MAPAL Blades for WP Single-Bladed and WP Twin-Bladed Reamers

High speed clamping groove
Even with high speed machining, the sintered clamping groove guarantees stable clamping by providing a positive connection between clamping plate and blade. This means the requirement is satisfied for meeting bore tolerances within a few microns – and not only for high speed machining.

The MAPAL F chamfer
The F chamfer is the name given by MAPAL to an additional stabilising and guide chamfer on the blade. This chamfer can be applied to all newly manufactured MAPAL indexable blades in any designs and with any cutting leads. The surface quality is improved by the F chamfer because of the controlled wear and is consistent right to the end of the blade life. Blades with F chamfer make a greater contribution to guiding the tool, which is extremely important, particularly where with high speed machining or unfavourable length and diameter situations.
A further advantage of the F chamfer lies in the higher dimensional stability and clearly longer blade life. The normally strong loss in dimension at the start of the cutting process is avoided and is slower and more constant over the whole of the blade life.

The MAPAL principle improved by additional guiding on the blade

Comparison of surface roughness for blades without and with F chamfer

The Key to Success

The blades are coded using the following system:

- **Cutting lead form**
  - AD = 3°/15° length 3 mm
  - AS = 3°/30° length 1.3 mm
  - EK = 3°/30° length 0.6 mm
  - AZ = 3°/75° length 1.3 mm

- **Size**
  - 81 | 80 | 91 | 92 | 93
  - Select the size to suit the type of reamer. For allocation see product tables.

- **Cutting direction**
  - R = R.H. cutting
  - L = L.H. cutting

- **Radial rake**
  - 0°
  - 6°
  - 12°

- **Cutting material grade**
e.g. HU615 = carbide
For other cutting material grades, see table on page 77.

- **End of life**
  - without F chamfer
  - with F chamfer

- **High speed clamping groove**
Even with high speed machining, the sintered clamping groove guarantees stable clamping by providing a positive connection between clamping plate and blade. This means the requirement is satisfied for meeting bore tolerances within a few microns – and not only for high speed machining.

- **Stabilisation Roughness**

- **End of life**

- **High speed clamping groove**

- **The MAPAL principle improved by additional guiding on the blade**

- **Comparison of surface roughness for blades without and with F chamfer**

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## Cutting Leads for MAPAL WP Blades

### Cutting Lead AD
- Universal cutting lead for high quality surface finishes also for low cutting speeds; note cutting lead length of 3 mm; not suitable for aluminium.
- Max. cutting depth: 0.25 mm
- Radial rake: 0°, 6°, 12°

### Cutting Lead AS (also end cutting available)
- Cutting lead suitable for all materials, high quality surface finish also for high cutting speeds; cutting lead length 1.3 mm.
- Max. cutting depth: 0.25 mm
- Radial rake: 0°, 6°, 12°

### Cutting Lead EK (end cutting)
- Only use where a low cutting length of 0.5 mm is required; for all materials; do not exceed max. feed of 0.2 mm/rev.
- Max. cutting depth: 0.15 mm
- Radial rake: 0°, 6°, 12°

### Cutting Lead AZ
- For high cutting speeds; especially suitable for machining aluminium.
- Max. cutting depth: 1 mm
- Radial rake: 0°, 6°, 12°

### Other cutting leads available on request

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## Cutting materials for MAPAL WP Blades

### Cutting material code:
- HU615: carbide; HC416, HP426 = coated carbide, CU140, CU134 = Cermet; CP140/CP134 = coated Cermet; PU620 = PCD-polycrystalline diamond; FU801, FU802 = PCBN-polycrystalline cubic boron nitride

### Application area

<table>
<thead>
<tr>
<th>Material Group</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>Uncoated carbide grade with wide range of applications; for general cutting tasks; suitable for use with low to medium cutting speeds.</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>Coated carbide grade; better wear resistance than grade HU615; for use with medium to upper cutting speed range.</td>
</tr>
<tr>
<td>Grey cast iron</td>
<td>Coated carbide grade with minimum wear compared to HU615; for use in medium to upper cutting speed range.</td>
</tr>
<tr>
<td>Non-ferrous metals (Alu etc.)</td>
<td>Uncoated Cermet grade; note minimum speed; better surface finish because of high cutting speeds. Not with sintered clamping groove.</td>
</tr>
<tr>
<td>High heat resistant</td>
<td>Uncoated Cermet grade; note minimum speed; better surface finish because of high cutting speeds.</td>
</tr>
<tr>
<td>Hard materials</td>
<td>Coated Cermet grade, better wear resistance than CU134; increase in cutting speed; note minimum speed.</td>
</tr>
<tr>
<td></td>
<td>Coated Cermet grade, better wear resistance than CU140; increase in cutting speed; note minimum speed. Not with sintered clamping groove.</td>
</tr>
<tr>
<td>PCD</td>
<td>PCD grade for machining non-ferrous metals.</td>
</tr>
<tr>
<td>PCBN</td>
<td>PCBN grade for machining hardened steel.</td>
</tr>
<tr>
<td>PDCBN</td>
<td>PDCBN grade for machining cast iron, also with heavily interrupted cut.</td>
</tr>
</tbody>
</table>

### Cutting Leads for MAPAL WP Blades

- Max. cutting depth: 0.25 mm
- Radial rake: 0°, 6°, 12°
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- Max. cutting depth: 0.15 mm
- Radial rake: 0°, 6°, 12°
- Max. cutting depth: 1 mm
- Radial rake: 0°, 6°, 12°

### Other cutting leads available on request
MAPALAL Blades for HX Single-Bladed and HX Twin-Bladed Reamers

The MAPAL HX system, which takes its name from the hexagonal form of the blades with 6 precision-ground cutting edges, sets the benchmark in economic terms for precision machining bores. Both with single-bladed and the multi-bladed reamers, the system has clear advantages because of the six-fold use of the HX blades:

1. Six precision-ground cutting edges for maximum economy in precision machining bores.
2. Better blade clamping with clamping grooves for a stable positioning, even for difficult cuts and high spindle speeds.
3. Chip breakers for controlled chip flow and achieving the required chip form.
4. The guide chamfer on the periphery of the blade in conjunction with the adjustable back taper ensures maximum tool life.
   - The force and positive connection of the blades guarantees they are safely held.
   - Held in finely adjustable cartridges.
   - The close allocation of the roughing and finishing blade produces the best possible surface quality with the twin-bladed tool in conjunction with the sensitive adjustment facility.

The HX blades with clamping groove are in special cartridges and can be adjusted with two adjusting wedges. They therefore produce the best results with regard to surface finish. The clamping plate grips directly into the clamping grooves on the blade, guaranteeing that the blade is held absolutely securely in the cartridge, even under difficult application conditions with extremely large allowances.

Cutting materials for MAPAL HX Blades

<table>
<thead>
<tr>
<th>Material code</th>
<th>Cutting material code</th>
<th>Coating</th>
<th>Material Group</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>HU612</td>
<td>WC</td>
<td>-</td>
<td>Steel</td>
<td>Strength</td>
</tr>
<tr>
<td>HP426</td>
<td>PVD</td>
<td>HC</td>
<td>Grey cast iron</td>
<td>Strength</td>
</tr>
<tr>
<td>CP140</td>
<td>PVD</td>
<td>HC</td>
<td>Non-ferrous</td>
<td>Strength</td>
</tr>
<tr>
<td>CU134</td>
<td>PVD</td>
<td>HC</td>
<td>High heat</td>
<td>Strength</td>
</tr>
<tr>
<td>PU620</td>
<td>PVD</td>
<td>HC</td>
<td>Hard materials</td>
<td>Strength</td>
</tr>
<tr>
<td>FU801</td>
<td>PVD</td>
<td>BN</td>
<td>Uncoated Cermet</td>
<td>Strength</td>
</tr>
<tr>
<td>FU802</td>
<td>PVD</td>
<td>BN</td>
<td>Coated Cermet</td>
<td>Strength</td>
</tr>
<tr>
<td>CU140</td>
<td>-</td>
<td>HC</td>
<td>Grey cast iron</td>
<td>Strength</td>
</tr>
<tr>
<td>CU134</td>
<td>-</td>
<td>HC</td>
<td>Non-ferrous</td>
<td>Strength</td>
</tr>
</tbody>
</table>

Application area

- P: Precious
- M: Medium
- X: Extra
- H: Heavy
- K: Kern
- S: Surface

Cutting materials for HX Blades:

- HU612 = carbide; HC416 = coated carbide; HP426 = Cermet; CU140/CU134 = coated Cermet; PU620 = PCD-polycristalline diamond; FU801, FU802 = PCBN-polycristalline cubic boron nitride.
MAPAL HX Blades without Clamping Grooves

The blades are coded using the following system:

<table>
<thead>
<tr>
<th>Cutting direction</th>
<th>R = R.H. cutting</th>
<th>L = L.H. cutting</th>
<th>RL = R.H. and L.H. cutting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radial rake</td>
<td>0 = 0°</td>
<td>3 = 3°</td>
<td>6 = 6°</td>
</tr>
<tr>
<td>Cutting material quality</td>
<td>e.g.: CT3 = Cermet</td>
<td>For further cutting material grades see table on page 78.</td>
<td></td>
</tr>
<tr>
<td>Cutting lead</td>
<td>5 = R 1,5</td>
<td>8 = R 0,8</td>
<td></td>
</tr>
<tr>
<td>Cutting edge</td>
<td>S = sharp</td>
<td>V = rounded</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F = negative chamfering only in conjunction with PCBN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blade size</td>
<td>2 = inscribed circle ø 6 mm</td>
<td>3 = inscribed circle ø 10 mm</td>
<td></td>
</tr>
<tr>
<td>Chip form geometry</td>
<td>1 = for steel and long chip materials</td>
<td>2 = for cast iron and short chip materials</td>
<td></td>
</tr>
</tbody>
</table>

MAPAL HX Blades with Clamping Grooves

The blades are coded using the following system:

<table>
<thead>
<tr>
<th>Cutting direction</th>
<th>R = R.H. cutting</th>
<th>L = L.H. cutting</th>
<th>RL = R.H. and L.H. cutting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radial rake</td>
<td>0 = 0°</td>
<td>3 = 3°</td>
<td>6 = 6°</td>
</tr>
<tr>
<td>Cutting material quality</td>
<td>e.g.: CT4 = Cermet</td>
<td>For further cutting material grades see table on page 78.</td>
<td></td>
</tr>
<tr>
<td>Cutting lead</td>
<td>B = R 0,8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutting edge</td>
<td>S = sharp</td>
<td>V = rounded</td>
<td></td>
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<td>Blade size</td>
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