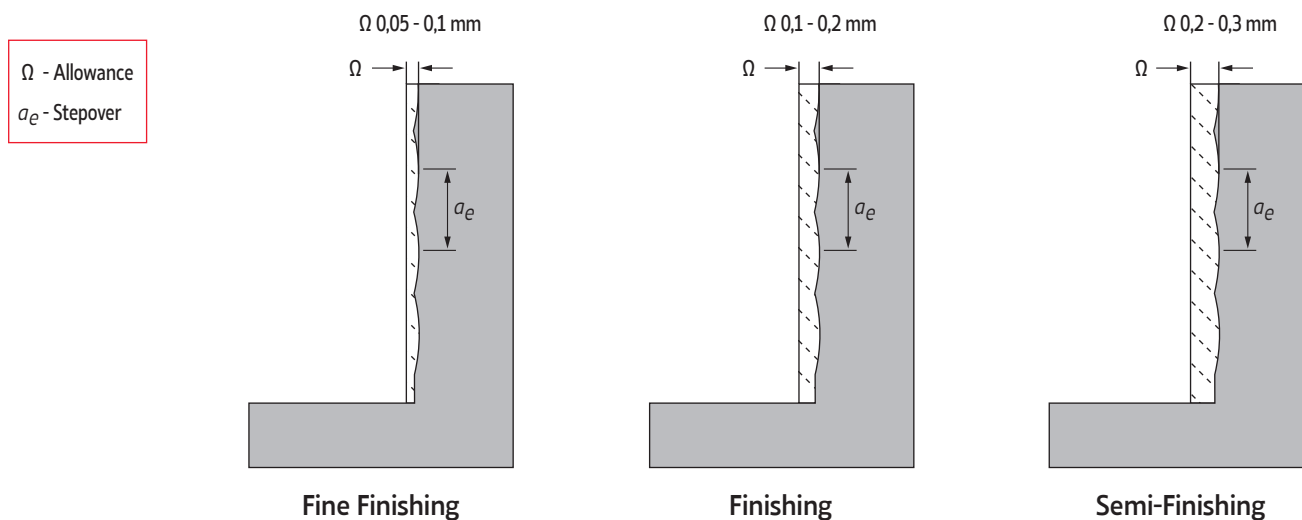
Endmill order code = (1) Geometry Code + (2) Grade Code



## GRADES SELECTION GUIDE | Guia para selecção de graus | Tabla para selección de calidades

| ISO | Material                                     | Grades |        |
|-----|----------------------------------------------|--------|--------|
|     |                                              | PHP920 | PHH920 |
| P   | Unalloyed Steel                              | ☉      |        |
|     | Low-Alloyed Steel                            | ☉      |        |
|     | High-Alloyed Steel                           | ☉      |        |
| M   | Stainless Steel (Ferritic / Martensitic)     |        | ☉      |
|     | Stainless Steel (Austenitic)                 |        | ☉      |
|     | Stainless Steel (Austenitic/Ferritic/Duplex) |        | ☉      |
| K   | Malleable Cast Iron                          | ☉      |        |
|     | Grey Cast Iron                               | ☉      |        |
|     | Nodular Cast Iron                            | ☉      |        |
| S   | Heat Resistant Super Alloys                  |        | ☉      |

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables



| ISO | Workpiece Material                           | Vc<br>(m/min) | fz (mm/t)                 |                           |                           |                           |                           |
|-----|----------------------------------------------|---------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
|     |                                              |               | HXC30GL - Conical         |                           | HXT30GL - Tangential      |                           |                           |
|     |                                              |               | $\Omega$ 0,05 - 0,1 mm    | $\Omega$ 0,1 - 0,2 mm     | $\Omega$ 0,05 - 0,1 mm    | $\Omega$ 0,1 - 0,2 mm     | $\Omega$ 0,2 - 0,3 mm     |
| P   | Unalloyed Steel                              | 180           | $0,007 \times \text{ØDc}$ | $0,006 \times \text{ØDc}$ | $0,007 \times \text{ØDc}$ | $0,006 \times \text{ØDc}$ | $0,005 \times \text{ØDc}$ |
|     | Low-Alloyed Steel                            | 160           | $0,006 \times \text{ØDc}$ | $0,005 \times \text{ØDc}$ | $0,006 \times \text{ØDc}$ | $0,005 \times \text{ØDc}$ | $0,004 \times \text{ØDc}$ |
|     | High-Alloyed Steel                           | 150           | $0,005 \times \text{ØDc}$ | $0,004 \times \text{ØDc}$ | $0,005 \times \text{ØDc}$ | $0,004 \times \text{ØDc}$ | $0,004 \times \text{ØDc}$ |
| M   | Stainless Steel (Ferritic / Martensitic)     | 120           | $0,005 \times \text{ØDc}$ | $0,004 \times \text{ØDc}$ | $0,005 \times \text{ØDc}$ | $0,004 \times \text{ØDc}$ | $0,004 \times \text{ØDc}$ |
|     | Stainless Steel (Austenitic)                 | 120           | $0,004 \times \text{ØDc}$ | $0,003 \times \text{ØDc}$ | $0,004 \times \text{ØDc}$ | $0,003 \times \text{ØDc}$ | $0,003 \times \text{ØDc}$ |
|     | Stainless Steel (Austenitic/Ferritic/Duplex) | 110           | $0,003 \times \text{ØDc}$ | $0,003 \times \text{ØDc}$ | $0,003 \times \text{ØDc}$ | $0,003 \times \text{ØDc}$ | $0,002 \times \text{ØDc}$ |
| K   | Malleable Cast Iron                          | 220           | $0,007 \times \text{ØDc}$ | $0,006 \times \text{ØDc}$ | $0,007 \times \text{ØDc}$ | $0,006 \times \text{ØDc}$ | $0,005 \times \text{ØDc}$ |
|     | Grey Cast Iron                               | 210           | $0,007 \times \text{ØDc}$ | $0,006 \times \text{ØDc}$ | $0,007 \times \text{ØDc}$ | $0,006 \times \text{ØDc}$ | $0,005 \times \text{ØDc}$ |
|     | Nodular Cast Iron                            | 190           | $0,006 \times \text{ØDc}$ | $0,005 \times \text{ØDc}$ | $0,006 \times \text{ØDc}$ | $0,005 \times \text{ØDc}$ | $0,005 \times \text{ØDc}$ |
| S   | Heat Resistant Super Alloys                  | 60            | $0,003 \times \text{ØDc}$ | $0,003 \times \text{ØDc}$ | $0,003 \times \text{ØDc}$ | $0,003 \times \text{ØDc}$ | $0,002 \times \text{ØDc}$ |

## HC40TSP Corner chamfer, variable helix 40°-42° || Trochoidal Speed Cutting

3xD  
5xDLong  
Extra longVariable Pitch  
5Variable Helix  
40° 41° 42°Reduced  
Neck Ø

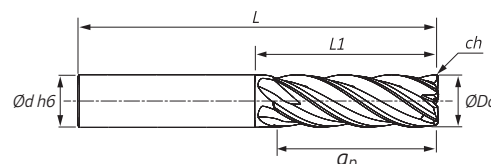
Chip-divider



Corner Chamfer



&lt; 50 HRC



| (1) Order code   |             | (2) Grade code                        |   | T1 | Dimensions   Dimensões   Dimensiones (mm) |         |        |            |     |     |
|------------------|-------------|---------------------------------------|---|----|-------------------------------------------|---------|--------|------------|-----|-----|
|                  |             | Reference<br>Referência<br>Referencia |   |    | ØDc                                       | Ød (h6) | ap max | CH         | L1  | L   |
| HA (Cylindrical) | HB (Weldon) |                                       |   |    |                                           |         |        |            |     |     |
| HC40TSPL         |             |                                       |   |    |                                           |         |        |            |     |     |
| 1180118          | 1180456     | HC40TSPL 5 060 20                     | 5 | ⊗  | 6                                         | 6       | 20     | 0,15 × 45° | 26  | 60  |
| 1180119          | 1180457     | HC40TSPL 5 080 25                     | 5 | ⊗  | 8                                         | 8       | 25     | 0,15 × 45° | 32  | 63  |
| 1180225          | 1180458     | HC40TSPL 5 100 32                     | 5 | ⊗  | 10                                        | 10      | 32     | 0,20 × 45° | 38  | 79  |
| 1180690          | 1180689     | HC40TSPL 5 120 41                     | 5 | ⊗  | 12                                        | 12      | 41     | 0,20 × 45° | 48  | 100 |
| 1180226          | 1180460     | HC40TSPL 5 160 50                     | 5 | ⊗  | 16                                        | 16      | 50     | 0,25 × 45° | 56  | 110 |
| 1180123          | 1180461     | HC40TSPL 5 180 60                     | 5 | ⊗  | 18                                        | 18      | 60     | 0,30 × 45° | 66  | 130 |
| 1180462          | 1180463     | HC40TSPL 5 200 64                     | 5 | ⊗  | 20                                        | 20      | 64     | 0,35 × 45° | 70  | 130 |
| HC40TSPXL        |             |                                       |   |    |                                           |         |        |            |     |     |
| 1180507          | 1180514     | HC40TSPXL 5 060 30                    | 5 | ⊗  | 6                                         | 6       | 30     | 0,15 × 45° | 36  | 75  |
| 1180508          | 1180515     | HC40TSPXL 5 080 40                    | 5 | ⊗  | 8                                         | 8       | 40     | 0,15 × 45° | 46  | 81  |
| 1180509          | 1180516     | HC40TSPXL 5 100 50                    | 5 | ⊗  | 10                                        | 10      | 50     | 0,20 × 45° | 59  | 100 |
| 1180510          | 1180517     | HC40TSPXL 5 120 60                    | 5 | ⊗  | 12                                        | 12      | 60     | 0,20 × 45° | 67  | 120 |
| 1180511          | 1180518     | HC40TSPXL 5 160 80                    | 5 | ⊗  | 16                                        | 16      | 80     | 0,20 × 45° | 85  | 136 |
| 1180512          | 1180519     | HC40TSPXL 5 180 90                    | 5 | ⊗  | 18                                        | 18      | 90     | 0,30 × 45° | 100 | 150 |
| 1180513          | 1180520     | HC40TSPXL 5 200 100                   | 5 | ⊗  | 20                                        | 20      | 100    | 0,35 × 45° | 104 | 162 |

⊗ Stock item | Produto de stock | Itens de stock

○ Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

Note: For HB (weldon) endmills, the reference ends with "-W"

## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | Workpiece Material  | fz (mm/t)   |             |             | Vc (m/min) |     |     |
|-----|---------------------|-------------|-------------|-------------|------------|-----|-----|
|     |                     | ae (mm)     |             |             | ae (mm)    |     |     |
|     |                     | 5,0%        | 15%         | 30%         | 5,0%       | 15% | 30% |
| P   | Unalloyed Steel     | 0,009 × ØDc | 0,009 × ØDc | 0,008 × ØDc | 180        | 170 | 170 |
|     | Low-Alloyed Steel   | 0,008 × ØDc | 0,007 × ØDc | 0,007 × ØDc | 160        | 160 | 150 |
|     | High-Alloyed Steel  | 0,007 × ØDc | 0,007 × ØDc | 0,006 × ØDc | 140        | 140 | 140 |
| K   | Malleable Cast Iron | 0,009 × ØDc | 0,009 × ØDc | 0,008 × ØDc | 210        | 210 | 200 |
|     | Grey Cast Iron      | 0,009 × ØDc | 0,009 × ØDc | 0,008 × ØDc | 210        | 200 | 200 |
|     | Nodular Cast Iron   | 0,009 × ØDc | 0,008 × ØDc | 0,007 × ØDc | 190        | 190 | 180 |



PDF

## HC35ML Corner chamfer steel specialized endmills



Short

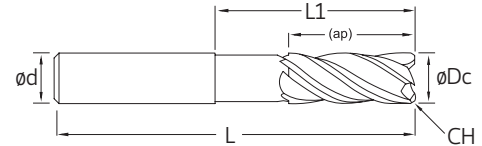

Variable Pitch  
4

Variable Helix  
35°/38°

Reduced  
Neck Ø

45°  
Corner chamfer


&lt; 48 HRC



|                           |             | <sup>(2)</sup> Grade code             |   | T1 | Dimensions   Dimensões   Dimensiones (mm) |                                           |         |        |            |     |
|---------------------------|-------------|---------------------------------------|---|----|-------------------------------------------|-------------------------------------------|---------|--------|------------|-----|
| <sup>(1)</sup> Order code |             | Reference<br>Referência<br>Referencia |   |    | PHP920                                    | Dimensions   Dimensões   Dimensiones (mm) |         |        |            |     |
| HA (Cylindrical)          | HB (Weldon) |                                       |   |    |                                           | ØDc                                       | Ød (h6) | ap max | CH         | L   |
| 1180480                   | -           | HF35ML 4 010 03                       | 4 |    |                                           | 1                                         | 6       | 2,5    | -          | 57  |
| 1180482                   | 1180483     | HC35ML 4 020 05                       | 4 |    |                                           | 2                                         | 6       | 5      | 0,07 x 45° | 57  |
| 1180466                   | 1180467     | HC35ML 4 030 08                       | 4 |    |                                           | 3                                         | 6       | 8      | 0,15 x 45° | 57  |
| 1180137                   | 1180468     | HC35ML 4 040 11                       | 4 |    |                                           | 4                                         | 6       | 11     | 0,15 x 45° | 57  |
| 1180469                   | 1180521     | HC35ML 4 050 13                       | 4 |    |                                           | 5                                         | 6       | 13     | 0,15 x 45° | 57  |
| 1180138                   | 1180470     | HC35ML 4 060 13                       | 4 |    |                                           | 6                                         | 6       | 13     | 0,15 x 45° | 57  |
| 1180052                   | 1180471     | HC35ML 4 080 19                       | 4 |    |                                           | 8                                         | 8       | 19     | 0,15 x 45° | 63  |
| 1180053                   | 1180472     | HC35ML 4 100 22                       | 4 |    |                                           | 10                                        | 10      | 22     | 0,20 x 45° | 72  |
| 1180139                   | 1180473     | HC35ML 4 120 26                       | 4 |    |                                           | 12                                        | 12      | 26     | 0,20 x 45° | 83  |
| 1180474                   | 1180475     | HC35ML 4 140 26                       | 4 |    |                                           | 14                                        | 14      | 26     | 0,25 x 45° | 83  |
| 1180153                   | 1180476     | HC35ML 4 160 32                       | 4 |    |                                           | 16                                        | 16      | 32     | 0,35 x 45° | 92  |
| 1180477                   | 1180478     | HC35ML 4 180 32                       | 4 |    |                                           | 18                                        | 18      | 32     | 0,45 x 45° | 92  |
| 1180140                   | 1180479     | HC35ML 4 200 38                       | 4 |    |                                           | 20                                        | 20      | 38     | 0,60 x 45° | 104 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

Note: For HB (Weldon) endmills, the reference ends with "-W"

Example: "HC35ML 4 030 08-W"





## HR35GL Corner radius steel specialized endmills



Long



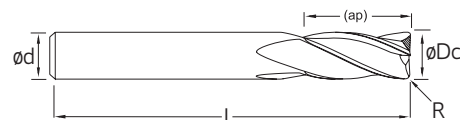
4

Variable Helix  
35°/38°

Corner radius



&lt; 52 HRC



| (1)<br>Geometry code | (2) Grade code                        |   | T1<br>PHP920 | Dimensions   Dimensões   Dimensiones (mm) |         |                   |   |     |
|----------------------|---------------------------------------|---|--------------|-------------------------------------------|---------|-------------------|---|-----|
|                      | Reference<br>Referência<br>Referencia |   |              | ØDc                                       | Ød (h6) | ap <sub>max</sub> | R | L   |
| 1180042              | HR35GL 4 120 26 R100                  | 4 |              | 12                                        | 12      | 26                | 1 | 81  |
| 1180043              | HR35GL 4 120 26 R200                  | 4 |              | 12                                        | 12      | 26                | 2 | 81  |
| 1180044              | HR35GL 4 120 26 R300                  | 4 |              | 12                                        | 12      | 26                | 3 | 81  |
| 1180187              | HR35GL 4 160 24 R100                  | 4 |              | 16                                        | 16      | 24                | 1 | 100 |
| 1180188              | HR35GL 4 160 24 R200                  | 4 |              | 16                                        | 16      | 24                | 2 | 100 |
| 1180189              | HR35GL 4 200 40 R100                  | 4 |              | 20                                        | 20      | 40                | 1 | 100 |
| 1180190              | HR35GL 4 200 40 R200                  | 4 |              | 20                                        | 20      | 40                | 2 | 100 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | Material            | fz (mm/t)            |                      |                       | Vc (m/min)           |                      |                       |
|-----|---------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|-----------------------|
|     |                     | a <sub>e</sub> = 25% | a <sub>e</sub> = 50% | a <sub>e</sub> = 100% | a <sub>e</sub> = 25% | a <sub>e</sub> = 50% | a <sub>e</sub> = 100% |
| P   | Unalloyed Steel     | 0,008 x ØDc          | 0,005 x ØDc          | 0,004 x ØDc           | 190                  | 180                  | 150                   |
|     | Low-Alloyed Steel   | 0,007 x ØDc          | 0,004 x ØDc          | 0,003 x ØDc           | 180                  | 160                  | 130                   |
|     | High-Alloyed Steel  | 0,006 x ØDc          | 0,004 x ØDc          | 0,003 x ØDc           | 160                  | 150                  | 120                   |
| K   | Malleable Cast Iron | 0,008 x ØDc          | 0,005 x ØDc          | 0,004 x ØDc           | 230                  | 210                  | 180                   |
|     | Grey Cast Iron      | 0,008 x ØDc          | 0,005 x ØDc          | 0,004 x ØDc           | 230                  | 210                  | 170                   |
|     | Nodular Cast Iron   | 0,008 x ØDc          | 0,004 x ØDc          | 0,004 x ØDc           | 210                  | 190                  | 160                   |

Note<sup>1</sup>: Recommended feed values for maximum ap. For reduced ap, consider increasing Fz up to 25%.Note<sup>2</sup>: Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.

## HC40SS Corner chamfer stainless steel specialized endmills

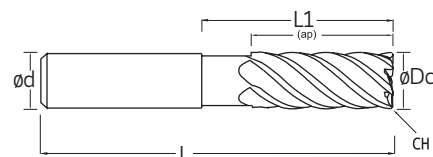


Short

Variable Pitch  
4Variable Helix  
40°/41°Reduced  
Neck Ø45°  
Corner chamfer

M

&lt; 42 HRC



|                           |             | <sup>(2)</sup> Grade code             |   | Z9     | Dimensions   Dimensões   Dimensiones (mm) |         |                   |            |    |     |
|---------------------------|-------------|---------------------------------------|---|--------|-------------------------------------------|---------|-------------------|------------|----|-----|
| <sup>(1)</sup> Order code |             | Reference<br>Referência<br>Referencia |   | PHU920 |                                           |         |                   |            |    |     |
| HA (Cylindrical)          | HB (Weldon) |                                       |   |        | ØDc                                       | Ød (h6) | ap <sub>max</sub> | CH         | L1 | L   |
| 1180484                   | 1180485     | HF40SS 4 010 03                       | 4 |        | 1                                         | 6       | 2,5               | -          | 5  | 57  |
| 1180380                   | 1180487     | HF40SS 4 020 05                       | 4 |        | 2                                         | 6       | 5                 | -          | 10 | 57  |
| 1180381                   | 1180488     | HC40SS 4 030 08                       | 4 |        | 3                                         | 6       | 8                 | 0,15 x 45° | 15 | 57  |
| 1180382                   | 1180489     | HC40SS 4 040 11                       | 4 |        | 4                                         | 6       | 11                | 0,15 x 45° | 17 | 57  |
| 1180383                   | 1180490     | HC40SS 4 050 13                       | 4 |        | 5                                         | 6       | 13                | 0,15 x 45° | 19 | 57  |
| 1180384                   | 1180389     | HC40SS 4 060 13                       | 4 |        | 6                                         | 6       | 13                | 0,15 x 45° | 21 | 57  |
| 1180329                   | 1180491     | HC40SS 4 080 19                       | 4 |        | 8                                         | 8       | 19                | 0,15 x 45° | 27 | 63  |
| 1180385                   | 1180492     | HC40SS 4 100 22                       | 4 |        | 10                                        | 10      | 22                | 0,20 x 45° | 32 | 72  |
| 1180386                   | 1180493     | HC40SS 4 120 26                       | 4 |        | 12                                        | 12      | 26                | 0,20 x 45° | 38 | 83  |
| 1180436                   | 1180494     | HC40SS 4 140 26                       | 4 |        | 14                                        | 14      | 26                | 0,25 x 45° | 38 | 83  |
| 1180387                   | 1180390     | HC40SS 4 160 32                       | 4 |        | 16                                        | 16      | 32                | 0,35 x 45° | 44 | 92  |
| 1180555                   | 1180556     | HC40SS 4 180 32                       | 4 |        | 18                                        | 18      | 32                | 0,45 x 45° | 44 | 92  |
| 1180388                   | 1180455     | HC40SS 4 200 38                       | 4 |        | 20                                        | 20      | 38                | 0,60 x 45° | 54 | 104 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | Material                          | fz (mm/t)   |             |             | Vc (m/min) |     |      |
|-----|-----------------------------------|-------------|-------------|-------------|------------|-----|------|
|     |                                   | ae          |             |             | ae         |     |      |
|     |                                   | 25%         | 50%         | 100%        | 25%        | 50% | 100% |
| M   | SS - Ferritic / Martensitic       | 0,007 x ØDc | 0,004 x ØDc | 0,003 x ØDc | 160        | 150 | 120  |
|     | SS - Austenitic                   | 0,006 x ØDc | 0,004 x ØDc | 0,003 x ØDc | 140        | 130 | 100  |
|     | SS - Austenitic-ferritic (Duplex) | 0,006 x ØDc | 0,003 x ØDc | 0,003 x ØDc | 130        | 120 | 100  |

Note<sup>1</sup>: Feed valid for when the endmill works with its whole ap, for when the endmill is working with lower depths of cut consider increasing the feed up to 25%.Note<sup>2</sup>: Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.

PDF

## HRO40SS Rougher stainless steel specialized endmills



Short



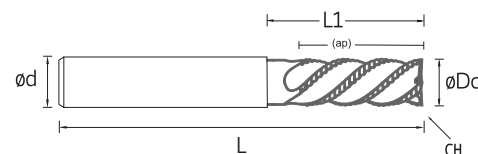
4

Variable Helix  
39°/41°Reduced  
Neck Ø

Rougher

45°  
Corner chamfer

&lt; 38 HRC



|                           |             | <sup>(2)</sup> Grade code             |   | Z9     | Dimensions   Dimensões   Dimensiones (mm) |         |        |            |    |     |
|---------------------------|-------------|---------------------------------------|---|--------|-------------------------------------------|---------|--------|------------|----|-----|
| <sup>(1)</sup> Order code |             | Reference<br>Referência<br>Referencia |   | PHU920 |                                           |         |        |            |    |     |
| HA (Cylindrical)          | HB (Weldon) |                                       |   |        | ØDc                                       | Ød (h6) | ap max | CH         | L1 | L   |
| 1180701                   | 1180702     | HRO40SS 4 030 08                      | 4 |        | 3                                         | 6       | 8      | 0,15 x 45° | 24 | 57  |
| 1180445                   | 1180392     | HRO40SS 4 040 11                      | 4 |        | 4                                         | 6       | 11     | 0,15 x 45° | 17 | 57  |
| 1180446                   | 1180393     | HRO40SS 4 050 13                      | 4 |        | 5                                         | 6       | 13     | 0,15 x 45° | 19 | 57  |
| 1180447                   | 1180394     | HRO40SS 4 060 13                      | 4 |        | 6                                         | 6       | 13     | 0,15 x 45° | 21 | 57  |
| 1180448                   | 1180395     | HRO40SS 4 080 19                      | 4 |        | 8                                         | 8       | 19     | 0,15 x 45° | 27 | 63  |
| 1180391                   | 1180396     | HRO40SS 4 100 22                      | 4 |        | 10                                        | 10      | 22     | 0,20 x 45° | 32 | 72  |
| 1180449                   | 1180397     | HRO40SS 4 120 26                      | 4 |        | 12                                        | 12      | 26     | 0,20 x 45° | 38 | 83  |
| 1180450                   | 1180398     | HRO40SS 4 140 26                      | 4 |        | 14                                        | 14      | 26     | 0,25 x 45° | 38 | 83  |
| 1180451                   | 1180399     | HRO40SS 4 160 32                      | 4 |        | 16                                        | 16      | 32     | 0,35 x 45° | 44 | 92  |
| 1180452                   | 1180400     | HRO40SS 4 180 32                      | 4 |        | 18                                        | 18      | 32     | 0,45 x 45° | 44 | 92  |
| 1180453                   | 1180454     | HRO40SS 4 200 38                      | 4 |        | 20                                        | 20      | 38     | 0,60 x 45° | 54 | 104 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | Material                          | f <sub>z</sub> (mm/t) |             |             | V <sub>c</sub> (m/min) |     |      |
|-----|-----------------------------------|-----------------------|-------------|-------------|------------------------|-----|------|
|     |                                   | ae                    |             |             | ae                     |     |      |
|     |                                   | 25%                   | 50%         | 100%        | 25%                    | 50% | 100% |
| M   | SS - Ferritic / Martensitic       | 0,006 x ØDc           | 0,005 x ØDc | 0,004 x ØDc | 140                    | 130 | 110  |
|     | SS - Austenitic                   | 0,006 x ØDc           | 0,005 x ØDc | 0,003 x ØDc | 130                    | 120 | 110  |
|     | SS - Austenitic-ferritic (Duplex) | 0,005 x ØDc           | 0,004 x ØDc | 0,003 x ØDc | 120                    | 110 | 100  |

Note<sup>1</sup>: Feed valid for when the endmill works with its whole ap, for when the endmill is working with lower depths of cut consider increasing the feed up to 25%.Note<sup>2</sup>: Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.

PDF

## HC38AS 3 Corner chamfer aluminium specialized endmills

N



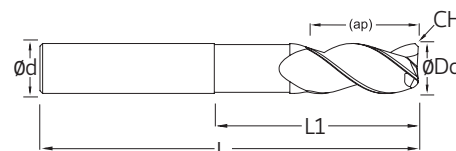
Short

Variable Pitch  
3

38°

Reduced  
Neck Ø

Corner Chamfer



| (1) Order code   |             | (2) Grade code                        |   | 12     | Dimensions   Dimensões   Dimensiones (mm) |         |        |            |    |     |
|------------------|-------------|---------------------------------------|---|--------|-------------------------------------------|---------|--------|------------|----|-----|
| HA (Cylindrical) | HB (Weldon) | Reference<br>Referência<br>Referencia |   | PH0920 | ØDc                                       | Ød (h6) | ap max | CH         | L1 | L   |
| 1180401          | 1180410     | HC38AS 3 030 07                       | 3 |        | 3                                         | 6       | 7      | 0,15 x 45° | 15 | 57  |
| 1180402          | 1180411     | HC38AS 3 040 08                       | 3 |        | 4                                         | 6       | 8      | 0,15 x 45° | 17 | 57  |
| 1180403          | 1180412     | HC38AS 3 050 10                       | 3 |        | 5                                         | 6       | 10     | 0,15 x 45° | 19 | 57  |
| 1180404          | 1180413     | HC38AS 3 060 10                       | 3 |        | 6                                         | 6       | 10     | 0,15 x 45° | 21 | 57  |
| 1180405          | 1180414     | HC38AS 3 080 16                       | 3 |        | 8                                         | 8       | 16     | 0,15 x 45° | 27 | 63  |
| 1180406          | 1180415     | HC38AS 3 100 19                       | 3 |        | 10                                        | 10      | 19     | 0,20 x 45° | 32 | 72  |
| 1180407          | 1180416     | HC38AS 3 120 22                       | 3 |        | 12                                        | 12      | 22     | 0,20 x 45° | 38 | 83  |
| 1180408          | 1180417     | HC38AS 3 160 26                       | 3 |        | 16                                        | 16      | 26     | 0,35 x 45° | 44 | 92  |
| 1180409          | 1180418     | HC38AS 3 200 32                       | 3 |        | 20                                        | 20      | 32     | 0,60 x 45° | 54 | 104 |

☒ Stock item | Produto de stock | Itens de stock

☐ Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

Note: For HB (Weldon) endmills, the reference ends with "-W"

Example: "HC38AS 3 030 07-W PH0920"

## RECOMMENDED CUTTING CONDITIONS | Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | Material         | f <sub>z</sub> (mm/t) |                      |                       | V <sub>c</sub> (m/min) |                      |                       |
|-----|------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|-----------------------|
|     |                  | a <sub>e</sub> = 25%  | a <sub>e</sub> = 50% | a <sub>e</sub> = 100% | a <sub>e</sub> = 25%   | a <sub>e</sub> = 50% | a <sub>e</sub> = 100% |
| N   | Aluminium <6%Si  | 0,011 x ØDc           | 0,009 x ØDc          | 0,006 x ØDc           | 230                    | 220                  | 190                   |
|     | Aluminium <12%Si | 0,009 x ØDc           | 0,008 x ØDc          | 0,005 x ØDc           | 210                    | 200                  | 180                   |
|     | Aluminium >12%Si | 0,008 x ØDc           | 0,007 x ØDc          | 0,005 x ØDc           | 200                    | 190                  | 170                   |

Note<sup>1</sup>: Recommended feed values for maximum a<sub>p</sub>. For reduced a<sub>p</sub>, consider increasing f<sub>z</sub> up to 25%.Note<sup>2</sup>: Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.

PDF

A

MILLING

Overview

Face milling

Hifed milling

Shoulder milling

Profile milling

Hardmill

Center &amp; Chamfer

Spot face

Spare Parts

Technical Data

End Mills

## HF30AS Single edge aluminium endmills



N



Short



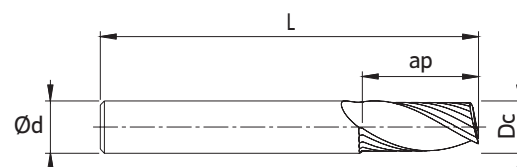
1



30°



Square



| (1)<br>Geometry code | (2) Grade code                        |   | PH0920 | Dimensions   Dimensões   Dimensiones (mm) |         |                   |    |
|----------------------|---------------------------------------|---|--------|-------------------------------------------|---------|-------------------|----|
|                      | Reference<br>Referência<br>Referencia |   |        | ØDc                                       | Ød (h6) | ap <sub>max</sub> | L  |
| 1180751              | HF30AS 1 020 05                       | 1 |        | 2                                         | 6       | 5                 | 57 |
| 1180752              | HF30AS 1 030 08                       | 1 |        | 3                                         | 6       | 8                 | 57 |
| 1180753              | HF30AS 1 040 11                       | 1 |        | 4                                         | 6       | 11                | 57 |
| 1180754              | HF30AS 1 050 13                       | 1 |        | 5                                         | 6       | 13                | 57 |
| 1180755              | HF30AS 1 060 13                       | 1 |        | 6                                         | 6       | 13                | 57 |
| 1180756              | HF30AS 1 080 19                       | 1 |        | 8                                         | 8       | 19                | 63 |
| 1180757              | HF30AS 1 100 25                       | 1 |        | 10                                        | 10      | 22                | 72 |
| 1180758              | HF30AS 1 120 26                       | 1 |        | 12                                        | 12      | 26                | 83 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

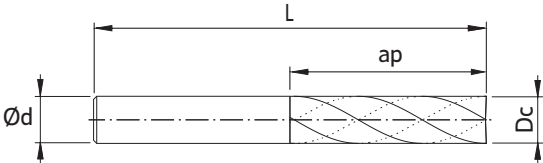
## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | Material         | f <sub>z</sub> (mm/t) |                      |                       | V <sub>c</sub> (m/min) |                      |                       |
|-----|------------------|-----------------------|----------------------|-----------------------|------------------------|----------------------|-----------------------|
|     |                  | a <sub>e</sub> = 25%  | a <sub>e</sub> = 50% | a <sub>e</sub> = 100% | a <sub>e</sub> = 25%   | a <sub>e</sub> = 50% | a <sub>e</sub> = 100% |
| N   | Aluminium <6%Si  | 0,011 x ØDc           | 0,009 x ØDc          | 0,006 x ØDc           | 230                    | 220                  | 190                   |
|     | Aluminium <12%Si | 0,009 x ØDc           | 0,008 x ØDc          | 0,005 x ØDc           | 210                    | 200                  | 180                   |
|     | Aluminium >12%Si | 0,008 x ØDc           | 0,007 x ØDc          | 0,005 x ØDc           | 200                    | 190                  | 170                   |

Note<sup>1</sup>: Recommended feed values for maximum ap. For reduced ap, consider increasing f<sub>z</sub> up to 25%.Note<sup>2</sup>: Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.

PDF

HF30HL Flat top endmill for hard materials



| (1)<br>Geometry code | (2) Grade code                        |   |  | X4<br>PHH603 | Dimensions   Dimensões   Dimensiones (mm) |         |        |     |
|----------------------|---------------------------------------|---|--|--------------|-------------------------------------------|---------|--------|-----|
|                      | Reference<br>Referência<br>Referencia |   |  |              | ØDc                                       | Ød (h6) | ap max | L   |
| 1180112              | HF30HL 4 040 20                       | 4 |  |              | 4                                         | 6       | 20     | 75  |
| 1180358              | HF30HL 4 050 20                       | 4 |  |              | 5                                         | 6       | 20     | 75  |
| 1180196              | HF30HL 4 060 30                       | 4 |  |              | 6                                         | 6       | 30     | 75  |
| 1180113              | HF30HL 4 080 35                       | 4 |  |              | 8                                         | 8       | 35     | 100 |
| 1180359              | HF30HL 4 100 40                       | 4 |  |              | 10                                        | 10      | 40     | 100 |
| 1180111              | HF30HL 4 120 50                       | 4 |  |              | 12                                        | 12      | 50     | 100 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## HB30HL Ball nose endmill for hard materials



Long



2



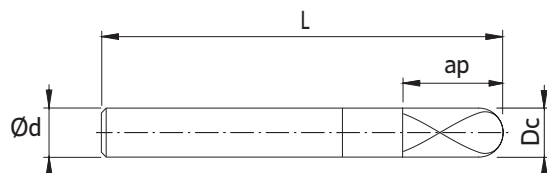
Helix 30°



Ball nose



&lt; 70 HRC



| (1)<br>Geometry code | (2) Grade code                        |   | X4<br>PHH603 | Dimensions   Dimensões   Dimensiones (mm) |         |                   |     |
|----------------------|---------------------------------------|---|--------------|-------------------------------------------|---------|-------------------|-----|
|                      | Reference<br>Referência<br>Referencia |   |              | ØDc                                       | Ød (h6) | ap <sub>max</sub> | L   |
| 1180356              | HB30HL 2 020 04                       | 2 |              | 2                                         | 6       | 4                 | 75  |
| 1180357              | HB30HL 2 030 06                       | 2 |              | 3                                         | 6       | 6                 | 75  |
| 1180093              | HB30HL 2 040 08                       | 2 |              | 4                                         | 6       | 8                 | 75  |
| 1180109              | HB30HL 2 050 10                       | 2 |              | 5                                         | 6       | 10                | 75  |
| 1180130              | HB30HL 2 060 12                       | 2 |              | 6                                         | 6       | 12                | 75  |
| 1180131              | HB30HL 2 080 16                       | 2 |              | 8                                         | 8       | 16                | 75  |
| 1180132              | HB30HL 2 100 20                       | 2 |              | 10                                        | 10      | 20                | 100 |
| 1180141              | HB30HL 2 120 24                       | 2 |              | 12                                        | 12      | 24                | 100 |

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill order code = (1) Geometry Code + (2) Grade Code

## RECOMMENDED CUTTING CONDITIONS || Condições de corte recomendadas | Condiciones de corte recomendables

| ISO | Material        | Vc (m/min) |     | fz (mm/t)   |             |
|-----|-----------------|------------|-----|-------------|-------------|
|     |                 | 10%        | 30% | 10%         | 30%         |
| H   | Hardened Steels | 120        | 110 | 0,006 x ØDc | 0,005 x ØDc |

## COATINGS

### PHP

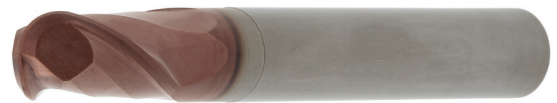
- Unmatched coating adhesion;
- Smoothest surface;
- Suitable for dry and wet machining;
- Color: Black;



Product of the latest coating technology, the PHP is the number one coating for machining steel and cast iron. Because of its smoothness at medium temperatures, the chips are able to flow effortlessly, maintaining the flutes clean and a long tool life even in dry conditions.

### PHH

- Highest thermal stability;
- Smooth surface;
- High performance in dry machining;
- Color: Light brown;



A prime coating for prime endmills, the PHH is the recommended coating for Hardened steels, as well as stainless steels and HRSA.

Because of its high performance at high temperatures the coating successfully protect the cutting edges allowing the tool to work for long periods of time.

### PHU

- High thermal shock resistance;
- Carefully engineered surface quality;
- Suitable for dry and wet machining;
- Color: Grey;



Combining both excellent thermal resistance and excellent surface quality, the PHU coating is recommended for stainless steels, while also being suitable for steels and cast iron.

Because of its surface quality and thermal resistance it is able to prevent built-up-edge in both low-alloy steels and stainless steels, making it a very versatile coating.

## SUBSTRATE

### PH...920

Universal substrate with great balance between toughness and wear resistance;  
Outstanding heat dissipation properties;  
Recommended for semi-finishing to roughing on most materials;

### PH...603

Harder grade with extreme wear resistance;  
Excellent thermal stability;  
Recommended for finishing applications and Hardened steels;



# SOLID CARBIDE TROUBLESHOOTING

| Trouble   Problema                                                                                      | Cause   Causa   Fuente                                                                                                                                                                                  | Possible Solution   Solução   Solución                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Breaking of tool</p> <p>Quebra da ferramenta</p> <p>Ruptura de la herramienta</p>                    | <ul style="list-style-type: none"> <li>• At time of engaging with work material</li> <li>• No início da maquinação</li> <li>• Al principio del mecanizado</li> </ul>                                    | <ul style="list-style-type: none"> <li>• 1. Decrease feed rate.</li> <li>• 2. Decrease projection amount.</li> <li>• 3. Shorten cutting edge length to required minimum limit.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                                                         | <ul style="list-style-type: none"> <li>• When ending cut</li> <li>• No final da maquinação</li> <li>• Al final del mecanizado</li> </ul>                                                                | <ul style="list-style-type: none"> <li>• 1. Diminuir a taxa de avanço.</li> <li>• 2. Diminuir quantidade de projeção.</li> <li>• 3. Encurtar comprimento da aresta de corte para limite mínimo exigido.</li> </ul>                                                                                                                                                                                                                                                                                                                                              |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Diminuir a taxa de avanço.</li> <li>• 2. Disminuir la cantidad de proyección.</li> <li>• 3. Acortar la longitud de la arista de corte para el límite mínimo.</li> </ul>                                                                                                                                                                                                                                                                                                                                             |
|                                                                                                         | <ul style="list-style-type: none"> <li>• During normal cutting</li> <li>• Durante o corte normal</li> <li>• Durante el corte normal</li> </ul>                                                          | <ul style="list-style-type: none"> <li>• 1. Decrease feed rate.</li> <li>• 2. Control wear - replace tool early.</li> <li>• 3. Replace chuck or collet.</li> <li>• 4. Decrease projection amount.</li> <li>• 5. Carry out honing.</li> <li>• 6. If 4 flute, reduce to 2 flute (clogging of chipping).</li> <li>• 7. If dry cutting change to wet cutting utilize cutting fluid. In case of wet cutting flow oil supplied from the front, change to from rear angle of side top. Use ample with rate.</li> </ul>                                                 |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Diminuir a taxa de avanço.</li> <li>• 2. Controlar desgaste - substituir ferramenta atempadamente.</li> <li>• 3. Substitua mandril ou porta-piça.</li> <li>• 4. Diminuir quantidade de projeção</li> <li>• 5. Criar boleamento</li> <li>• 6. Se tiver 4 navalhas, reduzir para 2 (obstrução da apara).</li> <li>• 7. Se utilizou corte seco alterar para corte com utilização de fluido. No caso de utilização de fluido frontal, alterar para utilização do fornecimento do fluido pela parte traseira.</li> </ul> |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Diminuir a taxa de avanço.</li> <li>• 2. Controlar Desgaste - substituir herramienta atempadamente.</li> <li>• 3. Reemplace plato o el portaherramienta.</li> <li>• 4. Disminuir la cantidad de proyección.</li> <li>• 5. Crear redondeo.</li> <li>• 6. Si 4 hélices, reducir a 2 hélices (obstrucción de viruta).</li> <li>• 7. Si se utiliza corte en seco cambie para corte con uso del fluido. En caso de el uso de frente de fluido cambie para suministro de fluido desde la parte trasera.</li> </ul>        |
|                                                                                                         | <ul style="list-style-type: none"> <li>• When changing direction of feed</li> <li>• Ao mudar do direcção do avanço</li> <li>• Al cambiar la dirección de avance</li> </ul>                              | <ul style="list-style-type: none"> <li>• 1. Utilize circular interpolation (in case of NC machine) or temporarily stop feed (Dowelling).</li> <li>• 2. Reduce feed rate before and after change of directions.</li> <li>• 3. Replace chuck or collect.</li> </ul>                                                                                                                                                                                                                                                                                               |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Utilização de interpolação helicoidal ( no caso de máquina CNC).</li> <li>• 2. Reduzir avanço antes ou depois de mudar de direcção.</li> <li>• 3. Substitua mandril ou porta-piças.</li> </ul>                                                                                                                                                                                                                                                                                                                      |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Utilización de interpolación helicoidal (para máquina CNC).</li> <li>• 2. Reducir avance antes o después de cambiar de dirección.</li> <li>• 3. Reemplace plato o el portaherramienta.</li> </ul>                                                                                                                                                                                                                                                                                                                   |
|                                                                                                         | <ul style="list-style-type: none"> <li>• Fracture of corners</li> <li>• Fratura dos cantos</li> <li>• Fratura dos cantos</li> </ul>                                                                     | <ul style="list-style-type: none"> <li>• 1. Carry out chamfering or nose with hand lapper.</li> <li>• 2. Down cut - Up cut.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Criar chanfro.</li> <li>• 2. Corte inferior - Corte Superior.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Criar chanfro.</li> <li>• 2. Corte inferior - Corte Superior.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p>Fracture of cutting edge</p> <p>Fratura da aresta de corte</p> <p>Fractura de la arista de corte</p> | <ul style="list-style-type: none"> <li>• Fracture at boundary of depth of cut</li> <li>• Fratura no limite de profundidade de corte</li> <li>• Fractura en el límite de profundidad de corte</li> </ul> | <ul style="list-style-type: none"> <li>• 1. Down cut - Up cut.</li> <li>• 2. Reduce cutting speed.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Corte inferior - Corte Superior.</li> <li>• 2. Reduzir velocidade de corte.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Corte inferior - Corte Superior.</li> <li>• 2. Reducir la velocidad de corte.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                                         | <ul style="list-style-type: none"> <li>• Chipping at center part or overall</li> <li>• Esmilhar na parte central ou global</li> <li>• Astillado en parte central o general</li> </ul>                   | <ul style="list-style-type: none"> <li>• 1. Carry out honing or enlarge.</li> <li>• 2. Change number of rotation (in case machine vibrates).</li> <li>• 3. Increase cutting speed.</li> <li>• 4. In case of squeaking noise during cutting, increase feed.</li> <li>• 5. If dry cutting use cutting fluid or blow air.</li> <li>• 6. Replace chuck or collet.</li> <li>• 7. Reduce cutting speed.</li> </ul>                                                                                                                                                    |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Criar ou aumentar boleamento.</li> <li>• 2. Alterar rotação (no caso da máquina vibrar).</li> <li>• 3. Aumentar velocidade de corte.</li> <li>• 4. No caso de barulho de esmagamento durante o corte, aumentar avanço.</li> <li>• 5. Se estiver a maquinar a seco, utilizar fluido de corte ou ar comprimido.</li> <li>• 6. Substitua mandril ou porta-piça.</li> <li>• 7. Reduzir velocidade de corte.</li> </ul>                                                                                                  |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Criar o aumentar redondeo.</li> <li>• 2. Cambie la rotación (en el caso de la máquina vibrar).</li> <li>• 3. Aumento de la velocidad de corte.</li> <li>• 4. En el caso de ruido de trituración durante el corte, aumentar avance.</li> <li>• 5. Si mecanizado en seco, utilizar un fluido de corte o aire comprimido.</li> <li>• 6. Reemplace plato o el portaherramienta.</li> <li>• 7. Reducir la velocidad de corte.</li> </ul>                                                                                 |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Decrease feed rate.</li> <li>• 2. If 4 flute reduce to 2 flute.</li> <li>• 3. Carry out honing or enlarge.</li> <li>• 4. Replace chuck or collet.</li> <li>• 5. Reduce cutting speed.</li> <li>• 6. If dry cutting, change to wet cutting. In case oil supply in wet cutting is from the front, change to rear at an angle or from side top. Use ample supply.</li> </ul>                                                                                                                                           |
|                                                                                                         | <ul style="list-style-type: none"> <li>• Large fracturing of cutting edge</li> <li>• Grande fratura da aresta de corte</li> <li>• Gran fractura de la arista de corte</li> </ul>                        | <ul style="list-style-type: none"> <li>• 1. Diminuir a taxa de avanço.</li> <li>• 2. Se tiver 4 navalhas, reduzir para 2 (obstrução da apara).</li> <li>• 3. Criar ou aumentar boleamento.</li> <li>• 4. Substitua mandril ou porta-piça.</li> <li>• 5. Reduzir velocidade de corte.</li> <li>• 6. Se utilizou corte seco alterar para corte com utilização de fluido. No caso de utilização de fluido frontal, alterar para utilização do fornecimento do fluido pela parte traseira. Use amplo fornecimento de fluido de corte.</li> </ul>                    |
|                                                                                                         |                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• 1. Disminuir la velocidad de avance.</li> <li>• 2. Si 4 hélices, reducir a 2 hélices (obstrucción de viruta)</li> <li>• 3. Crear o aumentar redondeo.</li> <li>• 4. Reemplace plato o el portaherramienta.</li> <li>• 5. Reducir la velocidad de corte.</li> <li>• 6. Si se utiliza corte en seco cambie para corte con uso del fluido. En caso de el uso de frente de fluido cambie para suministro de fluido desde la parte trasera. Utilice amplio suministro.</li> </ul>                                           |

| Trouble   Problema                                                                                           | Cause   Causa   Fuente                                                                                                                                                                                                               | Possible Solution   Solução   Solución                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Rapid tool wear</p> <p>Desgaste prematuro da ferramenta</p> <p>Desgaste prematuro de la herramienta</p>   |                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>1. Reduce cutting speed.</li> <li>2. Up cut - Down cut</li> <li>3. Increase feed.</li> <li>4. Utilize wet cutting or air.</li> <li>5. If reground tool, improve surface roughness of flank.</li> <li>1. Reducir la velocidad de corte.</li> <li>2. Corte Superior - Corte Inferior.</li> <li>3. Aumentar avanço.</li> <li>4. Utilize fluido de corte ou ar comprimido.</li> <li>5. Se utilizar uma ferramenta afiada, melhora a rugosidade da superfície ou flanco.</li> <li>1. Reducir la velocidad de corte.</li> <li>2. Corte Superior - Corte Inferior.</li> <li>3. Aumento del avance.</li> <li>4. Utilice corte en mojado o el aire comprimido.</li> <li>5. Se utiliza una herramienta afilada, mejora la rugosidad de la superficie o arista.</li> </ul>                                                                                                                                                                                                                           |
| <p>Inferior finished surface</p> <p>Fraco acabamento da superfície</p> <p>Acabado superficial deficiente</p> | <ul style="list-style-type: none"> <li>• Surface is good but rough</li> <li>• Superfície boa mas irregular</li> <li>• Buena superficie, pero irregular</li> </ul>                                                                    | <ul style="list-style-type: none"> <li>1. Decrease feed.</li> <li>2. In case using 2 flute, increase to 4 flute.</li> <li>1. Diminuir avanço.</li> <li>2. No caso de usar 2 hélices, aumentar para 4.</li> <li>1. Reducir avance.</li> <li>2. En caso de utilizar 2 filos de corte, aumentar para 4.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                                                                              | <ul style="list-style-type: none"> <li>• Small chip welding</li> <li>• Soldadura de pequenas aparas</li> <li>• Soldadura de pequeñas virutas</li> </ul>                                                                              | <ul style="list-style-type: none"> <li>1. Increase cutting speed.</li> <li>2. Utilize wet cutting air blow (ample supply).</li> <li>3. Carry out fine honing.</li> <li>4. Up cut - Down cut.</li> <li>5. Increase feed or enlarge finish allowance.</li> <li>1. Aumente velocidade de corte.</li> <li>2. Utilize fluido de corte e ar comprimido.</li> <li>3. Aumentar boleamento.</li> <li>4. Corte Superior - Corte Inferior.</li> <li>5. Aumento o avanço ou alargue as tolerâncias no acabamento.</li> <li>1. Aumento de la velocidad de corte.</li> <li>2. Utilice fluidos de corte y aire comprimido.</li> <li>3. Aumentar redondeo.</li> <li>4. Corte Superior - Corte Inferior.</li> <li>5. Aumente el avance o ampliación de las tolerancias en el acabado.</li> </ul>                                                                                                                                                                                                                                                  |
|                                                                                                              | <ul style="list-style-type: none"> <li>• With transverse streaks</li> <li>• Com as raia transversais</li> <li>• Con rayas transversales</li> </ul>                                                                                   | <ul style="list-style-type: none"> <li>1. Carry out fine honing.</li> <li>2. Use water insoluble cutting fluid.</li> <li>3. Down cut - Up cut.</li> <li>1. Aumentar boleamento.</li> <li>2. Utilize fluidos de corte.</li> <li>3. Corte Inferior - Corte Superior.</li> <li>1. Aumentar redondeo.</li> <li>2. Utilice fluidos de corte.</li> <li>3. Corte Inferior - Corte Superior.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                                                                              | <ul style="list-style-type: none"> <li>• Signs of excessive cutting</li> <li>• Sinais de corte excessivo</li> <li>• Señales de corte excesivo</li> </ul>                                                                             | <ul style="list-style-type: none"> <li>1. Reduce finishing depth of cut.</li> <li>2. Increase cutting speed.</li> <li>3. Reduce feed.</li> <li>1. Reduzir profundidade de corte no acabamento.</li> <li>2. Aumente velocidade de corte.</li> <li>3. Diminuir avanço.</li> <li>1. Reducir la profundidad de corte en el acabado.</li> <li>2. Aumento de la velocidad de corte.</li> <li>3. Reducir avance.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <p>Poor machining accuracy</p> <p>Fraca precisão na máquina</p> <p>Pobre precisión en el mecanizado</p>      | <ul style="list-style-type: none"> <li>• Finish dimensions are on minus side</li> <li>• Dimensões do acabamento estão inferiores ao previsto</li> <li>• Las dimensiones del acabado están terminando abajo de lo esperado</li> </ul> | <ul style="list-style-type: none"> <li>1. Up cut - Down cut.</li> <li>2. Reduce finishing depth of cut.</li> <li>3. Replace chuck or collet.</li> <li>4. Reduce projection amount.</li> <li>5. Increase cutting speed.</li> <li>1. Corte Superior - Corte Inferior.</li> <li>2. Reduzir profundidade de corte no acabamento.</li> <li>3. Substitua mandril ou porta-piça.</li> <li>4. Diminuir quantidade de projeção.</li> <li>5. Aumentar velocidade de corte.</li> <li>1. Corte Superior - Corte Inferior.</li> <li>2. Reducir la profundidad de corte en el acabado.</li> <li>3. Reemplace plato o el portaherramienta.</li> <li>4. Disminuir la cantidad de proyección.</li> <li>5. Aumento de la velocidad de corte.</li> </ul>                                                                                                                                                                                                                                                                                            |
|                                                                                                              | <ul style="list-style-type: none"> <li>• Poor perpendicularity</li> <li>• Fraca perpendicularidade</li> <li>• Fraca perpendicularidade</li> </ul>                                                                                    | <ul style="list-style-type: none"> <li>1. Reduce finishing depth of cut.</li> <li>2. Replace chuck or collet.</li> <li>3. Reduce projection amount.</li> <li>4. Increase cutting speed.</li> <li>5. 2 Flute - 4 Flute.</li> <li>6. Reduce feed.</li> <li>7. Check wear rate - Replace tool.</li> <li>1. Reduzir profundidade de corte no acabamento.</li> <li>2. Substitua mandril ou porta-piça.</li> <li>3. Diminuir quantidade de projeção.</li> <li>4. Aumentar velocidade de corte.</li> <li>5. 2 hélices - 4 hélices.</li> <li>6. Diminuir avanço.</li> <li>7. Verifique o desgaste - Substitua a ferramenta.</li> <li>1. Reducir la profundidad de corte en el acabado.</li> <li>2. Reemplace plato o el portaherramienta.</li> <li>3. Disminuir la cantidad de proyección.</li> <li>4. Aumento de la velocidad de corte.</li> <li>5. 2 hélices - 4 hélices.</li> <li>6. Reducir avance.</li> <li>7. Revise el desgaste Reemplace la herramienta.</li> </ul>                                                              |
|                                                                                                              |                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>1. Increase feed rate (in case over 0.05 mm/Zahn, try reducing).</li> <li>2. Change cutting speed.</li> <li>3. Replace chuck or collet.</li> <li>4. Reduce projection amount.</li> <li>5. Use 2 flute cutter for rough cutting and 4 flute for finishing.</li> <li>6. Down cut - Up cut.</li> <li>1. Aumente o avanço (no caso de mais de 0,05 mm / Zahn, tente reduzir).</li> <li>2. Alterar velocidade de corte.</li> <li>3. Substitua mandril ou porta-piça.</li> <li>4. Diminuir quantidade de projeção.</li> <li>5. Usar 2 hélices para desbaste e 4 para acabamento.</li> <li>6. Corte Inferior - Corte Superior.</li> <li>1. Aumento del avance (en caso de más de 0,05 mm / Zahn, intente reducir).</li> <li>2. Cambie de la velocidad de corte.</li> <li>3. Reemplace plato o el portaherramienta.</li> <li>4. Disminuir la cantidad de proyección.</li> <li>5. Utilice 2 filos de corte para desbaste y 4 para acabado.</li> <li>6. Corte Inferior - Corte Superior.</li> </ul> |

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MILLING

Overview

Face milling

Hi-feed milling

Shoulder milling

Profile milling

Hardmill

Center & Chamfer

Spot face

Spare Parts

Technical Data

End Mills