62090

# W-PRO

**Superior finish** on 3D complex surfaces

5-axis machining

**UPDATED TOOLHOLDER RANGE**

**MILLING**

Profiling | Facing | High Feed

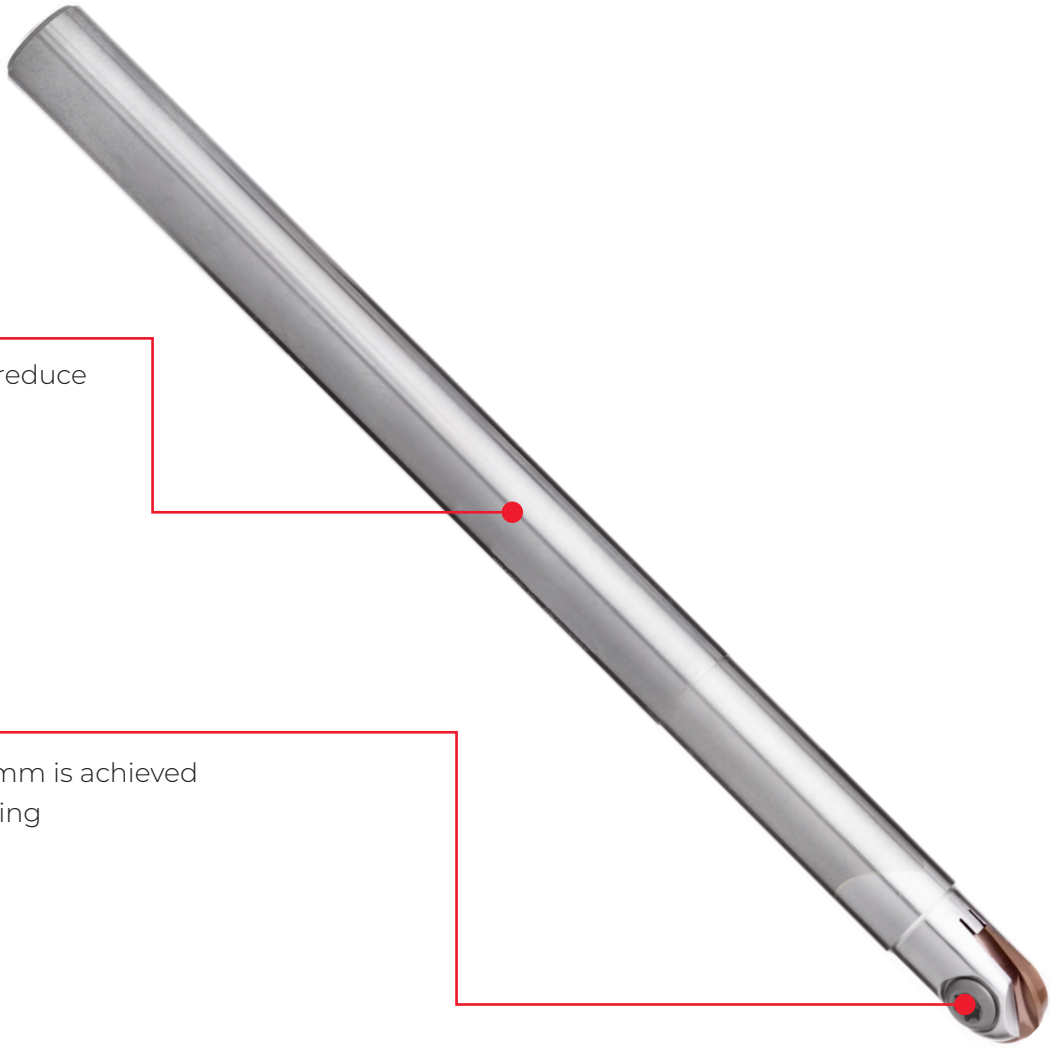
SINCE 1916

# W-PRO 62090

The W-PRO line is the combination of the most refined inserts with exceptionally stable shanks, making it an ideal finishing solution for materials such as steels, stainless steels, cast irons and hardened steels.
The design allows users to position the insert consistently, with the same side always facing the same direction when mounted in the tool body. This ensures high repeatable accuracy, reliability, excellent surface quality, and predictable tool life.

**Shank Type**
Carbide shank in order to reduce vibrations.

**Mounting type**
Maximum runout of 0,02 mm is achieved by a high accuracy mounting



# NEW TOOLHOLDER RANGE

The updated W-PRO 62090 toolholder range has been developed to offer greater size flexibility and improved compatibility across applications, while making it easier to select the correct coupling for each setup.

**This new generation introduces several improvements to both coupling types:**

- The range of **carbide cylindrical shank** toolholders has been expanded to include additional LU lengths, as well as shorter options for each diameter, providing greater flexibility and better alignment with customer requirements.
- All **threaded** toolholders have transitioned from a non-coolant system to an internal coolant system. In addition, the range has been expanded with the introduction of a new smaller diameter, DC 8 mm.

## MAIN CHANGES:

### Carbide Cylindrical Shank Toolholders

- New shorter size per diameter
- New LU and DN dimensions

### Threaded Toolholders

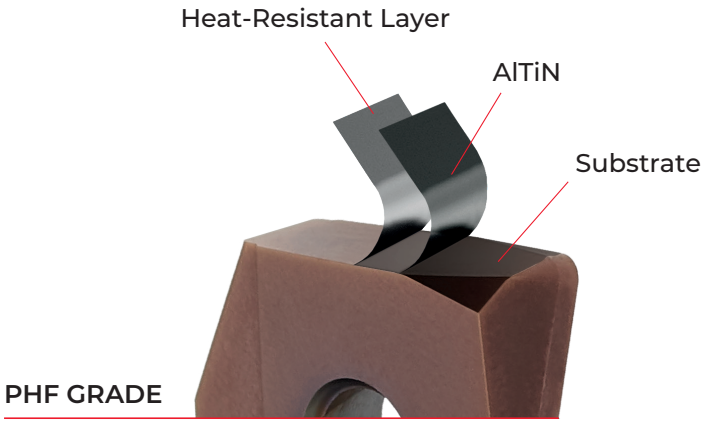
- New DC 8 mm (inserts WCR | WCL | WCX 08)
- New internal coolant system

# PHF GRADE

Keeping our commitment with high performance cutting tools, we present our new PHF series of grades. The PHF coating introduces significative enhancements when machining hard and exotic materials due to the better thermal stability, micro hardness and excellent adhesion, , thus enhancing process stability and efficiency when machining hardened steels.

Hardened steels with a hardness greater than 50 HRC are not only extremely hard but also exhibit a certain level of toughness. Additionally, they often contain alloying elements that enhance corrosion resistance, making their machining more challenging. PHF series was specifically developed to face the challenge of machining these hardened steels.

With harder materials, the temperatures achieved during the machining process are also higher, raising as essential needs for the inserts, durable and heat-resistant coatings. PHF series provides excellent thermal insulation, preventing heat from reaching the tool and efficiently dissipating it through the chips.



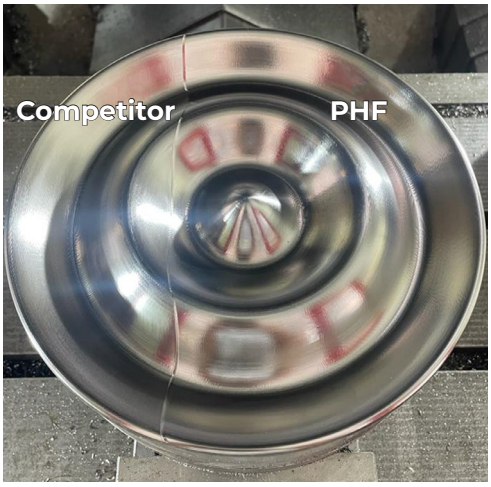

## KEY BENEFITS OF THE PHF GRADE

- Originally developed for machining hardened steels (over 50 HRC), it also demonstrates versatility with stainless steels, nickel-based alloys, titanium, and standard steels;
- High-density coating with improved adhesion to any tool geometry, and reduced roughness;
- Heat-resistant layer for exceptional thermal stability and hardness;
- Prevents heat from affecting the tool, crucial for materials with poor heat conductivity;
- Improves chip removal, contributing to high process stability;
- High temperature is dissipated through the chip, preserving tool integrity and performance;
- Particularly successful in machining injection molds.

**Toolholder:** 016E62090-02-U016200
**Insert:** Competitor vs WCR - 16 PHF910
**Workpiece Material:** X155CrVMo-121 (60 HRC)
**Operation:** Finishing - Profiling
**Coolant:** Air

| | |
|---|---|
| Cutting speed: $V_c$ | 100 m/min |
| Feed per tooth: $f_z$ | 0,05 mm/t |
| Depth of cut: APMX | 0,25 mm |
| Stepover : $a_e$ | 0,25 mm |
| Time | 22h |

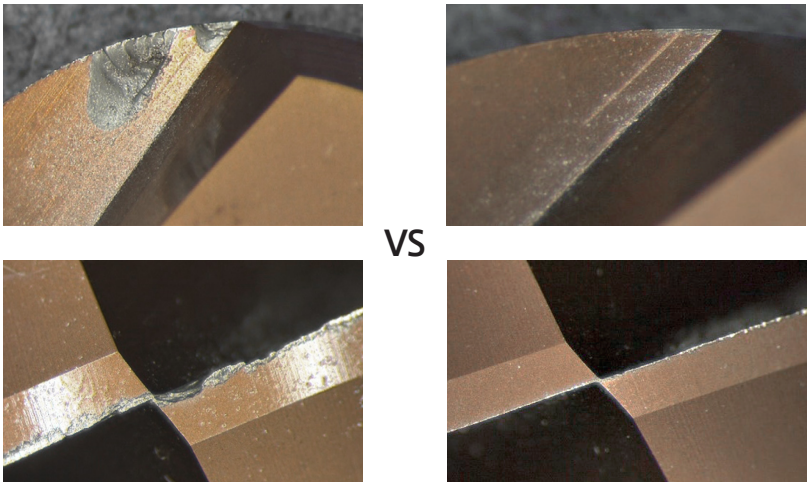
**+30%** Tool Life



Surface finish comparison. Competitor vs PHF

Competitor grade

PHF grade

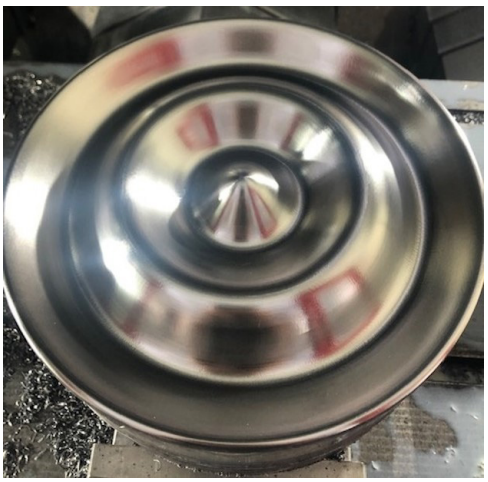


Real images

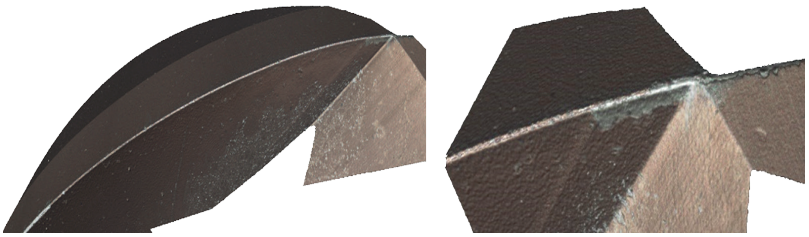
## CHANGING CUTTING CONDITIONS - PHF GRADE

| | |
|---|---|
| Cutting speed: $V_c$ | 125 m/min |
| Feed per tooth: $f_z$ | 0,10 mm/t |
| Depth of cut: APMX | 0,10 mm |
| Stepover : $a_e$ | 0,25 mm |
| Time | 10h |

**-55%** Cycle Time


Surface finishing with more challenging cutting conditions

PHF grade

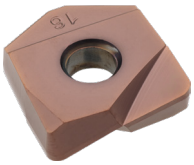

3D geometric survey

# W-PRO 62090 INSERTS | WCR | WCL | WCX

## WCR

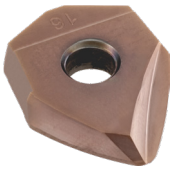
The WCR is a ball nose insert designed for the finishing and profiling of 3D surfaces. It features a unique helical profile, which ensures smooth cutting by reducing cutting forces.
It is available in a range of sizes from 08 to 20.

## WCL



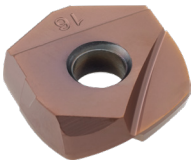
The WCL feature a square shape with corner radius. This radius can vary, providing different cutting geometries. This design combines the stability of a square insert with the smooth cutting characteristics of rounded edges.
It is available in a range of sizes from 08 to 20.

## NEW WCX XT



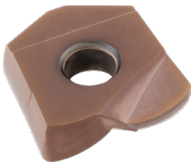
**5-axis machining:** The WCX-XT features a multi-radius insert that combines two different cutting edges: the Ball radius, which is the ball nose tip, and the Tangential radius, which is the peripheral cutting edge with a large radius. This design creates a multi-purpose tool that combines the capabilities of both a tangential tool and a ball nose tool in one.
It is available in a range of sizes from 12 to 20.

## NEW WCX LE



**5-axis machining:** The WCX-LE features a multi-radius insert that combines two large-radius cutting edges: the Lens radius, which forms a lens-shaped profile on the upper section, and the Barrel radius, which is a barrel-shaped profile on the peripheral section. This innovative design allows the tool to efficiently machine both bottom and wall surfaces with just one tool.
It is available in a range of sizes from 16 to 20.

## NEW WCX HF



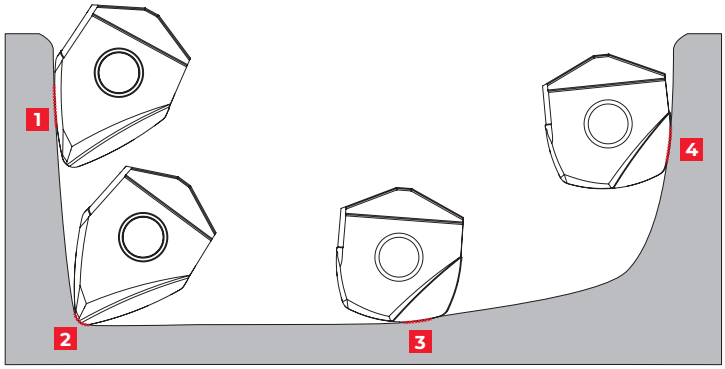
The WCX-HF features multi-radius and large radius principles combined with the chip thinning effect, resulting in a high-feed roughing tool that is distinctly different from previous geometries. It complements the W-PRO finishing line by providing an effective roughing solution.
It is available in a range of sizes from 08 to 20.

# **WCX INSERTS |** Barrel and lens geometries

With the introduction of new tangential, barrel and lens inserts, the W-PRO line is optimized for 5-axis machining of complex 3D surfaces and profiles, making it ideal for the mould & die and aerospace industries.

These advanced inserts are designed with larger radius cutting edges compared to traditional ball nose inserts, allowing for greater stepover or stepdown increments during machining. This results in significantly improved productivity while maintaining high-quality surface finishes, making the W-PRO an ideal choice for precision finishing operations on intricate geometries.

The WCX-XT and WCX-LE inserts are available in the PHF910 grade. This new coating offers high wear resistance due to the latest PVD coating technology, ensuring that the PHF910 provides exceptionally long tool life.



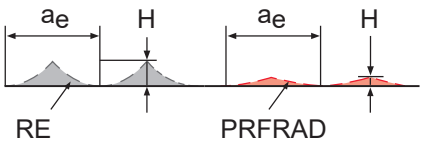

1. **WCX-XT** tangential radius
   cutting edge for inclined surfaces
2. **WCX-XT** ball radius
   cutting edge for corners
3. **WCX-LE** lens radius
   cutting edge for bottom surfaces
4. **WCX-LE** barrel radius
   cutting edge for wall surfaces

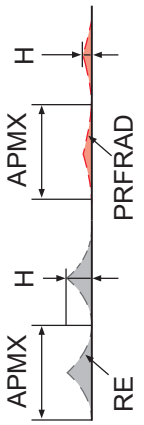
## COMPARING WCX-XT AND WCX-LE WITH WCR BALL INSERT

### With Same Stepdowns (APMX) or Stepovers ($a_e$)*

The WCX-XT and WCX-LE inserts achieves a lower cusp height (H) than a ball insert. This results in a significantly smoother surface finish, enhancing the overall quality of the machined part and reducing the need for secondary finishing operations.

**+ SURFACE QUALITY**

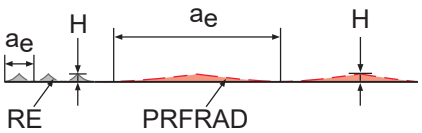


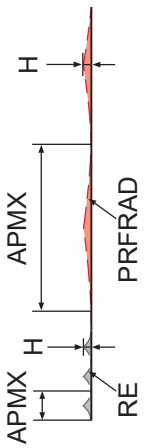




### With Same Cusp Heights (H)

The WCX-XT and WCX-LE inserts enables larger stepdowns or stepovers* compared to a ball insert. This advantage boosts productivity by minimizing the number of tool passes needed, allowing for faster and more efficient material removal.

**+ PRODUCTIVITY**



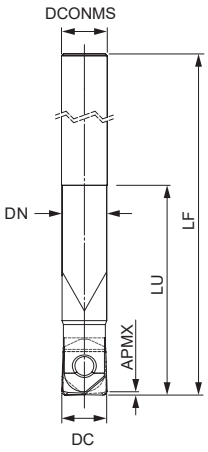




**WCX-XT | -LE**
multi-radius insert

**WCR**
ball insert

*The two vertical graphs illustrate the lens radius, while the two horizontal graphs illustrate the barrel and tangential radius.

# W-PRO 62090




## Cylindrical Carbide Shank

| Tolerance R | Runout Tolerance |
|---|---|
| ± 0,015 | R 0,02 |

| | Order code Código | Reference Referência Referencia | CICT | Dimensions \| Dimensões \| Dimensiones (mm) | | | | | WT | Insert Pastilha Inserto | Stock |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | DC | DCONMS | DN | LF | LU | | | |
| NEW | 181222000 | 008E62090-02-U008100-035 | 2 | 8 | 8 | 7,5 | 100 | 35 | 0,065 | WCR \| WCL \| WCX 08... | ◎ |
| NEW | 181222100 | 008E62090-02-U008140-075 | 2 | 8 | 8 | 7,5 | 140 | 75 | 0,090 | WCR \| WCL \| WCX 08... | ◎ |
| NEW | 181222200 | 010E62090-02-U010100-035 | 2 | 10 | 10 | 9,5 | 100 | 35 | 0, 095 | WCR \| WCL \| WCX 10... | ◎ |
| NEW | 181222300 | 010E62090-02-U010150-085 | 2 | 10 | 10 | 9,5 | 150 | 85 | 0,150 | WCR \| WCL \| WCX 10... | ◎ |
| NEW | 181222400 | 010E62090-02-U010180-115 | 2 | 10 | 10 | 9,5 | 180 | 115 | 0,180 | WCR \| WCL \| WCX 10... | ◎ |
| NEW | 181222500 | 012E62090-02-U012110-040 | 2 | 12 | 12 | 11,5 | 110 | 40 | 0,148 | WCR \| WCL \| WCX 12... | ◎ |
| NEW | 181222600 | 012E62090-02-U012165-095 | 2 | 12 | 12 | 11,5 | 165 | 95 | 0,230 | WCR \| WCL \| WCX 12... | ◎ |
| NEW | 181222700 | 012E62090-02-U012200-130 | 2 | 12 | 12 | 11,5 | 200 | 130 | 0,276 | WCR \| WCL \| WCX 12... | ◎ |
| NEW | 181222800 | 016E62090-02-U016130-060 | 2 | 16 | 16 | 15,0 | 130 | 60 | 0,290 | WCR \| WCL \| WCX 16... | ◎ |
| NEW | 181222900 | 016E62090-02-U016200-130 | 2 | 16 | 16 | 15,0 | 200 | 130 | 0,477 | WCR \| WCL \| WCX 16... | ◎ |
| NEW | 181223000 | 016E62090-02-U016250-180 | 2 | 16 | 16 | 15,0 | 250 | 180 | 0,605 | WCR \| WCL \| WCX 16... | ◎ |
| NEW | 181223100 | 020E62090-02-U020140-060 | 2 | 20 | 20 | 19,0 | 140 | 60 | 0,500 | WCR \| WCL \| WCX 20... | ◎ |
| NEW | 181223200 | 020E62090-02-U020220-140 | 2 | 20 | 20 | 19,0 | 220 | 140 | 0,850 | WCR \| WCL \| WCX 20... | ◎ |
| NEW | 181223300 | 020E62090-02-U020300-220 | 2 | 20 | 20 | 19,0 | 300 | 220 | 1,160 | WCR \| WCL \| WCX 20... | ◎ |

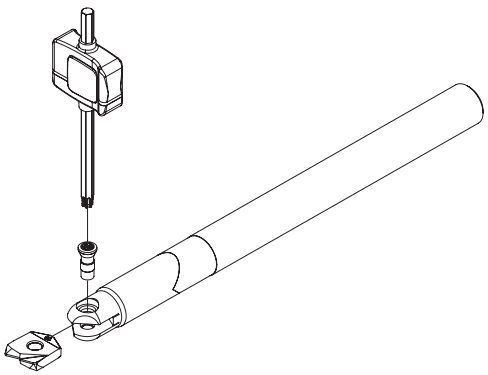
◎ Stock item | Produto de stock | Itens de stock

○ Available under request | Disponível sobre consulta | Disponible bajo consulta

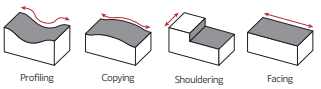
## SPARE PARTS Acessórios | Repuestos

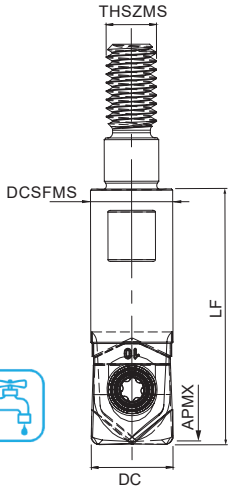
Order separately

| Cutter DC | Insert Screw | Key (Torx) | Key (Torx - Nm) | Torque Value |
|---|---|---|---|---|
| | | | | Nm |
| 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 |



# W-PRO 62090
WCR | WCL | WCX




## Threaded Steel Shank

| Tolerance R | Runout Tolerance |
|---|---|
| ± 0,015 | R 0,05 |

| | Order code<br>Código | Reference<br>Referência<br>Referencia | CICT | Dimensions \| Dimensões \| Dimensiones (mm) | | | | WT | Coolant | Insert<br>Pastilha<br>Inserto | Stock |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | DC | THSZMS | DCSFMS | LF | | | | |
| NEW | 181223600 | 008R62090-02-M06030 | 2 | 8 | M6 | 7,8 | 30 | 0,012 | Yes | WCR \| WCL \| WCX 08... | ◈ |
| | 181167000 | 010R62090-02-UM06030 | 2 | 10 | M6 | 9,8 | 30 | 0,011 | No | WCR \| WCL \| WCX 10... | ◇ |
| NEW | 181209700 | 010R62090-02-M06030 | 2 | 10 | M6 | 9,8 | 30 | 0,015 | Yes | WCR \| WCL \| WCX 10... | ◈ |
| | 181167100 | 012R62090-02-UM06030 | 2 | 12 | M6 | 9,8 | 30 | 0,016 | No | WCR \| WCL \| WCX 12... | ◇ |
| NEW | 181209800 | 012R62090-02-M06030 | 2 | 12 | M6 | 9,8 | 30 | 0,016 | Yes | WCR \| WCL \| WCX 12... | ◈ |
| | 181167200 | 016R62090-02-UM08030 | 2 | 16 | M8 | 12,8 | 30 | 0,028 | No | WCR \| WCL \| WCX 16... | ◇ |
| NEW | 181209900 | 016R62090-02-M08030 | 2 | 16 | M8 | 12,8 | 30 | 0,030 | Yes | WCR \| WCL \| WCX 16... | ◈ |
| | 181167300 | 020R62090-02-UM10035 | 2 | 20 | M10 | 17,8 | 35 | 0,058 | No | WCR \| WCL \| WCX 20... | ◇ |
| NEW | 181210000 | 020R62090-02-M10035 | 2 | 20 | M10 | 17,8 | 35 | 0,055 | Yes | WCR \| WCL \| WCX 20... | ◈ |

◈ 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 | Disponible bajo consulta

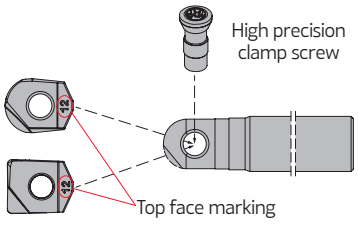
# PROCEDURES FOR CLAMPING SCREWS Procedimentos para parafusos de aperto | Procedimientos para sujetar tornillos

1. Check the insert seat.
Before assembly cutter it is important to ensure that the insert seat has not been damaged during machining or handling.

2. 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.

3. Position the insert.
Position the insert with the top face marking in the direction of screw placement and couple the insert into the cutter.

4. Lubricate the insert screw.
Apply sufficient screw lubrication to prevent seizure. Lubricant should be applied in small quantity to the screw threads.



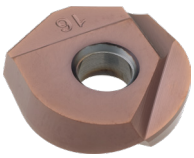

5. Always use a torque wrench to ensure that screws are correctly tightened ( please confirm torque data ). Excessive torque will negatively affect the performance of the tool and can cause screw and insert breakage. Unsufficient torque leads to insert movement, vibration and degrade the cutting result. 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.

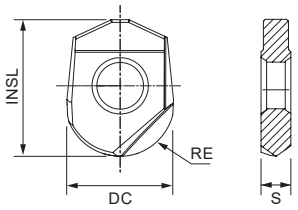
**CAUTION** To avoid affecting tolerances do not tighten the screw without assembling the insert in the toolholder.

# W-PRO 62090

## WCR Inserts | Pastilhas | Plaquitas



Ball

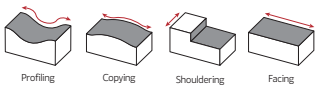



WCR

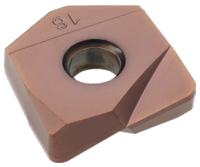
| | | P | | | | M | | | | K | | | | H | | | | Dimensions Dimensões Dimensiones (mm) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PVD | | | | PVD | | | | PVD | | | | PVD | | | | | | | |
| | [2] Grade code | X4 | 8F | X6 | 4F | X4 | 8F | X6 | 4F | X4 | 8F | X6 | 4F | X4 | 8F | X6 | 4F | | | | |
| [1] Geometry code | ISO Reference | PHH603 | PHF603 | PHH910 | PHF910 | PHH603 | PHF603 | PHH910 | PHF910 | PHH603 | PHF603 | PHH910 | PHF910 | PHH603 | PHF603 | PHH910 | PHF910 | INSL | RE | 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 | 1ª Escolha | 1ª Opción
◉ Stock Itens | 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 | Disponible bajo consulta

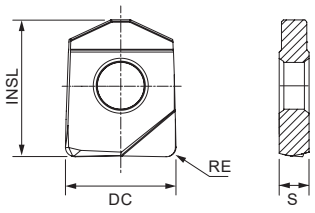
**Insert Order Code:** [1] Geometry code + [2] Grade code




# WCL Inserts | Pastilhas | Plaquitas



Radius




WCL

| | | P | | | | M | | | | K | | | | H | | | | Dimensions Dimensões Dimensiones (mm) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PVD | | | | PVD | | | | PVD | | | | PVD | | | | | | | |
| | [2] Grade code | X4 | 8F | X6 | 4F | X4 | 8F | X6 | 4F | X4 | 8F | X6 | 4F | X4 | 8F | X6 | 4F | | | | |
| [1] Geometry code | ISO Reference | PHH603 | PHF603 | PHH910 | PHF910 | PHH603 | PHF603 | PHH910 | PHF910 | PHH603 | PHF603 | PHH910 | PHF910 | PHH603 | PHF603 | PHH910 | PHF910 | INSL | RE | S | DC |
| 1112879 | WCL-08 R0.3 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 9,7 | 0,3 | 2,1 | 8,0 |
| 1112880 | WCL-08 R0.5 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 9,7 | 0,5 | 2,1 | 8,0 |
| 1112853 | WCL-08 R1.0 | | ● | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | 9,7 | 1,0 | 2,1 | 8,0 |
| 1112881 | WCL-10 R0.3 | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | 12,0 | 0,3 | 2,7 | 10,0 |
| 1112882 | WCL-10 R0.5 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 12,0 | 0,5 | 2,7 | 10,0 |
| 1112848 | WCL-10 R1.0 | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | | ● | 12,0 | 1,0 | 2,7 | 10,0 |
| 1112883 | WCL-10 R1.5 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 12,0 | 1,5 | 2,7 | 10,0 |
| 1112884 | WCL-10 R2.0 | | ● | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | 12,0 | 2,0 | 2,7 | 10,0 |
| 1112885 | WCL-12 R0.3 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 14,6 | 0,3 | 3,2 | 12,0 |
| 1112886 | WCL-12 R0.5 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 14,6 | 0,5 | 3,2 | 12,0 |
| 1112096 | WCL-12 R1.0 | | ● | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | 14,6 | 1,0 | 3,2 | 12,0 |
| 1112887 | WCL-12 R1.5 | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | | ● | 14,6 | 1,5 | 3,2 | 12,0 |
| 1112888 | WCL-12 R2.0 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 14,6 | 2,0 | 3,2 | 12,0 |
| 1112889 | WCL-12 R3.0 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 14,6 | 3,0 | 3,2 | 12,0 |
| 1112890 | WCL-16 R0.3 | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | | ● | 16,6 | 0,3 | 4,2 | 16,0 |
| 1112891 | WCL-16 R0.5 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 16,6 | 0,5 | 4,2 | 16,0 |
| 1112097 | WCL-16 R1.0 | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | | ● | 16,6 | 1,0 | 4,2 | 16,0 |
| 1112892 | WCL-16 R1.5 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 16,6 | 1,5 | 4,2 | 16,0 |
| 1112893 | WCL-16 R2.0 | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | 16,6 | 2,0 | 4,2 | 16,0 |
| 1112894 | WCL-16 R3.0 | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | 16,6 | 3,0 | 4,2 | 16,0 |
| 1112895 | WCL-20 R0.3 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 20,0 | 0,3 | 5,2 | 20,0 |
| 1112896 | WCL-20 R0.5 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 20,0 | 0,5 | 5,2 | 20,0 |
| 1112098 | WCL-20 R1.0 | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | 20,0 | 1,0 | 5,2 | 20,0 |
| 1112897 | WCL-20 R1.5 | | ● | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | | ● | ◬ | ● | 20,0 | 1,5 | 5,2 | 20,0 |
| 1112898 | WCL-20 R2.0 | | ● | | ● | | ● | | ● | | ● | | ● | | ● | | ● | 20,0 | 2,0 | 5,2 | 20,0 |
| 1112899 | WCL-20 R3.0 | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | ◬ | ● | 20,0 | 3,0 | 5,2 | 20,0 |

● First choice | 1ª Escolha | 1ª Opción
● Stock Itens | 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 | Disponible bajo consulta

**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 → PHH603 | PHF603 | PHH910 | PHF910 |
|---|---|---|---|---|---|---|---|
| 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 | 46-54 HRC | ✓ | ✓ | ✓ | ✓ |
| | 13 | Hardened Steels | 55-62 HRC | ✓ | ✓ | ✓ | ✓ |
| | 14 | Hardened Steels | 63-70 HRC | ✓ | ✓ | ✓ | ✓ |

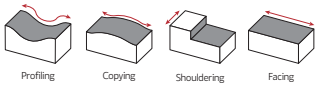
Good Conditions  Average Conditions  Difficult Conditions

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

| ISO | PSM | Material | HB (Brinell) | Vc (m/min) ← Wear Resistance — Toughness → PHH603 | PHF603 | PHH910 | PHF910 | Feed fz (mm/t) WCR | WCL |
|---|---|---|---|---|---|---|---|---|---|
| P | 1 | Unalloyed Steel | 125-220 | 180-310 | 180-310 | 140-270 | 140-270 | 0,15-0,45 | 0,10-0,30 |
| | 2 | Low-Alloyed Steel | 220-280 | 180-300 | 180-300 | 140- 260 | 140- 260 | 0,15-0,40 | 0,10-0,25 |
| | 3 | High-Alloyed Steel | 280-380 | 180-280 | 180-280 | 140-220 | 140-220 | 0,10-0,40 | 0,10-0,25 |
| M | 4 | SS - Ferritic / Martensitic | 200-330 | 170-300 | 170-300 | 130-260 | 130-260 | 0,15-0,35 | 0,10-0,25 |
| | 5 | SS - Austenitic | 200-330 | 160-290 | 160-290 | 120-250 | 120-250 | 0,15-0,35 | 0,10-0,25 |
| | 6 | SS - Austenitic-ferritic (Duplex) | 230-260 | 150-270 | 150-270 | 110-230 | 110-230 | 0,15-0,30 | 0,08-0,20 |
| K | 7 | Malleable Cast Iron | 130-230 | 200-380 | 200-380 | 180-370 | 180-370 | 0,10-0,50 | 0,10-0,35 |
| | 8 | Grey Cast Iron | 180-245 | 180-360 | 180-360 | 180-350 | 180-350 | 0,10-0,45 | 0,10-0,30 |
| | 9 | Nodular Cast iron | 160-250 | 160-310 | 160-310 | 160-290 | 160-290 | 0,10-0,40 | 0,10-0,30 |
| H | 12 | Hardened Steels | 46-54 HRC | 90-270 | 90-270 | 80-260 | 80-260 | 0,05-0,20 | 0,05-0,15 |
| | 13 | Hardened Steels | 55-62 HRC | 80-200 | 80-200 | 70-180 | 70-180 | 0,05-0,15 | 0,04-0,12 |
| | 14 | Hardened Steels | 63-70 HRC | 70-180 | 70-180 | 70-160 | 70-160 | 0,04-0,12 | 0,04-0,10 |

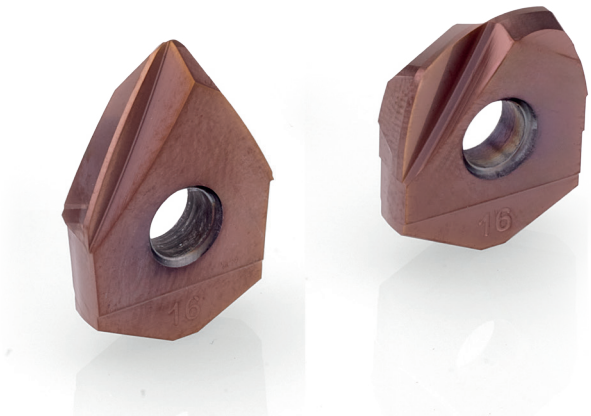
Determine the APMX or $a_e$ :

| | WCR | | WCL | |
|---|---|---|---|---|
| Insert size | APMX (mm) | $A_e$ max (mm) | APMX (mm) | $A_e$ max (mm) |
| 08 | 4,0 | 0,8 | 2,5 | 0,8 |
| 10 | 5,0 | 1,0 | 3,0 | 1,0 |
| 12 | 6,0 | 1,2 | 4,0 | 1,2 |
| 16 | 8,0 | 1,6 | 5,0 | 1,6 |
| 20 | 10,0 | 2,0 | 6,0 | 2,0 |

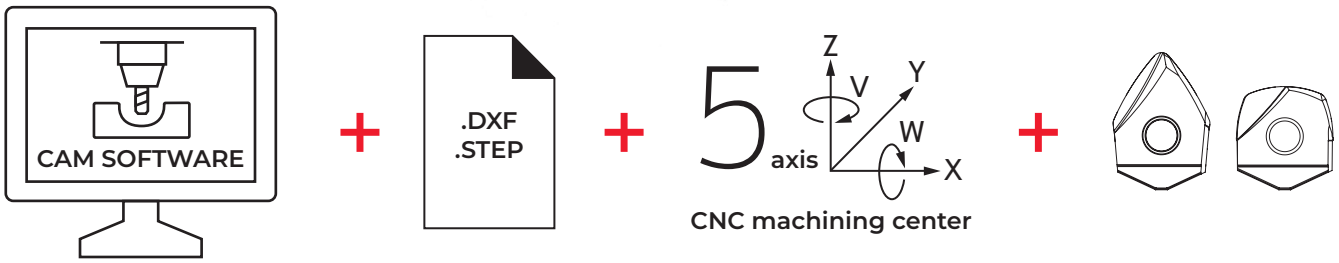



# BOOSTED PRODUCTIVITY WITH 5-AXIS MACHINING

Produtividade reforçada com maquinação 5 eixos | Mayor productividad con el mecanizado en 5 ejes



To take full advantage of the capabilities of the WCX-XT and WCX-LE, follow these steps to ensure optimal performance and efficiency:




- **CAM software:**
  A CAM software equipped with 5-axis strategies and free-form surface machining capabilities allows users to fully harness the potential of W-PRO 62090. This ensures optimized toolpaths and increased machining efficiency across complex geometries.

- **.DXF | .STEP file:**
  Downloadable directly from our website, these cut profile files can be easily uploaded to most CAM software. This guarantees precise machining by providing accurate data and minimizing errors in the machining process.

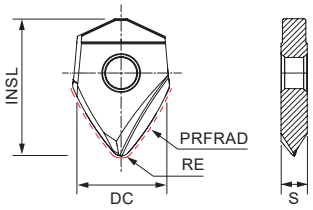
- **5-axis machining*:**
  In a 5-axis continuous machining center, the tool operates with complete freedom, allowing it to perform at its most efficient toolpath. This configuration enables faster, more accurate machining with fewer steps and better access to intricate geometries.

- **WCX-XT | WCX-LE:**
  These multi-radius inserts combines two large-radius cutting edges, designed to capitalize on the latest machining technologies. It ensures optimal performance, leading to faster cycle time and superior surface quality.

***Note:** In the absence of 5-axis machining capabilities, follow the machining methods described in the inserts chapter.

# NEW WCX-XT Inserts | Pastilhas | Plaquitas

Tangential




WCX XT

| | | P | M | K | H | Dimensions Dimensões Dimensiones (mm) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PVD | PVD | PVD | PVD | | | | | |
| | (2) Grade code | 4F | 4F | 4F | 4F | | | | | |
| (1) Geometry code | ISO Reference | PHF910 | PHF910 | PHF910 | PHF910 | INSL | RE | PRFRAD | S | DC |
| 1113527 | WCX-12 XT 1.2-30.0 | ◈ | ◈ | ◈ | ◈ | 14,6 | 1,2 | 30,0 | 3,2 | 12,0 |
| 1113381 | WCX-16 XT 1.6-40.0 | ◈ | ◈ | ◈ | ◈ | 16,6 | 1,6 | 40,0 | 4,2 | 16,0 |
| 1113528 | WCX-20 XT 2.0-50.0 | ◈ | ◈ | ◈ | ◈ | 20,0 | 2,0 | 50,0 | 5,2 | 20,0 |

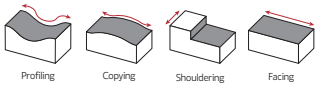
◈ First choice | Primeira opção | 1ª opción ◈ Stock item | Produto de stock | Itens de stock ◯ Available under request | Disponível sobre consulta Disponible bajo consulta

**Insert Order Code:** (1)Geometry code + (2)Grade code

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

| | | | | Tangential Radius | | | |
|---|---|---|---|---|---|---|---|
| ISO | PSM | Material | HB (Brinell) | Vc (m/min) | fz (mm/t) | APMX (mm) | ae (mm) |
| P | 1 | Unalloyed Steel | 125-220 | 750 (250-900) | 0,15 (0,10-0,40) | See the table in the next page | 0,10 (0,05-0,30) |
| | 2 | Low-Alloyed Steel | 220-280 | 720 (200-800) | 0,15 (0,08-0,30) | | 0,10 (0,05-0,30) |
| | 3 | High-Alloyed Steel | 280-380 | 520 (200-700) | 0,15 (0,05-0,30) | | 0,10 (0,05-0,30) |
| M | 4 | SS - Ferritic / Martensitic | 200-330 | 650 (200-800) | 0,15 (0,05-0,30) | | 0,10 (0,05-0,30) |
| | 5 | SS - Austenitic | 200-330 | 650 (200-800) | 0,15 (0,05-0,30) | | 0,10 (0,05-0,30) |
| | 6 | SS - Austenitic-ferritic (Duplex) | 230-260 | 650 (200-800) | 0,15 (0,05-0,25) | | 0,10 (0,05-0,20) |
| K | 7 | Malleable Cast Iron | 130-230 | 720 (250-900) | 0,20 (0,10-0,30) | | 0,10 (0,05-0,30) |
| | 8 | Grey Cast Iron | 180-245 | 720 (250-900) | 0,20 (0,10-0,30) | | 0,10 (0,05-0,30) |
| | 9 | Nodular Cast iron | 160-250 | 720 (250-900) | 0,20 (0,10-0,30) | | 0,10 (0,05-0,30) |
| H | 12 | Hardened Steels | 46-54 HRC | 320 (100-400) | 0,10 (0,05-0,20) | | 0,08 (0,02-0,20) |
| | 13 | Hardened Steels | 55-62 HRC | 280 (80-320) | 0,10 (0,05-0,15) | | 0,05 (0,01-0,20) |
| | 14 | Hardened Steels | 63-70 HRC | 280 (70-320) | 0,10 (0,05-0,15) | | 0,05 (0,01-0,20) |

| | | | | Ball Radius | | | |
|---|---|---|---|---|---|---|---|
| ISO | PSM | Material | HB (Brinell) | Vc (m/min) | fz (mm/t) | APMX (mm) | ae (mm) |
| P | 1 | Unalloyed Steel | 125-220 | 750 (250-900) | 0,05 (0,02-0,20) | 0,10 (0,05-0,30) | See the table in the next page |
| | 2 | Low-Alloyed Steel | 220-280 | 750 (200-800) | 0,05 (0,02-0,20) | 0,10 (0,05-0,25) | |
| | 3 | High-Alloyed Steel | 280-380 | 700 (200-700) | 0,05 (0,02-0,20) | 0,10 (0,05-0,25) | |
| M | 4 | SS - Ferritic / Martensitic | 200-330 | 750 (200-800) | 0,05 (0,02-0,20) | 0,10 (0,05-0,25) | |
| | 5 | SS - Austenitic | 200-330 | 750 (200-800) | 0,05 (0,02-0,20) | 0,10 (0,05-0,20) | |
| | 6 | SS - Austenitic-ferritic (Duplex) | 230-260 | 750 (200-800) | 0,05 (0,02-0,20) | 0,10 (0,05-0,20) | |
| K | 7 | Malleable Cast Iron | 130-230 | 750 (250-900) | 0,05 (0,02-0,20) | 0,10 (0,05-0,30) | |
| | 8 | Grey Cast Iron | 180-245 | 750 (250-900) | 0,05 (0,02-0,20) | 0,10 (0,05-0,30) | |
| | 9 | Nodular Cast iron | 160-250 | 750 (250-900) | 0,05 (0,02-0,20) | 0,10 (0,05-0,30) | |
| H | 12 | Hardened Steels | 46-54 HRC | 500 (100-400) | 0,05 (0,02-0,20) | 0,08 (0,02-0,15) | |
| | 13 | Hardened Steels | 55-62 HRC | 450 (80-320) | 0,05 (0,02-0,20) | 0,05 (0,01-0,15) | |
| | 14 | Hardened Steels | 63-70 HRC | 450 (70-320) | 0,05 (0,02-0,20) | 0,05 (0,01-0,15) | |

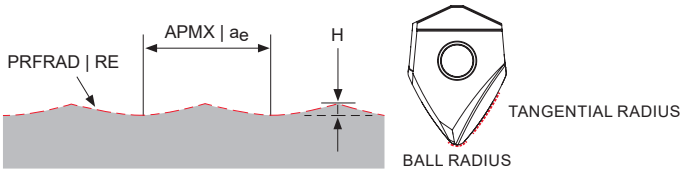



# RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

Determine the APMX or $a_e$ according to the desired cusp height:

| Insert | PRFRAD | Tangential Radius (APMX) H - Cusp Height (mm) | | | | | | | RE | Ball Radius ($a_e$) H - Cusp Height (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0,0005 | 0,0010 | 0,0020 | 0,0030 | 0,0040 | 0,0050 | 0,0100 | | 0,0005 | 0,0010 | 0,0020 | 0,0030 | 0,0040 | 0,0050 | 0,0100 |
| WCX-12 XT 1.2-30.0 | 30,0 | 0,35 | 0,49 | 0,69 | 0,85 | 0,98 | 1,10 | 1,55 | 1,2 | 0,07 | 0,10 | 0,14 | 0,17 | 0,20 | 0,22 | 0,31 |
| WCX-16 XT 1.6-40.0 | 40,0 | 0,40 | 0,57 | 0,80 | 0,98 | 1,13 | 1,26 | 1,79 | 1,6 | 0,08 | 0,11 | 0,16 | 0,20 | 0,23 | 0,25 | 0,36 |
| WCX-20 XT 2.0-50.0 | 50,0 | 0,45 | 0,63 | 0,89 | 1,10 | 1,26 | 1,41 | 2,00 | 2,0 | 0,09 | 0,13 | 0,18 | 0,22 | 0,25 | 0,28 | 0,40 |

| Tangential Radius | Ball Radius |
|---|---|
| $APMX = 2\sqrt{PRFRAD^2 - (PRFRAD - H)^2}$ | $a_e = 2\sqrt{RE^2 - (RE - H)^2}$ |



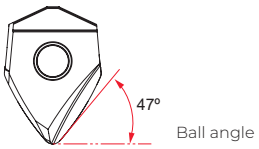

For high overhang conditions consider the next:

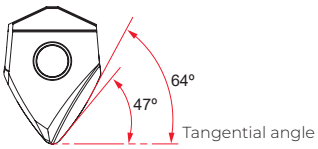
**Vc1 = Vc x k**

Vc1 - Recommended cutting speed for high overhang
Vc - Recommended cutting speed
k - Overhang factor

| Overhang ratio | Factor (k) |
|---|---|
| 3<DC | 1,00 |
| 3<DC<5 | 0,70 |
| 5<DC<6 | 0,60 |
| 6<DC<7 | 0,50 |
| DC>7 | 0,45 |

# MACHINING METHODS Métodos de maquinação | Métodos de mecanizado



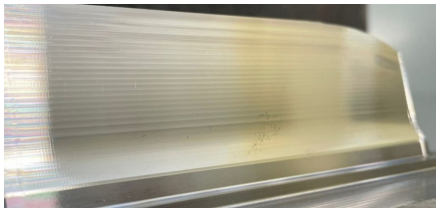

In 3-Axis machining usable range of:
- Ball angle: between 0° and 47°.
- Tangential angle: between 47° and 64°.

# WCX-XT TEST REPORT Relatório de Teste WCX-XT | Informe de Prueba WCX-XT

**Workpiece Material:** 1.2738 steel (36-40 HRC)

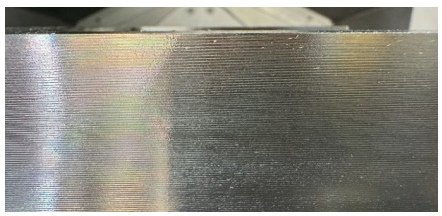
**Toolholder:** 016E62090-02-U016200
**Insert:** WCX 16-XT 1.6-40.0 PHF910
**Operation:** Finishing - 5-axis

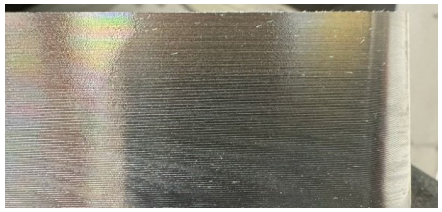
| | |
|---|---|
| Cutting speed: $V_C$ | 520 m/min |
| Feed per tooth: $f_Z$ | 0,15 mm/t |
| Depth of cut: APMX | 1,13 mm |
| Stepover : $a_e$ | 0,10 mm |
| Time | 10 min |



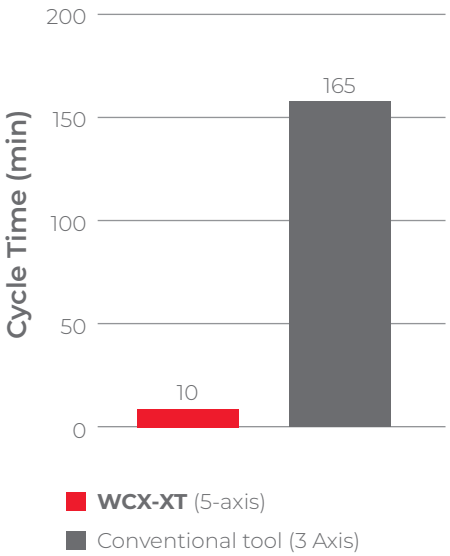
**Toolholder:** Conventional tool - D16 Z2 R0,8
**Operation:** Finishing - 3 Axis

| | |
|---|---|
| Cutting speed: $V_C$ | 200 m/min |
| Feed per tooth: $f_Z$ | 0,10 mm/t |
| Depth of cut: APMX | 0,15 mm |
| Stepover : $a_e$ | 0,20 mm |
| Time | 165 min |

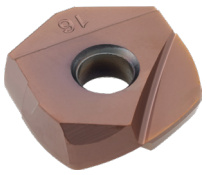




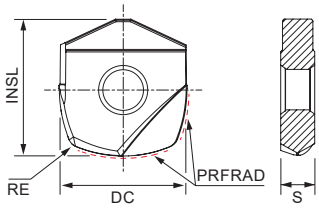
**-94%** Cycle time



# NEW WCX-LE Inserts | Pastilhas | Plaquitas



Lens




WCX LE

| | | P | M | K | H |
|---|---|---|---|---|---|
| | | PVD | PVD | PVD | PVD |
| | (2) Grade code | 4F | 4F | 4F | 4F |
| (1) Geometry code | ISO Reference | PHF910 | PHF910 | PHF910 | PHF910 |

| Dimensions Dimensões Dimensiones (mm) | | | | |
|---|---|---|---|---|
| INSL | RE | PRFRAD | S | DC |
| 16,6 | 1,5 | 16,0 | 4,2 | 16,0 |
| 16,6 | 5,0 | 16,0 | 4,2 | 16,0 |
| 20,0 | 1,9 | 20,0 | 5,2 | 20,0 |
| 20,0 | 6,0 | 20,0 | 5,2 | 20,0 |

| 1113412 | WCX-16 LE 1.5-16.0 | ● | ● | ● | ● |
|---|---|---|---|---|---|
| 1113529 | WCX-16 LE 5.0-16.0 | ○ | ○ | ○ | ○ |
| 1113530 | WCX-20 LE 1.9-20.0 | ● | ● | ● | ● |
| 1113531 | WCX-20 LE 6.0-20.0 | ○ | ○ | ○ | ○ |

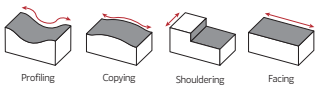
● First choice | Primeira opção | 1ª opción ● Stock item | Produto de stock | Itens de stock ○ Available under request | Disponível sobre consulta Disponible bajo consulta

**Insert Order Code:** (1) Geometry code + (2) Grade code

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

| | | | | Barrel Radius | | | |
|---|---|---|---|---|---|---|---|
| ISO | PSM | Material | HB (Brinell) | Vc (m/min) | fz (mm/t) | APMX (mm) | ae (mm) |
| P | 1 | Unalloyed Steel | 125-220 | 650 (250-900) | 0,20 (0,15-0,45) | See the table in the next page | 0,10 (0,05-0,30) |
| | 2 | Low-Alloyed Steel | 220-280 | 600 (200-800) | 0,20 (0,10-0,35) | | 0,10 (0,05-0,30) |
| | 3 | High-Alloyed Steel | 280-380 | 400 (200-700) | 0,20 (0,10-0,35) | | 0,10 (0,05-0,30) |
| M | 4 | SS - Ferritic / Martensitic | 200-330 | 500 (200-800) | 0,20 (0,10-0,35) | | 0,10 (0,05-0,30) |
| | 5 | SS - Austenitic | 200-330 | 500 (200-800) | 0,20 (0,10-0,35) | | 0,10 (0,05-0,30) |
| | 6 | SS - Austenitic-ferritic (Duplex) | 230-260 | 500 (200-800) | 0,20 (0,10-0,30) | | 0,10 (0,05-0,20) |
| K | 7 | Malleable Cast Iron | 130-230 | 600 (250-900) | 0,25 (0,20-0,50) | | 0,10 (0,05-0,30) |
| | 8 | Grey Cast Iron | 180-245 | 600 (250-900) | 0,25 (0,20-0,50) | | 0,10 (0,05-0,30) |
| | 9 | Nodular Cast iron | 160-250 | 600 (250-900) | 0,25 (0,20-0,50) | | 0,10 (0,05-0,30) |
| H | 12 | Hardened Steels | 46-54 HRC | 250 (100-400) | 0,15 (0,10-0,30) | | 0,08 (0,02-0,20) |
| | 13 | Hardened Steels | 55-62 HRC | 220 (80-320) | 0,15 (0,10-0,25) | | 0,05 (0,01-0,20) |
| | 14 | Hardened Steels | 63-70 HRC | 220 (70-320) | 0,15 (0,10-0,25) | | 0,05 (0,01-0,20) |

| | | | | Lens Radius | | | |
|---|---|---|---|---|---|---|---|
| ISO | PSM | Material | HB (Brinell) | Vc (m/min) | fz (mm/t) | APMX (mm) | ae (mm) |
| P | 1 | Unalloyed Steel | 125-220 | 750 (250-900) | 0,25 (0,20-0,45) | 0,10 (0,05-0,30) | See the table in the next page |
| | 2 | Low-Alloyed Steel | 220-280 | 720 (200-800) | 0,25 (0,15-0,35) | 0,10 (0,05-0,30) | |
| | 3 | High-Alloyed Steel | 280-380 | 520 (200-700) | 0,25 (0,15-0,35) | 0,10 (0,05-0,30) | |
| M | 4 | SS - Ferritic / Martensitic | 200-330 | 650 (200-800) | 0,25 (0,15-0,35) | 0,10 (0,05-0,30) | |
| | 5 | SS - Austenitic | 200-330 | 650 (200-800) | 0,25 (0,15-0,35) | 0,10 (0,05-0,30) | |
| | 6 | SS - Austenitic-ferritic (Duplex) | 230-260 | 650 (200-800) | 0,25 (0,10-0,30) | 0,10 (0,05-0,20) | |
| K | 7 | Malleable Cast Iron | 130-230 | 720 (250-900) | 0,40 (0,20-0,50) | 0,10 (0,05-0,30) | |
| | 8 | Grey Cast Iron | 180-245 | 720 (250-900) | 0,40 (0,20-0,50) | 0,10 (0,05-0,30) | |
| | 9 | Nodular Cast iron | 160-250 | 720 (250-900) | 0,40 (0,20-0,50) | 0,10 (0,05-0,30) | |
| H | 12 | Hardened Steels | 46-54 HRC | 320 (100-400) | 0,20 (0,10-0,30) | 0,08 (0,02-0,20) | |
| | 13 | Hardened Steels | 55-62 HRC | 280 (80-320) | 0,20 (0,10-0,25) | 0,05 (0,01-0,20) | |
| | 14 | Hardened Steels | 63-70 HRC | 280 (70-320) | 0,20 (0,10-0,25) | 0,05 (0,01-0,20) | |

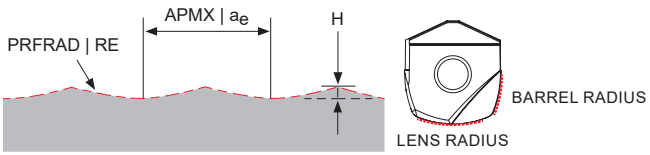



# RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

Determine the APMX or $a_e$ according to the desired cusp height:

| Insert | Barrel Radius (APMX) | | | | | | | Lens Radius ($a_e$) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PRFRAD | H - Cusp Height (mm) | | | | | | PRFRAD | H - Cusp Height (mm) | | | | | |
| | | 0,0010 | 0,0020 | 0,0030 | 0,0040 | 0,0050 | 0,0100 | | 0,0010 | 0,0020 | 0,0030 | 0,0040 | 0,0050 | 0,0100 |
| WCX-16 LE 1.5-16.0<br>WCX-16 LE 5.0-16.0 | 16 | 0,36 | 0,51 | 0,62 | 0,72 | 0,80 | 1,55 | 16 | 0,36 | 0,51 | 0,62 | 0,72 | 0,80 | 1,55 |
| WCX-20 LE 1.9-20.0<br>WCX-20 LE 6.0-20.0 | 20 | 0,40 | 0,57 | 0,69 | 0,80 | 0,89 | 1,26 | 20 | 0,40 | 0,57 | 0,69 | 0,80 | 0,89 | 1,26 |

| Lens Radius | Barrel Radius |
|---|---|
| $APMX = 2\sqrt{PRFRAD^2 - (PRFRAD - H)^2}$ | $a_e = 2\sqrt{PRFRAD^2 - (PRFRAD - H)^2}$ |



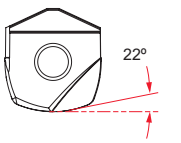

For high overhang conditions consider the next:

**Vc1 = Vc x k**

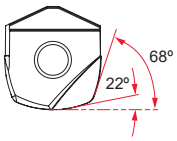
Vc1 - Recommended cutting speed for high overhang
Vc - Recommended cutting speed
k - Overhang factor

| Overhang ratio | Factor (k) |
|---|---|
| 3<DC | 1,00 |
| 3<DC<5 | 0,70 |
| 5<DC<6 | 0,60 |
| 6<DC<7 | 0,50 |
| DC>7 | 0,45 |

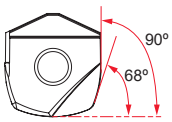
# MACHINING METHODS Métodos de maquinação | Métodos de mecanizado



Lens angle

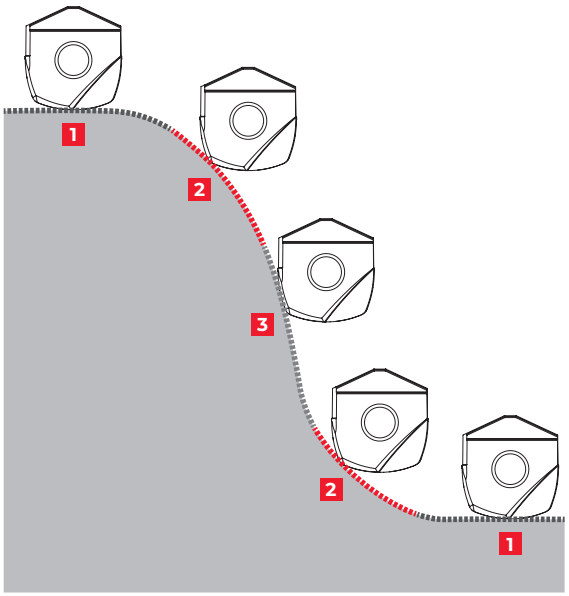


Corner angle



Barrel angle

In 3-Axis machining usable range of:
- Lens angle: between 0° and 22°.
- Corner angle: between 22° and 68°.
- Barrel angle: between 68° and 90°.




1 **WCX-LE** lens radius
cutting edge for bottom surfaces - large stepover

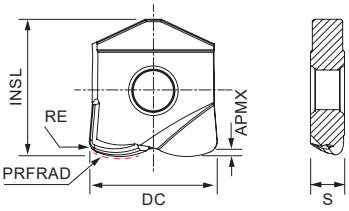
2 **WCX-LE** corner radius
cutting edge for inclined surfaces - small stepover

3 **WCX-LE** barrel radius
cutting edge for wall surfaces - large stepdown

**Note:** In 5-axis machining, the tool must be tilted to avoid cutting into the center where Vc=0 m/min. This tilt angle should not exceed 22°.

# NEW WCX-HF Inserts | Pastilhas | Plaquitas

High feed




WCX HF

| | | P | M | K | H | Dimensions Dimensões Dimensiones (mm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PVD | PVD | PVD | PVD | | | | | | |
| | (2) Grade code | 4F | 4F | 4F | 4F | | | | | | |
| (1) Geometry code | ISO Reference | PHF910 | PHF910 | PHF910 | PHF910 | INSL | RE | PRFRAD | S | APMX | DC |
| 1113376 | WCX-08 HF 0.6-03.4 | ◎ | ◎ | ◎ | ◎ | 9,7 | 0,6 | 3,4 | 2,1 | 0,40 | 8,0 |
| 1113377 | WCX-10 HF 0.8-04.6 | ◎ | ◎ | ◎ | ◎ | 12,0 | 0,8 | 4,6 | 2,7 | 0,50 | 10,0 |
| 1113378 | WCX-12 HF 1.0-06.0 | ◎ | ◎ | ◎ | ◎ | 14,6 | 1,0 | 6,0 | 3,2 | 0,50 | 12,0 |
| 1113379 | WCX-16 HF 1.4-08.0 | ◎ | ◎ | ◎ | ◎ | 16,6 | 1,4 | 8,0 | 4,2 | 0,55 | 16,0 |
| 1113380 | WCX-20 HF 1.8-10.0 | ◎ | ◎ | ◎ | ◎ | 20,0 | 1,8 | 10,0 | 5,2 | 0,55 | 20,0 |

◎ First choice | Primeira opção | 1ª opción ◎ Stock item | Produto de stock | Itens de stock ○ Available under request | Disponível sobre consulta Disponible bajo consulta

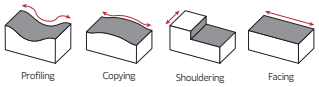
**Insert Order Code:** (1) Geometry code + (2) Grade code

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

| ISO | PSM | Material | HB (Brinell) | Vc (m/min) | | | Feed fz (mm/t) | | | Plunging | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ae=25% | ae=50% | ae=100% | ae=25% | ae=50% | ae=100% | Vc (m/min) | fz (mm/t) |
| P | 1 | Unalloyed Steel | 125-220 | 300 | 280 | 170 | 0,044 x DC | 0,038 x DC | 0,023 x DC | 160 | 0,004 x DC |
| | 2 | Low-Alloyed Steel | 220-280 | 280 | 250 | 230 | 0,044 x DC | 0,038 x DC | 0,023 x DC | 140 | 0,004 x DC |
| | 3 | High-Alloyed Steel | 280-380 | 200 | 180 | 150 | 0,040 x DC | 0,036 x DC | 0,020 x DC | 120 | 0,004 x DC |
| M | 4 | SS - Ferritic / Martensitic | 200-330 | 180 | 160 | 150 | 0,035 x DC | 0,035 x DC | 0,018 x DC | 110 | 0,003 x DC |
| | 5 | SS - Austenitic | 200-330 | 120 | 110 | 100 | 0,035 x DC | 0,033 x DC | 0,018 x DC | 100 | 0,003 x DC |
| | 6 | SS - Austenitic-ferritic (Duplex) | 230-260 | 80 | 70 | 60 | 0,033 x DC | 0,031 x DC | 0,018 x DC | 60 | 0,003 x DC |
| K | 7 | Malleable Cast Iron | 130-230 | 170 | 150 | 130 | 0,034 x DC | 0,032 x DC | 0,021 x DC | 110 | 0,003 x DC |
| | 8 | Grey Cast Iron | 180-245 | 220 | 200 | 180 | 0,033 x DC | 0,035 x DC | 0,021 x DC | 120 | 0,003 x DC |
| | 9 | Nodular Cast iron | 160-250 | 160 | 140 | 120 | 0,034 x DC | 0,032 x DC | 0,021 x DC | 110 | 0,003 x DC |
| H | 12 | Hardened Steels | 46-54 HRC | 90 | 85 | 70 | 0,026 x DC | 0,021 x DC | 0,014 x DC | 70 | 0,002 x DC |
| | 13 | Hardened Steels | 55-62 HRC | 90 | 85 | 70 | 0,026 x DC | 0,021 x DC | 0,014 x DC | 70 | 0,002 x DC |
| | 14 | Hardened Steels | 63-70 HRC | 90 | 85 | 70 | 0,026 x DC | 0,021 x DC | 0,014 x DC | 70 | 0,002 x DC |

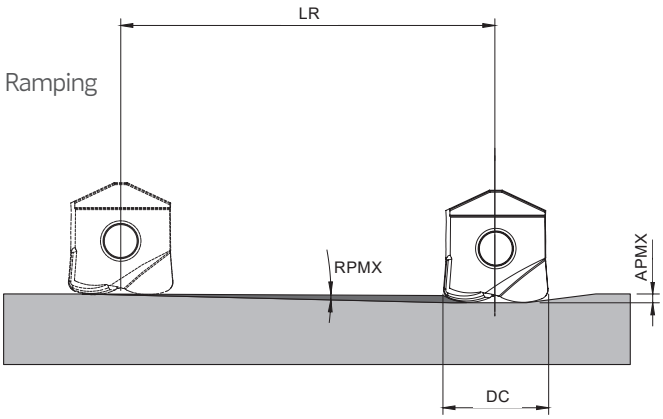
Determine the APMX:

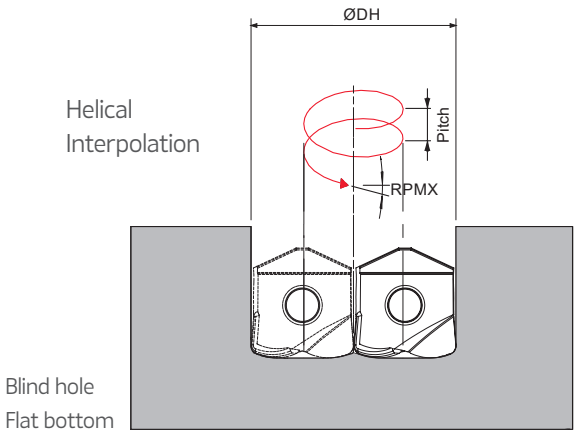
| Insert size | APMX (mm) |
|---|---|
| WCX-08 HF 0.6-03.4 | 0,40 |
| WCX-10 HF 0.8-04.6 | 0,50 |
| WCX-12 HF 1.0-06.0 | 0,50 |
| WCX-16 HF 1.4-08.0 | 0,55 |
| WCX-20 HF 1.8-10.0 | 0,55 |




# RAMPING AND HELICAL INTERPOLATION

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



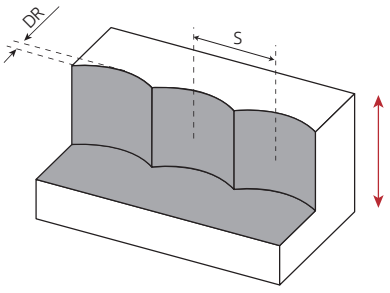

ØDi = ØDH - DC

| DC | Ramping | | | Helical Interpolation | | | Max Angle (°) |
|---|---|---|---|---|---|---|---|
| | RPMX | APMX | Min LR | ØDHmin | ØDHmax | Max Pitch/Rev. | |
| 8 | 1,5 | 0,40 | 15,3 | 10,7<br>- | -<br>16,0 | 0,21<br>0,40 | 1,5<br>1,0 |
| 10 | 1,5 | 0,50 | 19,1 | 13,3<br>- | -<br>20,0 | 0,25<br>0,50 | 1,5<br>1,0 |
| 12 | 1,5 | 0,50 | 19,1 | 16,0<br>- | -<br>24,0 | 0,32<br>0,50 | 1,5<br>0,8 |
| 16 | 1,5 | 0,55 | 21,0 | 21,3<br>- | -<br>32,0 | 0,42<br>0,55 | 1,5<br>0,6 |
| 20 | 1,5 | 0,55 | 21,0 | 26,7<br>- | -<br>40,0 | 0,53<br>0,55 | 1,5<br>0,5 |

Note: During helical interpolation do not exceed APMX.

## PLUNGING Mergulho | Plunge

| S max and DR corresponding cutting diameter DC (mm) | | | | | |
|---|---|---|---|---|---|
| DR (mm) | DC (mm) | | | | |
| | 8 | 10 | 12 | 16 | 20 |
| 1,0 | 2,6 | 3,0 | 3,3 | 3,9 | 4,4 |
| 2,0 | 3,5 | 4,0 | 4,5 | 5,3 | 6,0 |
| 3,0 | - | 4,6 | 5,2 | 6,2 | 7,1 |
| 4,0 | - | - | 5,7 | 6,9 | 8,0 |
| 5,0 | - | - | - | 7,4 | 8,7 |
| 6,0 | - | - | - | 7,7 | 9,2 |
| 7,0 | - | - | - | - | 9,5 |

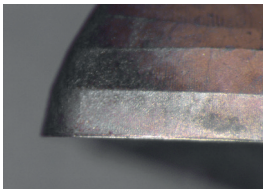


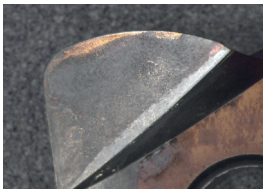
# WCX-XT TEST REPORT Relatório de Teste WCX-XT | Informe de Prueba WCX-XT

**Workpiece Material:** 1.2738 steel (36-40 HRC)
**Toolholder:** 016E62090-02-U016200
**Insert:** WCX 16 HF 1.4-08.0 PHF910

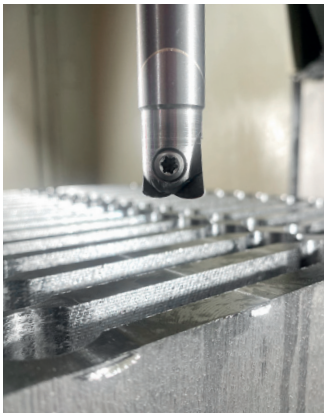
**Operation:** Helical Interpolation | Slotting

| | |
|---|---|
| Cutting speed: $V_c$ | 150 m/min |
| Feed per tooth: $f_z$ | 0,80 mm/t |
| Depth of cut: APMX | 0,60 mm |
| Stepover : $a_e$ | 16 mm |
| Ramp Depth | 0,55 mm |
| Time | 45 min |





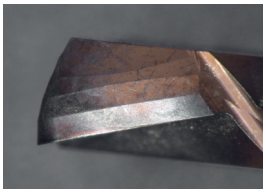
Flank and Rake wear after 45 min

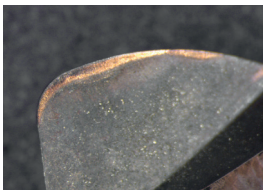


Helical Interpolation and slotting operations

**Operation:** Interrupted Pocket Milling

| | |
|---|---|
| Cutting speed: $V_c$ | 150 m/min |
| Feed per tooth: $f_z$ | 0,80 mm/t |
| Depth of cut: APMX | 0,60 mm |
| Stepover : $a_e$ | 9,60 mm |
| Ramp Depth | 0,55 mm |
| Time | 22 min |

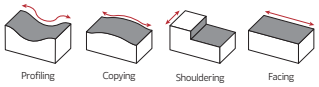




Flank and Rake wear after 67 min

Interrupted Pocket milling operation

The full test duration is 67 minutes, consisting of 45 minutes of helical interpolation and slotting machining, and an additional 22 minutes of interrupted pocket milling, all without any noticeable wear on the cutting edge.




# ONE CLAMP, FIVE INSERT GEOMETRIES Um Sistema de Fixação, Cinco Geometrias | Un Sistema de Sujeción, Cinco Geometrías

62090

# W-PRO

**Superior finish** on 3D complex surfaces

5-axis machining

Check the QrCode to our website page for more information

Check the QrCode to see the tool in action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