

MillLine

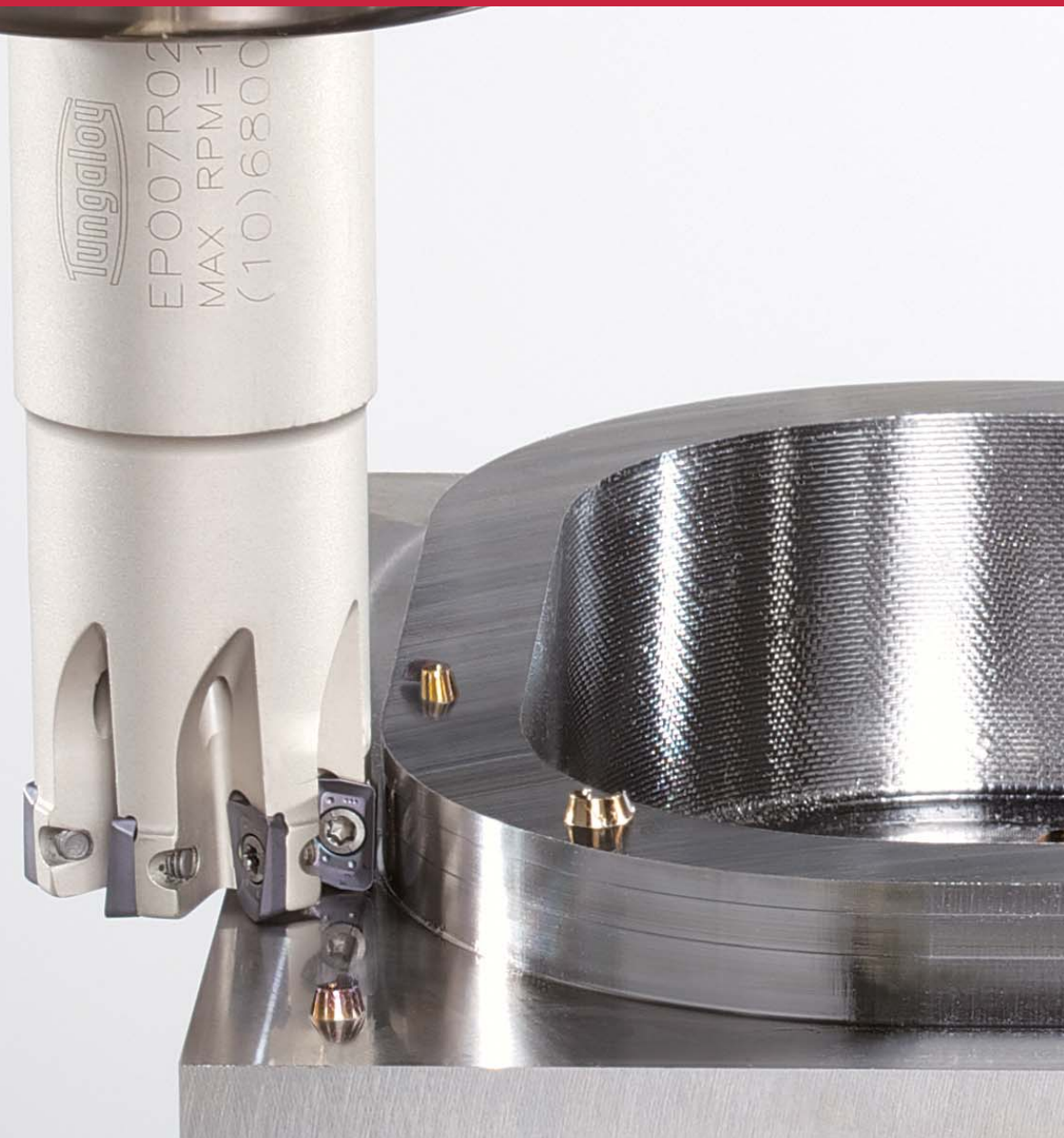
**TUNGREC**

www.tungaloy.com

Tungaloy Report No. 380-G



## Multi-functional high precision cutter



**INDUSTRY 4.0**  
*FEED the SPEED!*



ACCELERATED MACHINING



**TUNGREC**  
TUNGALOY

Highly productive semi-finish  
milling cutter with  
accurate 90° shoulders



# TUNGREC

TUNGALOY

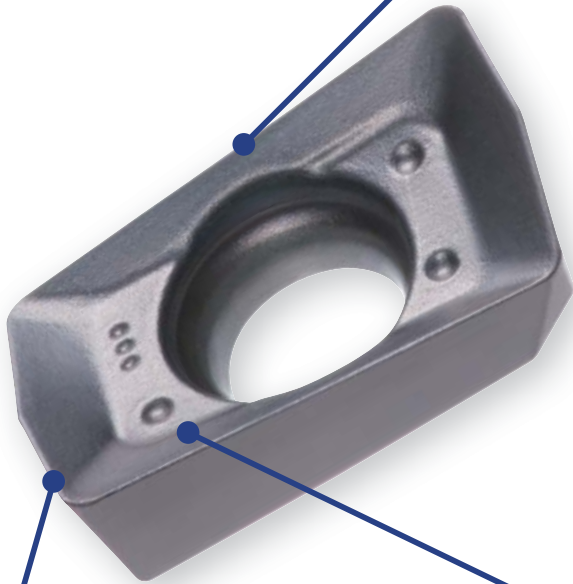
**Highly productive semi-finish milling cutter with accurate 90° shoulders**  
 Helical cutting edges and high axial rake angles provide free cutting.



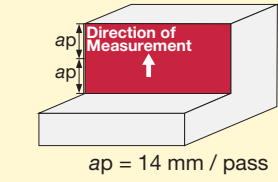
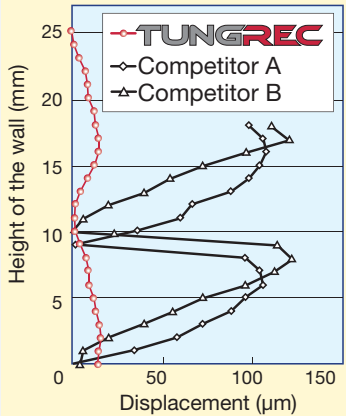
## ● High performance inserts

### Helical cutting edges

**Excellent wall straightness!**



#### ■ Comparison of straightness

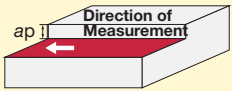
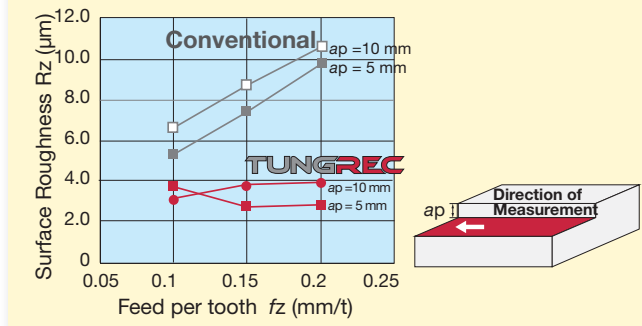


Milling cutter : EPO18R025M25.0-02 (ø25, z = 2)  
 Workpiece : S55C / C55  
 Cutting speed : Vc = 150 m/min  
 Feed per tooth : fz = 0.1 mm/t  
 Depth of cut : ap = 14 mm x 2 passes  
 Width of cut : ae = 5 mm

### Wiper edges

**Excellent surface finish!**

#### ■ Comparison of surface roughness

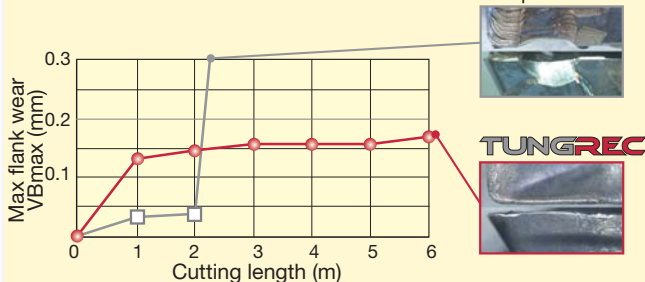


Milling cutter : EPO18R025M25.0-02 (ø25, z = 2)  
 Workpiece : S55C / C55  
 Cutting speed : Vc = 150 m/min  
 Depth of cut : ap = 5 mm / 10 mm  
 Width of cut : ae = 20 mm

### Optimized rake angle

**Provides sharpness and reliability!**

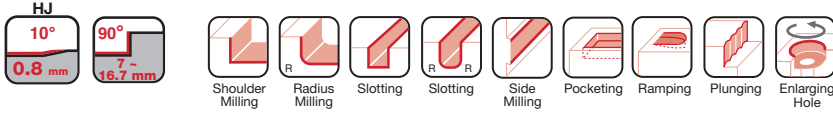
#### ■ Comparison of tool life



Milling cutter : EPO18R025M25.0-02 (ø25, z = 2, only one insert used)  
 Grade : AH140  
 Workpiece : SUS304 / X5CrNi18-9  
 Cutting speed : Vc = 150 m/min  
 Feed per tooth : fz = 0.15 mm/t  
 Depth of cut : ap = 5 mm  
 Width of cut : ae = 10 mm

## High precision shoulder milling cutter

4 types of chipbreakers for a wide range of applications



### Chipbreakers

**MJ type**  
for general machining

**P M K S**  
Steel Stainless Cast Iron Superalloys

ASMT11 AOMT07

Land width  
Rake angle

**MS type**  
for stainless steel machining

**M S**  
Stainless Superalloys

ASMT11

Land width  
Rake angle

**AJ type**  
for aluminium machining

**N**  
Non-ferrous

AOGT18 AOGT07

Rake angle

**HJ type**  
for high feed machining

**P M K S**  
Steel Stainless Cast Iron Superalloys

AOMT07

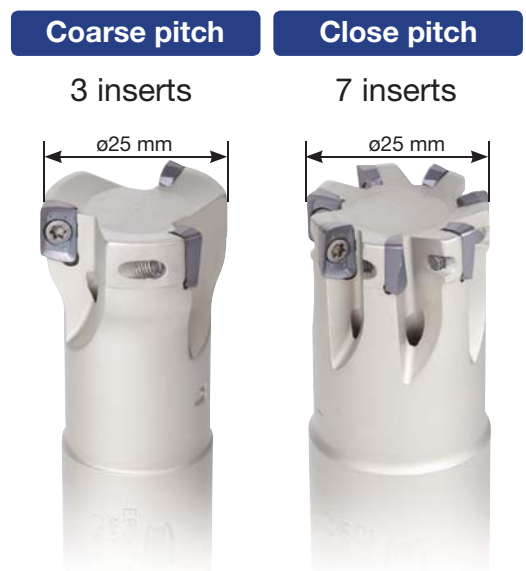
Max. ap = 0.8 mm  
10°  
Land width  
Rake angle

## High performance cutter bodies

**Air holes** ➔ For improved chip evacuation!

**Coarse pitch, close pitch and long shank cutters available!**

➔ Choice of optimum cutter body for your application!



■ Max. depth of cut: ap / with MJ chipbreaker

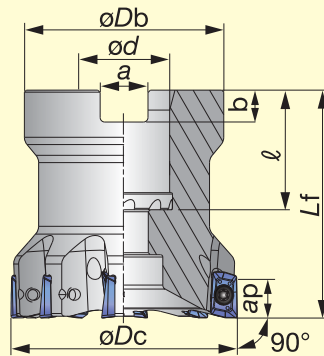
**AOMT18**  
Max. ap = 16.7 mm

**ASMT11**  
Max. ap = 10.6 mm

**AOMT07**  
Max. ap = 7.0 mm

## Cutter

### Bore type



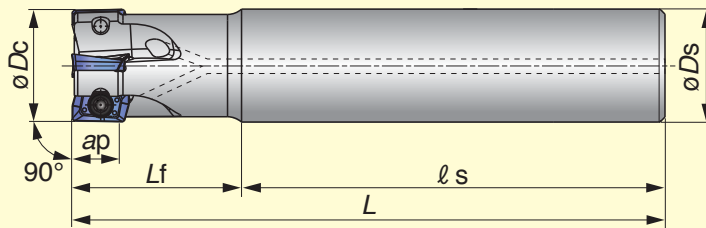
Max. ap:  
MJ = 7 mm  
AJ = 6.4 mm  
HJ = 0.8 mm

#### Parts

| Description | Cat. No. |
|-------------|----------|
| Wrench      | T-7DB    |

| Cat. No.          | Stock | No. of inserts | Dimensions (mm) |           |          |        |          |     |      | Weight (kg) | Air hole | Center bolt | Clamping screw | Inserts     |
|-------------------|-------|----------------|-----------------|-----------|----------|--------|----------|-----|------|-------------|----------|-------------|----------------|-------------|
|                   |       |                | * $\phi Dc$     | $\phi Db$ | $\phi d$ | $\ell$ | ** $L_f$ | $b$ | $a$  |             |          |             |                |             |
| TPO07R032M16.0E08 | ●     | 8              | 32              | 30        | 16       | 21     | 40       | 5.6 | 8.4  | 0.1         | with     | CM8x30H     | CSTB-2.5L046   | AO□T0702... |
| TPO07R040M16.0E10 | ●     | 10             | 40              | 35        | 16       | 21     | 40       | 5.6 | 8.4  | 0.2         | with     | CM8x30H     | CSTB-2.5L046   | AO□T0702... |
| TPO07R050M22.0E12 | ●     | 12             | 50              | 41        | 22       | 22     | 40       | 6.3 | 10.4 | 0.3         | with     | CM10x30H    | CSTB-2.5L046   | AO□T0702... |

### Shank type



Max. ap:  
MJ = 7 mm  
AJ = 6.4 mm  
HJ = 0.8 mm

#### Parts

| Description | Cat. No. |
|-------------|----------|
| Wrench      | T-7DB    |

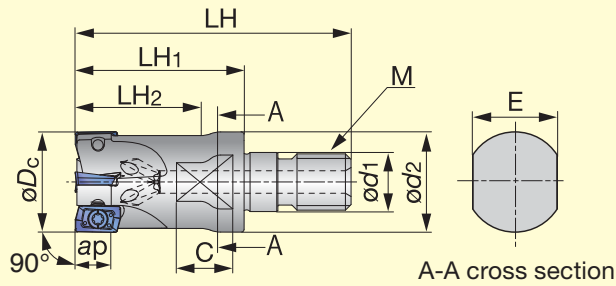
| Cat. No.           | Stock | No. of inserts | Dimensions (mm) |           |          |          |        | Weight (kg) | Air hole | Clamping Screw | Inserts     |
|--------------------|-------|----------------|-----------------|-----------|----------|----------|--------|-------------|----------|----------------|-------------|
|                    |       |                | * $\phi Dc$     | $\phi Ds$ | $\ell_s$ | ** $L_f$ | ** $L$ |             |          |                |             |
| EPO07R012M12.0-02  | ●     | 2              | 12              | 12        | 50       | 18       | 68     | 0.1         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R012M12.0-02L | ●     | 2              | 12              | 12        | 95       | 30       | 125    | 0.1         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R016M12.0-02  | ●     | 2              | 16              | 12        | 50       | 20       | 70     | 0.1         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R016M16.0-02L | ●     | 2              | 16              | 16        | 105      | 40       | 145    | 0.2         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R016M16.0-04  | ●     | 4              | 16              | 16        | 60       | 24       | 84     | 0.1         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R018M16.0-02L | ●     | 2              | 18              | 16        | 105      | 40       | 145    | 0.2         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R018M16.0-04  | ●     | 4              | 18              | 16        | 60       | 24       | 84     | 0.1         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R020M16.0-03  | ●     | 3              | 20              | 16        | 60       | 30       | 90     | 0.1         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R020M20.0-03L | ●     | 3              | 20              | 20        | 135      | 50       | 185    | 0.4         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R020M20.0-05  | ●     | 5              | 20              | 20        | 70       | 30       | 100    | 0.2         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R022M20.0-03L | ●     | 3              | 22              | 20        | 135      | 50       | 185    | 0.4         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R022M20.0-05  | ●     | 5              | 22              | 20        | 70       | 30       | 100    | 0.2         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R025M20.0-03  | ●     | 3              | 25              | 20        | 60       | 35       | 95     | 0.3         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R025M25.0-03L | ●     | 3              | 25              | 25        | 150      | 70       | 220    | 0.7         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R025M25.0-07  | ●     | 7              | 25              | 25        | 80       | 35       | 115    | 0.4         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R028M25.0-03L | ●     | 3              | 28              | 25        | 150      | 70       | 220    | 0.7         | with     | CSTB-2.5L046   | AO□T0702... |
| EPO07R028M25.0-07  | ●     | 7              | 28              | 25        | 80       | 35       | 115    | 0.4         | with     | CSTB-2.5L046   | AO□T0702... |

\*The  $\phi Dc$  in the above table shows the diameter when MJ and AJ chipbreakers are used. When HJ chipbreaker is used, the tool diameter is equal to the above shown  $\phi Dc + 0.6$  mm.

\*\*The  $L_f$  and  $L$  in the above table show the lengths when MJ chip-breaker is used. When AJ chipbreaker is used, the lengths are equal to  $L_f$ ,  $L + 0.1$  mm. When HJ chipbreaker is used, the lengths are equal to  $L_f$ ,  $L + 0.5$  mm.

● : Stocked items

## Modular type



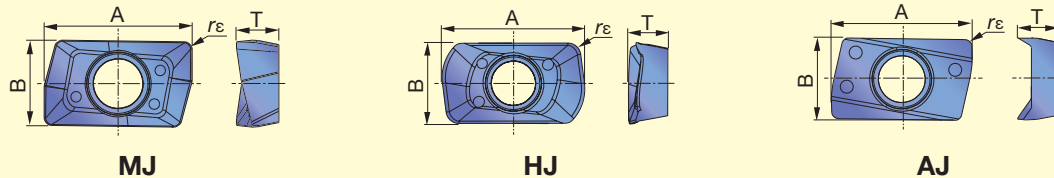
Max. ap:  
MJ = 7.0 mm  
AJ = 6.4 mm  
HJ = 0.8 mm

### Parts

| Descriptions   | Parts Cat. No.      |
|----------------|---------------------|
| Clamping screw | <b>CSTB-2.5L046</b> |
| Wrench         | <b>T-7DB</b>        |

| Cat. No.                    | Stock | No. of Inserts | Dimensions (mm) |      |     |     |     |    |      |      |     | Weight (kg) | Air hole | Applicable Insert |
|-----------------------------|-------|----------------|-----------------|------|-----|-----|-----|----|------|------|-----|-------------|----------|-------------------|
|                             |       |                | øDc             | LH   | LH1 | LH2 | C   | E  | ød1  | ød2  | M   |             |          |                   |
| <b>New</b> HPO07R012MM06-02 | ★     | 2              | 12              | 39.5 | 25  | -   | 5   | 7  | 6.5  | 9.8  | M6  | 0.01        | with     | AO□T0702...       |
| HPO07R012MM08-02            | ●     | 2              | 12              | 42   | 25  | 20  | 8   | 10 | 8.5  | 12.8 | M8  | 0.02        | with     | AO□T0702...       |
| <b>New</b> HPO07R016MM08-04 | ★     | 4              | 16              | 42   | 25  | -   | 8   | 10 | 8.5  | 12.8 | M8  | 0.03        | with     | AO□T0702...       |
| HPO07R016MM10-04            | ●     | 4              | 16              | 49   | 30  | 20  | 6.5 | 15 | 10.5 | 17.8 | M10 | 0.05        | with     | AO□T0702...       |
| HPO07R020MM10-05            | ●     | 5              | 20              | 49   | 30  | -   | 10  | 15 | 10.5 | 17.8 | M10 | 0.06        | with     | AO□T0702...       |
| HPO07R025MM12-07            | ●     | 7              | 25              | 57   | 35  | -   | 10  | 17 | 12.5 | 20.8 | M12 | 0.10        | with     | AO□T0702...       |

## ● Inserts



| Cat. No.          | Accuracy | Honing  | Grades |       |         | Dimensions (mm) |     |     |     |
|-------------------|----------|---------|--------|-------|---------|-----------------|-----|-----|-----|
|                   |          |         | Coated |       | Carbide | A               | B   | T   | rε  |
|                   |          |         | AH725  | AH140 |         |                 |     |     |     |
| AOMT070202PDPR-MJ | M        | with    | ●      | ●     |         | 8.0             | 4.7 | 2.3 | 0.2 |
| AOMT070204PDPR-MJ | M        | with    | ●      | ●     |         | 8.0             | 4.7 | 2.3 | 0.4 |
| AOMT070208PDPR-MJ | M        | with    | ●      | ●     |         | 8.0             | 4.7 | 2.3 | 0.8 |
| AOMT070216PDPR-MJ | M        | with    | ●      | ●     |         | 8.0             | 4.7 | 2.3 | 1.6 |
| AOMT070208PDPR-HJ | M        | with    | ●      | ●     |         | 8.8             | 4.9 | 2.4 | 0.8 |
| AOGT070204PDR-AJ  | G        | without |        |       | ●       | 8.1             | 4.7 | 2.3 | 0.4 |

● : Stocked items  
★ : Available in 2015

## Standard cutting conditions

| ISO      | Workpiece materials   | Hardness HB | Grades       | Cutting Speed Vc (m/min) | Feed per tooth: fz (mm/t) |           |            |
|----------|---|-------------|--------------|--------------------------|---------------------------|-----------|------------|
|          |   |             |              |                          | MJ                        | HJ        | AJ         |
| <b>P</b> | Low carbon steel (S15C / C15E4 etc.)                                  | < 200       | <b>AH725</b> | 90 - 200                 | 0.05 - 0.1                | 0.4 - 0.9 | -          |
|          | High carbon steel and alloy steel (S55C / C55, SCM440 / 42CrMo4 etc.) | 200 - 300   | <b>AH725</b> | 90 - 150                 | 0.05 - 0.1                | 0.4 - 0.9 | -          |
|          | Tool steel (SKD11 / X153CrMoV12 etc.)                                 | 150 - 300   | <b>AH725</b> | 80 - 120                 | 0.05 - 0.1                | 0.4 - 0.9 | -          |
| <b>M</b> | Stainless steel (SUS304 / X5CrNi18-9 etc.)                            | -           | <b>AH140</b> | 90 - 150                 | 0.05 - 0.1                | 0.4 - 0.9 | -          |
| <b>K</b> | Grey cast irons (FC250 / 250 etc.)                                    | 150 - 250   | <b>AH725</b> | 100 - 180                | 0.05 - 0.1                | 0.4 - 0.9 | -          |
|          | Ductile cast irons (FCD450 / 450-10S etc.)                            | 150 - 250   | <b>AH725</b> | 80 - 150                 | 0.05 - 0.1                | 0.4 - 0.9 | -          |
| <b>N</b> | Aluminium alloys (Si < 13%)   | -           | <b>KS15F</b> | 300 - 1000               | -                         | -         | 0.08 - 0.2 |
|          | Aluminium alloys (Si ≥ 13%)   | -           | <b>KS15F</b> | 100 - 200                | -                         | -         | 0.08 - 0.2 |
| <b>S</b> | Titanium alloys (Ti-6Al-4V etc.)                                      | -           | <b>AH725</b> | 20 - 50                  | 0.05 - 0.1                | 0.4 - 0.9 | -          |
|          | Superalloys (Inconel 718 etc.)  | -           | <b>AH725</b> | 20 - 35                  | 0.05 - 0.08               | 0.2 - 0.6 | -          |

- To remove excessive chip accumulation use an air blast.
- To avoid build up edge on the cutting edges (aluminium machining), use a water soluble coolant.
- When cutting an interrupted surface or a casted skin, the feed per tooth (fz) should be reduced to the lower recommended value shown in the above table.

- Cutting conditions are limited by machine power, workpiece rigidity, and spindle output. When the cutting width, depth, or overhang length is large, set Vc and fz to the lower recommended values and check the machine power and vibration.

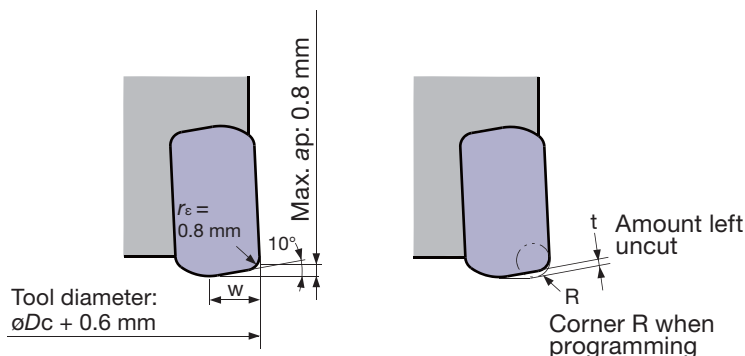
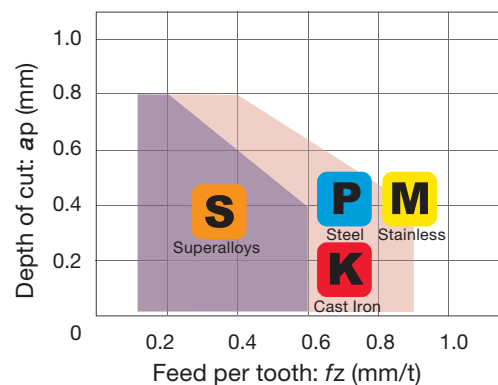
## Cautionary points when using HJ inserts

HJ type inserts are designed for high feed machining.

Please note the following when using HJ inserts:

1. The shape of HJ insert differs from that of other inserts (MJ, AJ). However the same insert pocket can be used.
2. When using HJ inserts, all the inserts on the cutter body must be HJ type. Do not use other types of inserts (MJ and AJ types) with HJ inserts on the same cutter body.
3. When using CAD/CAM, please program it as a radius cutter. The table below shows the corner R when programming and the uncut area (t).
4. With HJ inserts, the tool diameter increases by 0.6 mm over the diameter  $\phi D_c$  shown in the table.

## TungRec 07 type HJ inserts Standard conditions



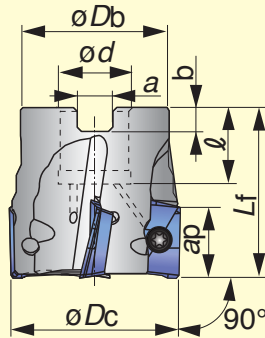
| Max. depth of cut max ap (mm) | Main cutting edge length W (mm) | Corner R when programming | Amount left uncut t (mm) |
|-------------------------------|---------------------------------|---------------------------|--------------------------|
| 0.8                           | 3.0                             | R 0.5                     | 0.4                      |
|                               |                                 | R 1.0                     | 0.3                      |



## Cutter

### Bore type

**NEW**



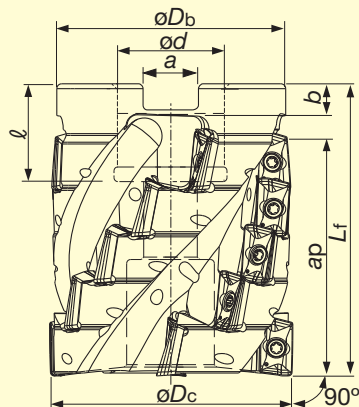
Max.  $ap = 10.6$  mm

#### Parts

| Description | Cat. No. |
|-------------|----------|
| Wrench      | IP-8D    |

| Cat. No.           | Stock | No. of inserts | Dimensions (mm) |            |          |        |       |     |      | Weight (kg) | Air hole | Center bolt | Clamping screw | Inserts     |
|--------------------|-------|----------------|-----------------|------------|----------|--------|-------|-----|------|-------------|----------|-------------|----------------|-------------|
|                    |       |                | $\phi D_c$      | $\phi D_b$ | $\phi d$ | $\ell$ | $L_f$ | $b$ | $a$  |             |          |             |                |             |
| TPO11R040M16.0E06  | ★     | 6              | 40              | 35         | 16       | 18     | 40    | 5.6 | 8.4  | 0.21        | with     | CM8x30H     | CSPB-2.5       | AS□T11T3... |
| TPO11R050M22.0E07  | ★     | 7              | 50              | 45         | 22       | 20     | 40    | 6.3 | 10.4 | 0.35        | with     | CM10x30H    | CSPB-2.5       | AS□T11T3... |
| TPO11R063M22.0E08  | ★     | 8              | 63              | 47         | 22       | 20     | 45    | 6.3 | 10.4 | 0.59        | with     | CM10x30H    | CSPB-2.5       | AS□T11T3... |
| TPO11R080M25.4-10  | ★     | 10             | 80              | 58         | 25.4     | 26     | 50    | 6   | 9.5  | 1.07        | with     | CM12X30H    | CSPB-2.5       | AS□T11T3... |
| TPO11R080M27.0E10  | ★     | 10             | 80              | 58         | 27       | 22     | 50    | 7   | 12.4 | 1.05        | with     | CM12X30H    | CSPB-2.5       | AS□T11T3... |
| TPO11R100M31.75-11 | ★     | 11             | 100             | 70         | 31.75    | 32     | 63    | 8   | 12.7 | 1.95        | with     | CM16X40H    | CSPB-2.5       | AS□T11T3... |
| TPO11R100M32.0E11  | ★     | 11             | 100             | 70         | 32       | 25     | 63    | 8   | 14.4 | 2.01        | with     | CM16X40H    | CSPB-2.5       | AS□T11T3... |
| TPS11040RB         | ▲     | 6              | 40              | 35         | 16       | 18     | 40    | 5.6 | 8.2  | 0.2         | with     | CM8X30H     | CSPB-2.5       | AS□T11T3... |
| TPS11040RB-E       | ▲     | 6              | 40              | 35         | 16       | 19     | 40    | 5.6 | 8.4  | 0.2         | without  | CM8X30      | CSPB-2.5       | AS□T11T3... |
| TPS11050RB         | ▲     | 7              | 50              | 41         | 22       | 20     | 40    | 6   | 10   | 0.4         | with     | CM10X30H    | CSPB-2.5       | AS□T11T3... |
| TPS11050RB-E       | ▲     | 7              | 50              | 41         | 22       | 20     | 40    | 6.3 | 10.4 | 0.4         | without  | CM10X30     | CSPB-2.5       | AS□T11T3... |
| TPS11063RB         | ▲     | 8              | 63              | 41         | 22       | 20     | 40    | 6   | 10   | 0.6         | with     | CM10X30H    | CSPB-2.5       | AS□T11T3... |
| TPS11063RB-E       | ▲     | 8              | 63              | 41         | 22       | 20     | 45    | 6.3 | 10.4 | 0.6         | without  | CM10X30     | CSPB-2.5       | AS□T11T3... |
| TPS11080RB         | ▲     | 10             | 80              | 58         | 25.4     | 26     | 50    | 6   | 9.5  | 1.2         | with     | CM12X30H    | CSPB-2.5       | AS□T11T3... |
| TPS11100RB         | ▲     | 11             | 100             | 70         | 31.75    | 32     | 63    | 8   | 12.7 | 2.4         | with     | CM16X40H    | CSPB-2.5       | AS□T11T3... |

### Roughing bore type



#### Parts

| Description    | Cat. No.  |           |
|----------------|-----------|-----------|
| Cutter         | TLS11R... | ELS11R... |
| Clamping screw | CSPB-2.5  |           |
| Wrench         | IP-8D     |           |
| Center bolt    | CM10X40H  | -         |

| Cat. No.          | Stock | No. of eff. edge lines | Dimensions (mm) |            |          |        |       |     |      | Weight (kg) | Air hole | No. of inserts | Inserts |             |
|-------------------|-------|------------------------|-----------------|------------|----------|--------|-------|-----|------|-------------|----------|----------------|---------|-------------|
|                   |       |                        | $\phi D_c$      | $\phi D_b$ | $\phi d$ | $\ell$ | $L_f$ | $b$ | $a$  |             |          |                |         | Max. $ap$   |
| TLS11R050M22.0E04 | ●     | 4                      | 50              | 47         | 22       | 20     | 60    | 6.3 | 10.4 | 48.8        | 0.5      | with           | 20      | AS□T11T3... |

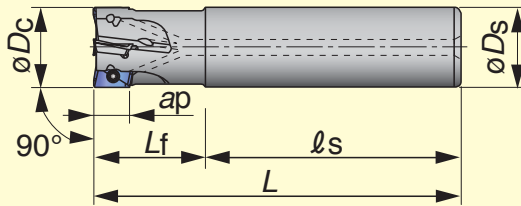
Note: Coolant cannot be supplied through the arbor center (through the clamping screw). Supply coolant through the flange of the arbor pilot.

- : Stocked items
- ★ : Available in 2014
- ▲ : Discontinued items

## Cutter

### Shank type

**NEW**



Max. ap = 10.6 mm

#### Parts

| Description | Cat. No. |
|-------------|----------|
| Wrench      | IP-8D    |

| Cat. No.           | Stock | No. of inserts | Dimensions (mm) |     |     |    |     | Weight (kg) | Air hole | Clamping screw | Inserts     |
|--------------------|-------|----------------|-----------------|-----|-----|----|-----|-------------|----------|----------------|-------------|
|                    |       |                | øDc             | øDs | ls  | Lf | L   |             |          |                |             |
| EPO11R012M16.0-01  | ●     | 1              | 12              | 16  | 60  | 25 | 85  | 0.11        | with     | CSPB-2.5S      | AS□T11T3... |
| EPO11R012M16.0-01L | ●     | 1              | 12              | 16  | 95  | 30 | 125 | 0.16        | with     | CSPB-2.5S      | AS□T11T3... |
| EPO11R016M16.0-02  | ●     | 2              | 16              | 16  | 60  | 25 | 85  | 0.12        | with     | CSPB-2.5S      | AS□T11T3... |
| EPO11R016M16.0-02L | ●     | 2              | 16              | 16  | 105 | 40 | 145 | 0.2         | with     | CSPB-2.5S      | AS□T11T3... |
| EPO11R018M16.0-02  | ★     | 2              | 18              | 16  | 60  | 25 | 85  | 0.12        | with     | CSPB-2.5S      | AS□T11T3... |
| EPO11R018M16.0-02L | ★     | 2              | 18              | 16  | 105 | 40 | 145 | 0.21        | with     | CSPB-2.5S      | AS□T11T3... |
| EPO11R020M20.0-02  | ●     | 2              | 20              | 20  | 70  | 30 | 100 | 0.22        | with     | CSPB-2.5S      | AS□T11T3... |
| EPO11R020M20.0-02L | ●     | 2              | 20              | 20  | 135 | 50 | 185 | 0.41        | with     | CSPB-2.5S      | AS□T11T3... |
| EPO11R020M20.0-03  | ●     | 3              | 20              | 20  | 70  | 30 | 100 | 0.21        | with     | CSPB-2.5S      | AS□T11T3... |
| EPO11R022M20.0-02  | ★     | 2              | 22              | 20  | 70  | 30 | 100 | 0.22        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R022M20.0-02L | ★     | 2              | 22              | 20  | 155 | 30 | 185 | 0.42        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R022M20.0-03  | ★     | 3              | 22              | 20  | 70  | 30 | 100 | 0.22        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R025M25.0-02L | ●     | 2              | 25              | 25  | 150 | 70 | 220 | 0.76        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R025M25.0-03  | ●     | 3              | 25              | 25  | 80  | 35 | 115 | 0.39        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R025M25.0-04  | ●     | 4              | 25              | 25  | 80  | 35 | 115 | 0.38        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R028M25.0-02L | ★     | 2              | 28              | 25  | 185 | 35 | 220 | 0.8         | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R028M25.0-03  | ★     | 3              | 28              | 25  | 80  | 35 | 115 | 0.4         | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R028M25.0-04  | ★     | 4              | 28              | 25  | 80  | 35 | 115 | 0.39        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R030M25.0-02L | ★     | 2              | 30              | 25  | 180 | 40 | 220 | 0.8         | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R030M25.0-03  | ★     | 3              | 30              | 25  | 80  | 40 | 120 | 0.43        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R030M25.0-04  | ★     | 4              | 30              | 25  | 80  | 40 | 120 | 0.42        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R032M32.0-02L | ●     | 2              | 32              | 32  | 175 | 80 | 255 | 1.48        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R032M32.0-03  | ●     | 3              | 32              | 32  | 80  | 40 | 120 | 0.68        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R032M32.0-05  | ●     | 5              | 32              | 32  | 80  | 40 | 120 | 0.67        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R035M32.0-02L | ★     | 2              | 35              | 32  | 215 | 40 | 255 | 1.49        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R035M32.0-03  | ★     | 3              | 35              | 32  | 80  | 40 | 120 | 0.69        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R035M32.0-05  | ★     | 5              | 35              | 32  | 80  | 40 | 120 | 0.67        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R040M32.0-02L | ★     | 2              | 40              | 32  | 205 | 50 | 255 | 1.53        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R040M32.0-04  | ●     | 4              | 40              | 32  | 80  | 40 | 120 | 0.72        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R040M32.0-06  | ●     | 6              | 40              | 32  | 80  | 40 | 120 | 0.71        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R050M32.0-05  | ●     | 5              | 50              | 32  | 80  | 40 | 120 | 0.83        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R050M32.0-07  | ●     | 7              | 50              | 32  | 80  | 40 | 120 | 0.82        | with     | CSPB-2.5       | AS□T11T3... |
| EPO11R050M42.0-03L | ★     | 3              | 50              | 42  | 310 | 50 | 360 | 3.78        | with     | CSPB-2.5       | AS□T11T3... |

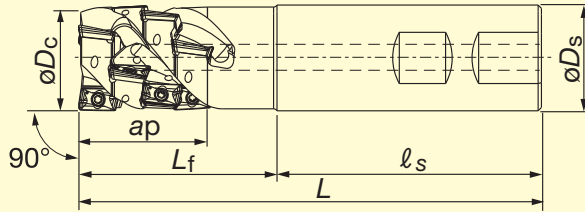
● : Stocked items  
★ : Available in 2014

| Cat. No.      | Stock | No. of inserts | Dimensions (mm)   |                   |       |       | Weight (kg) | Air hole | Clamping screw | Inserts   |             |
|---------------|-------|----------------|-------------------|-------------------|-------|-------|-------------|----------|----------------|-----------|-------------|
|               |       |                | $\varnothing D_c$ | $\varnothing D_s$ | $l_s$ | $L_f$ |             |          |                |           | $L$         |
| EPS11012RL    | ▲     | 1              | 12                | 16                | 95    | 30    | 125         | 0.2      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11012RS    | ▲     | 1              | 12                | 16                | 60    | 25    | 85          | 0.1      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11012RS-E  | ▲     | 1              | 12                | 16                | 55    | 25    | 80          | 0.1      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11016RL    | ▲     | 2              | 16                | 16                | 105   | 40    | 145         | 0.2      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11016RS    | ▲     | 2              | 16                | 16                | 60    | 25    | 85          | 0.1      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11016RS-E  | ▲     | 2              | 16                | 16                | 60    | 25    | 85          | 0.1      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11018RL    | ▲     | 2              | 18                | 16                | 105   | 40    | 145         | 0.2      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11018RS    | ▲     | 2              | 18                | 16                | 60    | 25    | 85          | 0.1      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11020RL    | ▲     | 2              | 20                | 20                | 135   | 50    | 185         | 0.4      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11020RS    | ▲     | 2              | 20                | 20                | 70    | 30    | 100         | 0.2      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11020RSB   | ▲     | 3              | 20                | 20                | 70    | 30    | 100         | 0.2      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11020RSB-E | ▲     | 3              | 20                | 20                | 60    | 30    | 90          | 0.2      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11021RL    | ▲     | 2              | 21                | 20                | 135   | 50    | 185         | 0.4      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11021RS    | ▲     | 2              | 21                | 20                | 70    | 30    | 100         | 0.2      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11021RSB   | ▲     | 3              | 21                | 20                | 70    | 30    | 100         | 0.2      | with           | CSPB-2.5S | AS□T11T3... |
| EPS11025RL    | ▲     | 2              | 25                | 25                | 150   | 70    | 220         | 0.8      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11025RS    | ▲     | 3              | 25                | 25                | 80    | 35    | 115         | 0.4      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11025RSB   | ▲     | 4              | 25                | 25                | 80    | 35    | 115         | 0.4      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11025RSB-E | ▲     | 4              | 25                | 25                | 60    | 35    | 95          | 0.4      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11025RSS20 | ▲     | 2              | 25                | 20                | 60    | 35    | 95          | 0.2      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11026RL    | ▲     | 2              | 26                | 25                | 150   | 70    | 220         | 0.8      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11026RS    | ▲     | 3              | 26                | 25                | 80    | 35    | 115         | 0.4      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11026RSB   | ▲     | 4              | 26                | 25                | 80    | 35    | 115         | 0.4      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11030RL    | ▲     | 2              | 30                | 25                | 150   | 70    | 220         | 0.9      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11030RS    | ▲     | 3              | 30                | 25                | 80    | 35    | 115         | 0.4      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11030RSB   | ▲     | 4              | 30                | 25                | 80    | 35    | 115         | 0.4      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11030RSS20 | ▲     | 2              | 30                | 20                | 60    | 35    | 95          | 0.3      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11032RL    | ▲     | 2              | 32                | 32                | 175   | 80    | 255         | 1.5      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11032RS    | ▲     | 3              | 32                | 32                | 80    | 40    | 120         | 0.7      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11032RSB   | ▲     | 5              | 32                | 32                | 80    | 40    | 120         | 0.7      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11032RSB-E | ▲     | 5              | 32                | 32                | 70    | 40    | 110         | 0.7      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11032RSS20 | ▲     | 2              | 32                | 20                | 60    | 35    | 95          | 0.3      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11033RL    | ▲     | 2              | 33                | 32                | 175   | 80    | 255         | 1.5      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11033RS    | ▲     | 3              | 33                | 32                | 80    | 40    | 120         | 0.7      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11033RSB   | ▲     | 5              | 33                | 32                | 80    | 40    | 120         | 0.7      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11040RL    | ▲     | 2              | 40                | 32                | 205   | 50    | 255         | 1.6      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11040RS    | ▲     | 4              | 40                | 32                | 80    | 40    | 120         | 0.8      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11040RSB   | ▲     | 6              | 40                | 32                | 80    | 40    | 120         | 0.8      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11040RLS42 | ▲     | 2              | 40                | 42                | 210   | 100   | 310         | 3.0      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11040RSS20 | ▲     | 3              | 40                | 20                | 60    | 35    | 95          | 0.4      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11050RL    | ▲     | 3              | 50                | 42                | 310   | 50    | 360         | 3.9      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11050RS    | ▲     | 5              | 50                | 32                | 80    | 40    | 120         | 1.0      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11050RSB   | ▲     | 7              | 50                | 32                | 80    | 40    | 120         | 1.0      | with           | CSPB-2.5  | AS□T11T3... |
| EPS11050RSS20 | ▲     | 3              | 50                | 20                | 60    | 35    | 95          | 0.5      | with           | CSPB-2.5  | AS□T11T3... |

▲ : Discontinued items

## Cutter

### Roughing shank type

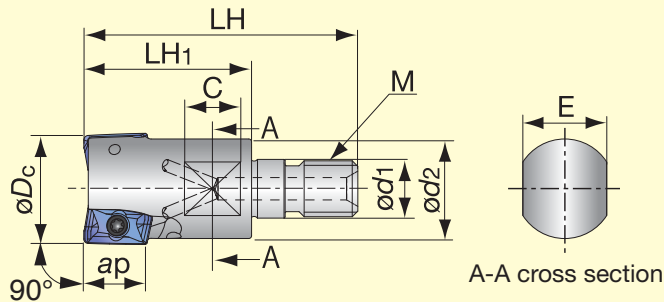


#### Parts

| Description    | Cat. No.  |           |
|----------------|-----------|-----------|
| Cutter         | TLS11R... | ELS11R... |
| Clamping screw | CSPB-2.5  |           |
| Wrench         | IP-8D     |           |
| Center bolt    | CM10X40H  | -         |

| Cat. No.          | Stock | No. of eff. edge lines | Dimensions (mm) |            |       |       |     |           | Weight (kg) | Air hole | No. of inserts | Inserts     |
|-------------------|-------|------------------------|-----------------|------------|-------|-------|-----|-----------|-------------|----------|----------------|-------------|
|                   |       |                        | $\phi D_c$      | $\phi D_s$ | $l_s$ | $L_f$ | $L$ | Max. $ap$ |             |          |                |             |
| ELS11R025M25.0W02 | ●     | 2                      | 25              | 25         | 80    | 40    | 120 | 30.4      | 0.4         | with     | 6              | AS□T11T3... |
| ELS11R032M32.0W03 | ●     | 3                      | 32              | 32         | 80    | 60    | 140 | 39.4      | 0.8         | with     | 12             | AS□T11T3... |
| ELS11R040M42.0W03 | ●     | 3                      | 40              | 42         | 90    | 60    | 150 | 40        | 1.4         | with     | 12             | AS□T11T3... |

### Modular type



Max.  $ap = 10.6$  mm

#### Parts

| Descriptions   | Parts Cat. No. |                      |
|----------------|----------------|----------------------|
| Clamping screw | HPO11R020      | HPO11R025, HPO11R032 |
|                | CSPB-2.5S      | CSPB-2.5             |
| Wrench         | IP-8D          |                      |

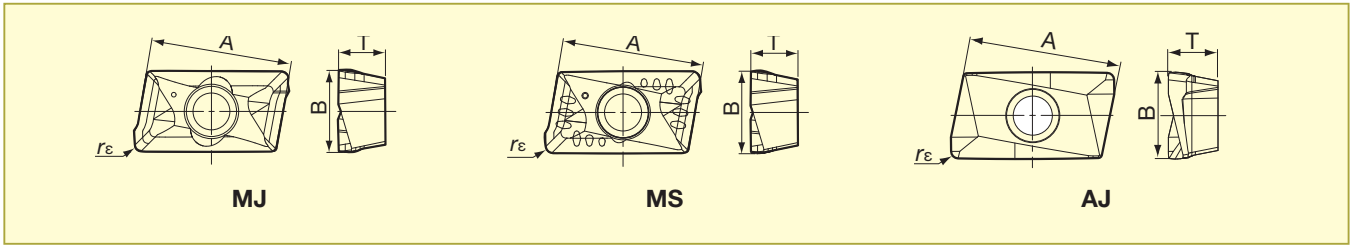
| Cat. No.         | Stock | No. of Inserts | Dimensions (mm) |    |                 |    |    |            |            |     | Weight (kg) | Air hole | Applicable Insert |
|------------------|-------|----------------|-----------------|----|-----------------|----|----|------------|------------|-----|-------------|----------|-------------------|
|                  |       |                | $\phi D_c$      | LH | LH <sub>1</sub> | C  | E  | $\phi d_1$ | $\phi d_2$ | M   |             |          |                   |
| HPO11R020MM10-02 | ●     | 2              | 20              | 49 | 30              | 10 | 15 | 10.5       | 17.8       | M10 | 0.06        | with     | AS□T11T3...       |
| HPO11R025MM12-03 | ●     | 3              | 25              | 57 | 35              | 10 | 17 | 12.5       | 20.8       | M12 | 0.10        | with     | AS□T11T3...       |
| HPO11R032MM16-03 | ●     | 3              | 32              | 63 | 40              | 12 | 22 | 17.0       | 28.8       | M16 | 0.20        | with     | AS□T11T3...       |

● : Stocked items





## ● Inserts



| Cat. No.          | Accuracy Honing | Grades |       |       |       |       |       |            |        |          | Dimensions (mm) |      |     |                |     |
|-------------------|-----------------|--------|-------|-------|-------|-------|-------|------------|--------|----------|-----------------|------|-----|----------------|-----|
|                   |                 | Coated |       |       |       |       |       | DLC coated | Cermet | Uncoated | A               | B    | T   | $r_{\epsilon}$ |     |
|                   |                 | AH725  | AH120 | AH130 | AH140 | T3130 | T1115 | DS1100     | NS740  | KS05F    |                 |      |     |                |     |
| ASMT11T304PDPR-MJ | M with          | ●      | ●     |       |       | ●     | ●     |            |        | ●        |                 | 11.6 | 6.7 | 3.7            | 0.4 |
| ASMT11T308PDPR-MJ | M with          | ●      | ●     |       |       | ●     | ●     |            |        | ●        |                 | 11.6 | 6.7 | 3.7            | 0.8 |
| ASMT11T312PDPR-MJ | M with          | ●      | ●     |       |       | ●     |       |            |        |          |                 | 11.6 | 6.7 | 3.7            | 1.2 |
| ASMT11T316PDPR-MJ | M with          | ●      | ●     |       |       | ●     |       |            |        | ●        |                 | 11.6 | 6.7 | 3.7            | 1.6 |
| ASMT11T320PDPR-MJ | M with          |        | ●     |       |       |       |       |            |        |          |                 | 11.6 | 6.7 | 3.7            | 2.0 |
| ASMT11T330PDPR-MJ | M with          |        | ●     |       |       |       |       |            |        |          |                 | 11.6 | 6.7 | 3.7            | 3.0 |
| ASMT11T304PDPR-MS | M with          |        |       | ●     | ●     |       |       |            |        |          |                 | 11.6 | 6.7 | 3.7            | 0.4 |
| ASGT11T304PDFR-AJ | G without       |        |       |       |       |       |       | ●          |        |          | ●               | 11.6 | 6.7 | 3.7            | 0.4 |
| ASGT11T308PDFR-AJ | G without       |        |       |       |       |       |       | ●          |        |          | ●               | 11.6 | 6.7 | 3.7            | 0.8 |

● : Stocked items



## Standard cutting conditions

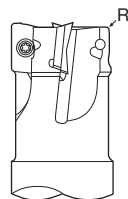
### TPS11 / EPS11, HPO11, TPO11 / EPO11 type

| ISO      | Workpiece materials  | Brinell hardness<br>HB                        | Priority               | Grade         | Cutting speed<br>Vc (m/min) | Feed per tooth: fz (mm/t) |             |            |
|----------|--|---|------------------------|---------------|-----------------------------|---------------------------|-------------|------------|
|          |  |   |                        |               |                             | MJ                        | MS          | AJ         |
| <b>P</b> | Low carbon steel<br>(S15C / C15E4 etc.)                                  | ~ 200   | First choice           | <b>AH725</b>  | 100 - 250                   | 0.1 - 0.2                 | -           | -          |
|          |  | ~ 200   | For wear resistance    | <b>T3130</b>  | 100 - 250                   | 0.1 - 0.2                 | -           | -          |
|          |  | ~ 200   | For surface appearance | <b>NS740</b>  | 100 - 250                   | 0.05 - 0.15               | -           | -          |
|          | High carbon steel and alloy steel<br>(S55C / C55, SCM440 / 42CrMo4 etc.) | 200 ~ 300                                     | First choice           | <b>AH725</b>  | 100 - 200                   | 0.1 - 0.15                | -           | -          |
|          |  | 200 ~ 300                                     | For wear resistance    | <b>T3130</b>  | 100 - 200                   | 0.1 - 0.15                | -           | -          |
|          |  | 200 ~ 300                                     | For surface appearance | <b>NS740</b>  | 100 - 200                   | 0.05 - 0.12               | -           | -          |
|          | Tool steel<br>(SKD11 / X153CrMoV12 etc.)                                 | 150 ~ 300                                     | First choice           | <b>AH725</b>  | 100 - 150                   | 0.1 - 0.15                | -           | -          |
|          |  | 150 ~ 300                                     | For wear resistance    | <b>T3130</b>  | 100 - 150                   | 0.1 - 0.15                | -           | -          |
|          | <b>M</b>   | Stainless steel<br>(SUS304 / X5CrNi18-9 etc.) | -                      | -             | <b>AH130</b>                | 80 - 200                  | -           | 0.08 - 0.2 |
| <b>K</b> | Grey cast irons<br>(FC250 / 250 etc.)                                    | 150 ~ 250                                     | First choice           | <b>AH120</b>  | 100 - 250                   | 0.12 - 0.2                | -           | -          |
|          |  | 150 ~ 250                                     | For wear resistance    | <b>T1115</b>  | 100 - 250                   | 0.12 - 0.2                | -           | -          |
|          | Ductile cast irons<br>(FCD450 / 450-10S etc.)                            | 150 ~ 250                                     | First choice           | <b>AH120</b>  | 80 - 200                    | 0.12 - 0.2                | -           | -          |
|          |  | 150 ~ 250                                     | For wear resistance    | <b>T1115</b>  | 80 - 200                    | 0.12 - 0.2                | -           | -          |
| <b>N</b> | Aluminium alloys (Si < 13%)  | -   | -                      | <b>DS1100</b> | 300 - 1000                  | -                         | -           | 0.05 - 0.2 |
|          | Aluminium alloys (Si ≥ 13%)  | -   | -                      | <b>DS1100</b> | 100 - 200                   | -                         | -           | 0.05 - 0.2 |
|          | Copper alloys  | -   | -                      | <b>KS05F</b>  | 200 - 500                   | -                         | -           | 0.05 - 0.2 |
| <b>S</b> | Titanium alloys<br>(Ti-6Al-4V etc.)                                      | -   | -                      | <b>AH130</b>  | 20 - 60                     | -                         | 0.08 - 0.15 | -          |
|          | Superalloys<br>(Inconel 718 etc.)  | -   | -                      | <b>AH725</b>  | 20 - 40                     | 0.08 - 0.13               | -           | -          |

### Cautionary point in modifying cutter bodies

When using inserts with corner radius  $r_{\epsilon} \geq 2.0$  mm, standard cutter bodies have to be modified "R". (Only for TPS11, EPS11, TLS11, ELS11, HPO11, EPO11)

- From 2nd row onwards, please use insert with  $r_{\epsilon} = 0.4$  or  $0.8$  mm



| Corner radius $r_{\epsilon}$ (mm) | The dimension of modifying (mm) |
|-----------------------------------|---------------------------------|
| 0.4 ~ 1.6                         | Unnecessary                     |
| 2.0 ~ 3.2                         | 2                               |

## Roughing type TLS11 / ELS11

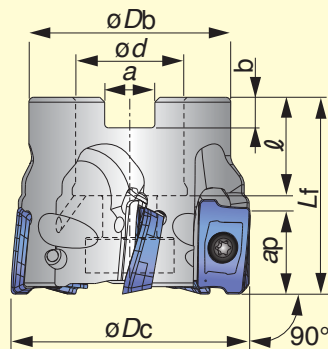
| ISO      | Workpiece materials  | Brinell hardness<br>HB | Priority            | Grade         | Cutting speed<br>Vc (m/min) | Feed per tooth: fz (mm/t) |             |             |
|----------|--|------------------------|---------------------|---------------|-----------------------------|---------------------------|-------------|-------------|
|          |  |                        |                     |               |                             | MJ                        | MS          | AJ          |
| <b>P</b> | Low carbon steel<br>(S15C / C15E4 etc.)                                  | ~ 200                  | First choice        | <b>AH725</b>  | 100 - 250                   | 0.10 - 0.18               | -           | -           |
|          |  | ~ 200                  | For wear resistance | <b>T3130</b>  | 100 - 250                   | 0.10 - 0.18               | -           | -           |
|          | High carbon steel and alloy steel<br>(S55C / C55, SCM440 / 42CrMo4 etc.) | 200 ~ 300              | First choice        | <b>AH725</b>  | 100 - 200                   | 0.08 - 0.14               | -           | -           |
|          |  | 200 ~ 300              | For wear resistance | <b>T3130</b>  | 100 - 200                   | 0.08 - 0.14               | -           | -           |
|          | Tool steel<br>(SKD11 / X153CrMoV12 etc.)                                 | 150 ~ 300              | First choice        | <b>AH725</b>  | 100 - 200                   | 0.08 - 0.14               | -           | -           |
|          |  | 150 ~ 300              | For wear resistance | <b>T3130</b>  | 100 - 200                   | 0.08 - 0.14               | -           | -           |
| <b>M</b> | Stainless steel<br>(SUS304 / X5CrNi18-9 etc.)                            | -                      | -                   | <b>AH130</b>  | 100 - 150                   | -                         | 0.08 - 0.15 | -           |
| <b>K</b> | Grey cast irons<br>(FC250 / 250 etc.)                                    | 150 ~ 250              | First choice        | <b>AH120</b>  | 100 - 250                   | 0.10 - 0.18               | -           | -           |
|          |  | 150 ~ 250              | For wear resistance | <b>T1115</b>  | 100 - 250                   | 0.10 - 0.18               | -           | -           |
|          | Ductile cast irons<br>(FCD450 / 450-10S etc.)                            | 150 ~ 250              | First choice        | <b>AH120</b>  | 80 - 200                    | 0.10 - 0.18               | -           | -           |
|          |  | 150 ~ 250              | For wear resistance | <b>T1115</b>  | 80 - 200                    | 0.10 - 0.18               | -           | -           |
| <b>N</b> | Aluminium alloys (Si < 13%)  | -                      | -                   | <b>DS1100</b> | 200 - 500                   | -                         | -           | 0.05 - 0.18 |
|          | Aluminium alloys (Si ≥ 13%)  | -                      | -                   | <b>DS1100</b> | 100 - 200                   | -                         | -           | 0.05 - 0.18 |
| <b>S</b> | Titanium alloys (Ti-6Al-4V etc.)   | -                      | -                   | <b>AH130</b>  | 20 - 60                     | -                         | 0.08 - 0.14 | -           |
|          | Superalloys<br>(Inconel718 etc.)   | -                      | -                   | <b>AH725</b>  | 20 - 40                     | 0.06 - 0.12               | -           | -           |

- To remove excessive chip accumulation use an air blast.
- To avoid build up edge on the cutting edges (aluminium machining), use a water soluble coolant.
- When cutting an interrupted surface or a casted skin, the feed per tooth (fz) should be reduced to the lower recommended value shown in the above table.

- Cutting conditions are limited by machine power, workpiece rigidity, and spindle output. When the cutting width, depth, or overhang length is large, set Vc and fz to the lower recommended values and check the machine power and vibration.

## Cutter

### Bore type

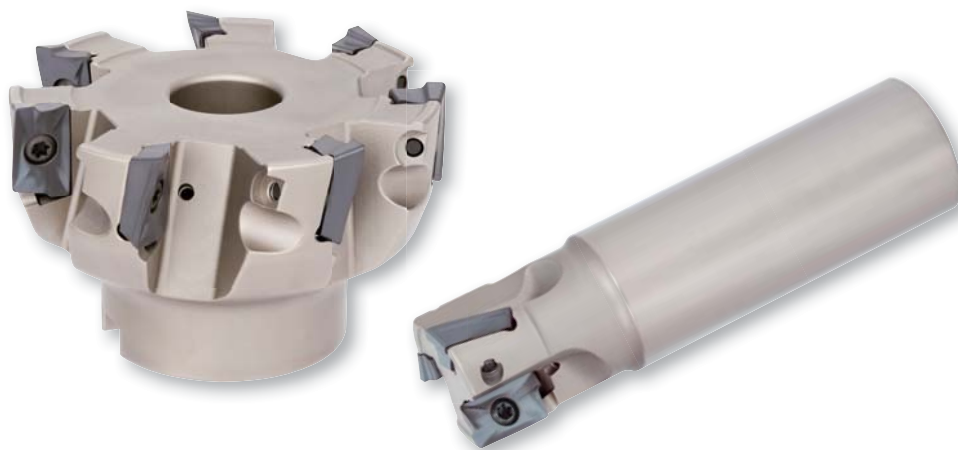


Max.  $ap = 16.7$  mm

#### Parts

| Description            | Cat. No.  |              |
|------------------------|-----------|--------------|
| Applicable cutter      | TPO18R... |              |
| Wrench                 | Torx bit  | <b>BT15M</b> |
|                        | Grip      | <b>H-TBS</b> |
| Mono block type wrench | -         |              |

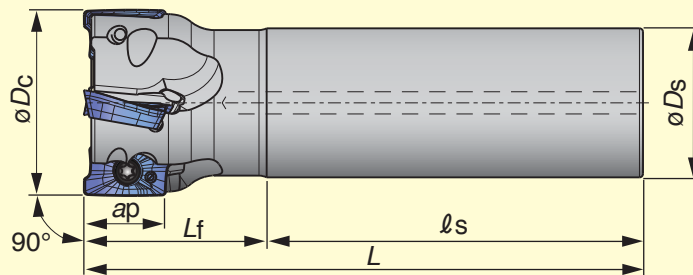
| Cat. No.          | Stock | No. of inserts | Dimensions (mm) |            |          |        |          |     |      | Weight (kg) | Air hole | Center bolt | Clamping screw | Inserts     |
|-------------------|-------|----------------|-----------------|------------|----------|--------|----------|-----|------|-------------|----------|-------------|----------------|-------------|
|                   |       |                | * $\phi D_c$    | $\phi D_b$ | $\phi d$ | $\ell$ | ** $L_f$ | $b$ | $a$  |             |          |             |                |             |
| TPO18R040M16.0-04 | ●     | 4              | 40              | 35         | 16       | 18     | 40       | 5.6 | 8.2  | 0.2         | with     | FSHM8-30H   | CSTB-4L093     | AO□T1805... |
| TPO18R040M16.0E04 | ●     | 4              | 40              | 35         | 16       | 18     | 40       | 5.6 | 8.4  | 0.2         | with     | FSHM8-30H   | CSTB-4L093     | AO□T1805... |
| TPO18R050M22.0-05 | ●     | 5              | 50              | 41         | 22       | 20     | 40       | 6   | 10   | 0.2         | with     | CM10x30H    | CSTB-4L093     | AO□T1805... |
| TPO18R050M22.0E05 | ●     | 5              | 50              | 41         | 22       | 20     | 40       | 6.3 | 10.4 | 0.3         | with     | CM10x30H    | CSTB-4L093     | AO□T1805... |
| TPO18R063M22.0-06 | ●     | 6              | 63              | 41         | 22       | 20     | 40       | 6   | 10   | 0.4         | with     | CM10x30H    | CSTB-4L093     | AO□T1805... |
| TPO18R063M22.0E06 | ●     | 6              | 63              | 41         | 22       | 20     | 40       | 6.3 | 10.4 | 0.5         | with     | CM10x30H    | CSTB-4L093     | AO□T1805... |
| TPO18R080M25.4-07 | ●     | 7              | 80              | 46         | 25.4     | 26     | 50       | 6   | 9.5  | 0.8         | with     | CM12x30H    | CSTB-4L120     | AO□T1805... |
| TPO18R080M27.0E07 | ●     | 7              | 80              | 50         | 27       | 22     | 50       | 7   | 12.4 | 1.0         | with     | CM12x30H    | CSTB-4L120     | AO□T1805... |
| TPO18R100M31.7-08 | ●     | 8              | 100             | 60         | 31.75    | 32     | 50       | 8   | 12.7 | 1.2         | with     | TMBA-M16H   | CSTB-4L120     | AO□T1805... |
| TPO18R100M32.0E08 | ●     | 8              | 100             | 60         | 32       | 28.5   | 50       | 8   | 14.4 | 1.4         | with     | TMBA-M16H   | CSTB-4L120     | AO□T1805... |
| TPO18R125M38.1-09 | ●     | 9              | 125             | 80         | 38.1     | 38     | 63       | 10  | 15.9 | 2.8         | with     | TMBA-M20H   | CSTB-4L120     | AO□T1805... |
| TPO18R125M40.0E09 | ●     | 9              | 125             | 71         | 40       | 32     | 63       | 9   | 16.4 | 2.8         | with     | TMBA-M20H   | CSTB-4L120     | AO□T1805... |
| TPO18R160M40.0E10 | ●     | 10             | 160             | 100        | 40       | 29     | 63       | 9   | 16.4 | 4.9         | without  | -           | CSTB-4L120     | AO□T1805... |
| TPO18R160M50.8-10 | ●     | 10             | 160             | 100        | 50.8     | 46     | 63       | 11  | 19   | 4.9         | without  | -           | CSTB-4L120     | AO□T1805... |



● : Stocked items



## Shank type



Max.  $a_p$  = 16.7 mm

### Parts

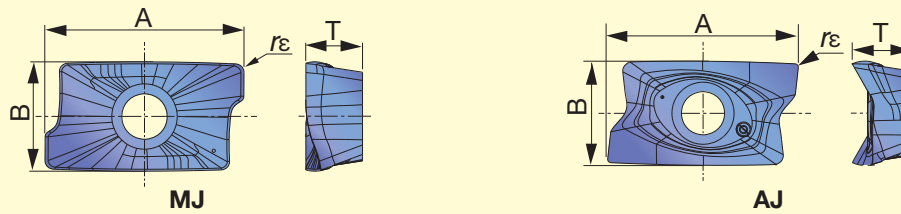
| Description            | Cat. No.      |   |
|------------------------|---------------|---|
| Applicable cutter      | EPO18R...     |   |
| Wrench                 | Torx bit      | - |
|                        | Grip          | - |
| Mono block type wrench | <b>T-15DB</b> |   |

| Cat. No.           | Stock | No. of inserts | Dimensions (mm) |            |       |       | Weight (kg) | Air hole | Clamping Screw | Inserts    |             |
|--------------------|-------|----------------|-----------------|------------|-------|-------|-------------|----------|----------------|------------|-------------|
|                    |       |                | * $\phi D_c$    | $\phi D_s$ | $l_s$ | $L_f$ |             |          |                |            | $L$         |
| EPO18R025M25.0-02  | ●     | 2              | 25              | 25         | 80    | 35    | 115         | 0.4      | with           | CSTB-4L085 | AO□T1805... |
| EPO18R025M25.0-02L | ●     | 2              | 25              | 25         | 150   | 70    | 220         | 0.8      | with           | CSTB-4L085 | AO□T1805... |
| EPO18R028M25.0-02  | ●     | 2              | 28              | 25         | 80    | 35    | 115         | 0.4      | with           | CSTB-4L085 | AO□T1805... |
| EPO18R028M25.0-02L | ●     | 2              | 28              | 25         | 150   | 70    | 220         | 0.8      | with           | CSTB-4L085 | AO□T1805... |
| EPO18R030M32.0-02  | ●     | 2              | 30              | 32         | 80    | 40    | 120         | 0.6      | with           | CSTB-4L085 | AO□T1805... |
| EPO18R030M32.0-02L | ●     | 2              | 30              | 32         | 175   | 80    | 255         | 1.4      | with           | CSTB-4L085 | AO□T1805... |
| EPO18R030M32.0-03  | ●     | 3              | 30              | 32         | 80    | 40    | 120         | 0.6      | with           | CSTB-4L085 | AO□T1805... |
| EPO18R032M32.0-02  | ●     | 2              | 32              | 32         | 80    | 40    | 120         | 0.7      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R032M32.0-02L | ●     | 2              | 32              | 32         | 175   | 80    | 255         | 1.5      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R032M32.0-03  | ●     | 3              | 32              | 32         | 80    | 40    | 120         | 0.6      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R035M32.0-02  | ●     | 2              | 35              | 32         | 80    | 40    | 120         | 0.7      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R035M32.0-02L | ●     | 2              | 35              | 32         | 175   | 80    | 255         | 1.5      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R035M32.0-03  | ●     | 3              | 35              | 32         | 80    | 40    | 120         | 0.7      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R040M32.0-02L | ●     | 2              | 40              | 32         | 205   | 50    | 255         | 1.6      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R040M32.0-03  | ●     | 3              | 40              | 32         | 80    | 40    | 120         | 0.7      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R040M32.0-04  | ●     | 4              | 40              | 32         | 80    | 40    | 120         | 0.7      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R040M42.0-02L | ●     | 2              | 40              | 42         | 210   | 100   | 310         | 3.0      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R050M32.0-03  | ●     | 3              | 50              | 32         | 80    | 40    | 120         | 0.8      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R050M32.0-05  | ●     | 5              | 50              | 32         | 80    | 40    | 120         | 0.8      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R050M42.0-03L | ●     | 3              | 50              | 42         | 310   | 50    | 360         | 3.8      | with           | CSTB-4L093 | AO□T1805... |
| EPO18R063M32.0-04  | ●     | 4              | 63              | 32         | 80    | 45    | 125         | 1.0      | with           | CSTB-4L120 | AO□T1805... |
| EPO18R063M32.0-06  | ●     | 6              | 63              | 32         | 80    | 45    | 125         | 1.1      | with           | CSTB-4L120 | AO□T1805... |
| EPO18R063M42.0-03L | ●     | 3              | 63              | 42         | 310   | 50    | 360         | 4.0      | with           | CSTB-4L120 | AO□T1805... |

\* The  $\phi D_c$  in the above table shows the diameter when MJ chipbreaker is used.  
When AJ chipbreaker is used, the diameter is equal to the above shown  $\phi D_c + 0.2$  mm.

● : Stocked items

## ● Inserts



| Cat. No.          | Accuracy | Honing  | Grades |       |         | Dimensions (mm) |      |     |              |
|-------------------|----------|---------|--------|-------|---------|-----------------|------|-----|--------------|
|                   |          |         | Coated |       | Carbide | A               | B    | T   | r $\epsilon$ |
|                   |          |         | AH725  | AH140 | KS15F   |                 |      |     |              |
| AOMT180508PDPR-MJ | M        | with    | ●      | ●     |         | 19.5            | 10.7 | 5.6 | 0.8          |
| AOMT180516PDPR-MJ | M        | with    | ●      | ●     |         | 19.5            | 10.7 | 5.6 | 1.6          |
| AOMT180524PDPR-MJ | M        | with    | ●      | ●     |         | 19.5            | 10.7 | 5.6 | 2.4          |
| AOMT180532PDPR-MJ | M        | with    | ●      | ●     |         | 19.5            | 10.7 | 5.6 | 3.2          |
| AOGT180504PDFR-AJ | G        | without |        |       | ●       | 19.8            | 10.8 | 6.1 | 0.4          |
| AOGT180508PDFR-AJ | G        | without |        |       | ●       | 19.8            | 10.8 | 6.1 | 0.8          |

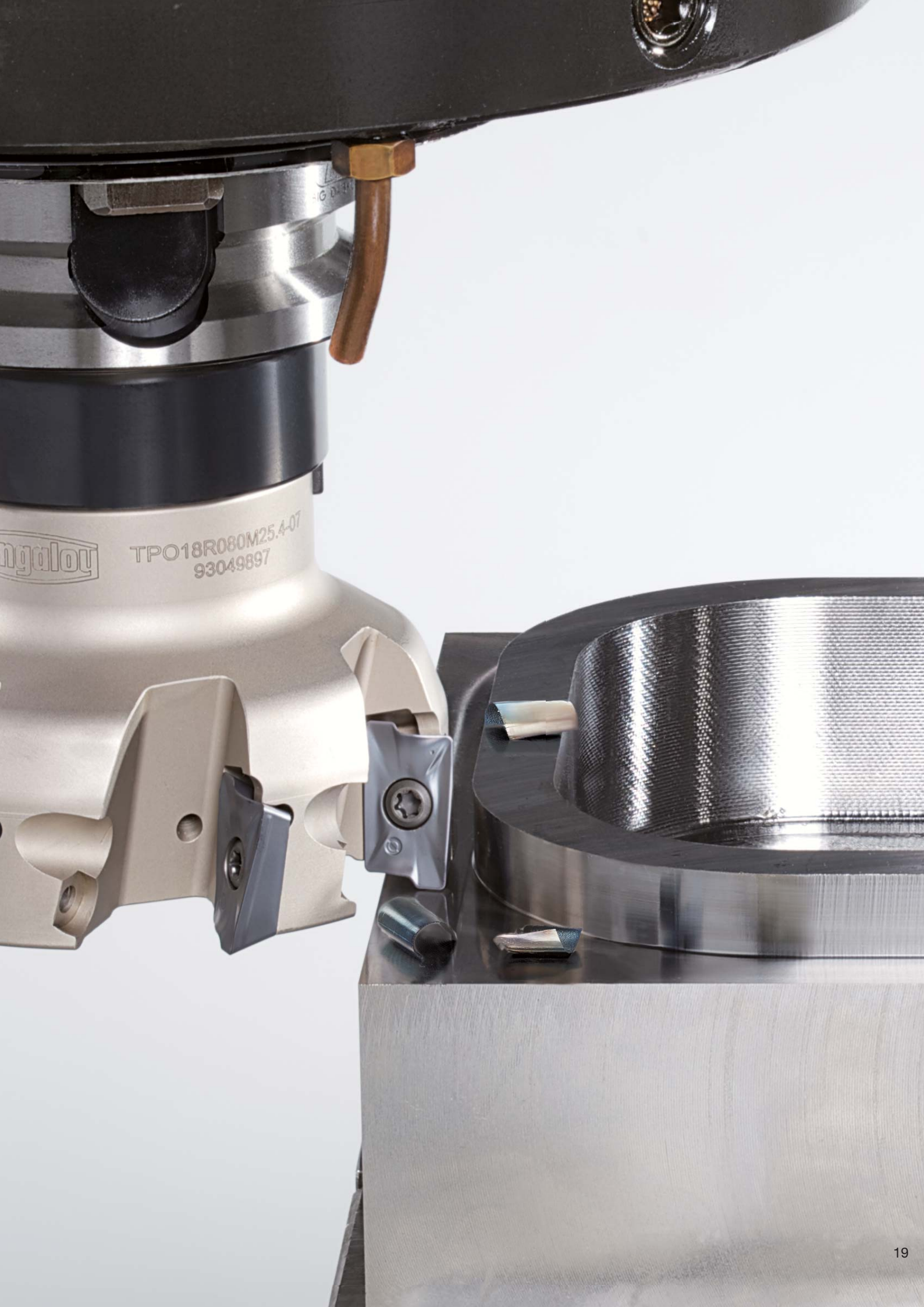
● : Stocked items

## ● Standard cutting conditions

| ISO      | Workpiece materials  | Brinell hardness<br>HB | Grade | Cutting speed<br>Vc (m/min) | Feed per tooth: fz (mm/t) |             |
|----------|--|------------------------|-------|-----------------------------|---------------------------|-------------|
|          |  |                        |       |                             | MJ                        | AJ          |
|          | Low carbon steel<br>(S15C / C15E4 etc.)                                  | ~ 200                  | AH725 | 100 - 250                   | 0.08 - 0.25               | -           |
| <b>P</b> | High carbon steel and alloy steel<br>(S55C / C55, SCM440 / 42CrMo4 etc.) | 200 ~ 300              | AH725 | 100 - 230                   | 0.08 - 0.2                | -           |
|          | Tool steel<br>(SKD11 / X153CrMoV12 etc.)                                 | 150 ~ 300              | AH725 | 100 - 180                   | 0.08 - 0.2                | -           |
| <b>M</b> | Stainless steel<br>(SUS304 / X5CrNi18-9 etc.)                            | -                      | AH140 | 90 - 200                    | 0.08 - 0.2                | -           |
|          | Grey cast irons<br>(FC250 / 250 etc.)                                    | 150 ~ 250              | AH725 | 140 - 250                   | 0.08 - 0.25               | -           |
| <b>K</b> | Ductile cast irons<br>(FCD450 / 450-10S etc.)                            | 150 ~ 250              | AH725 | 110 - 200                   | 0.08 - 0.25               | -           |
|          | Aluminium alloys (Si < 13%)  | -                      | KS15F | 300 - 1000                  | -                         | 0.05 - 0.25 |
| <b>N</b> | Aluminium alloys (Si ≥ 13%)  | -                      | KS15F | 100 - 200                   | -                         | 0.05 - 0.25 |
|          | Titanium alloys (Ti-6Al-4V etc.)   | -                      | AH725 | 20 - 60                     | 0.08 - 0.18               | -           |
| <b>S</b> | Superalloys<br>(Inconel718 etc.)   | -                      | AH725 | 20 - 40                     | 0.08 - 0.15               | -           |

- To remove excessive chip accumulation use an air blast.
- To avoid build up edge on the cutting edges (aluminium machining), use a water soluble coolant.
- When cutting an interrupted surface or a casted skin, the feed per tooth (fz) should be reduced to the lower recommended value shown in the above table.

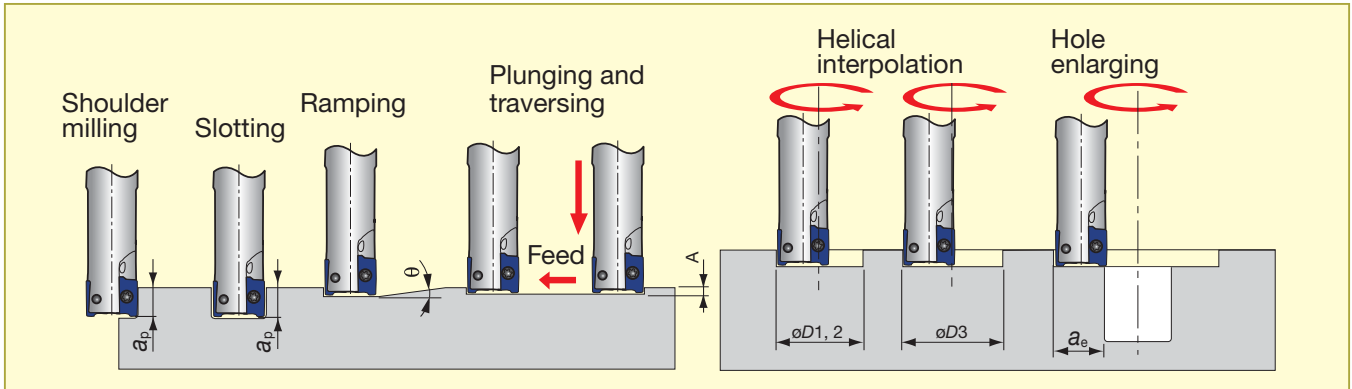
- Cutting conditions are limited by machine power, workpiece rigidity, and spindle output. When the cutting width, depth, or overhang length is large, set Vc and fz to the lower recommended values and check the machine power and vibration.



ngaloy

TPO18R080M25.4-07  
93049897

## Machining applications



| Cat. No.                     | Tool- $\phi$<br>$\phi D_c$ (mm) | Chip-breaker | Max. depth of cut<br>$a_p$ (mm) | Max. ramping angle $\theta$ | Max. plunging<br>A (mm) | Min. machining<br>$\phi D_1$ (mm) | Max. machining<br>$\phi D_2$ (mm) | *Max. machining<br>$\phi D_3$ (mm) | Max. cutting width in enlarging<br>$a_e$ (mm) |
|------------------------------|---------------------------------|--------------|---------------------------------|-----------------------------|-------------------------|-----------------------------------|-----------------------------------|------------------------------------|---|
| E/HPO07R012...               | $\phi 12$                       | MJ           | 7                               | 8                           | 0.5                     | 16                                | 23                                | 20.5                               | 11.5  |
| E/HPO07R016...               | $\phi 16$                       | MJ           | 7                               | 5                           | 0.5                     | 24                                | 3                                 | 28.5                               | 15.5  |
| EPO07R018...                 | $\phi 18$                       | MJ           | 7                               | 4                           | 0.5                     | 28                                | 35                                | 32.5                               | 17.5  |
| E/HPO07R020...               | $\phi 20$                       | MJ           | 7                               | 3.5                         | 0.5                     | 32                                | 39                                | 36.5                               | 19.5  |
| EPO07R022...                 | $\phi 22$                       | MJ           | 7                               | 3                           | 0.5                     | 36                                | 43                                | 40.5                               | 21.5  |
| E/HPO07R025...               | $\phi 25$                       | MJ           | 7                               | 2.5                         | 0.5                     | 42                                | 49                                | 46.5                               | 24.5  |
| EPO07R028...                 | $\phi 28$                       | MJ           | 7                               | 2                           | 0.5                     | 48                                | 55                                | 52.5                               | 27.5  |
| TPO07R032...                 | $\phi 32$                       | MJ           | 7                               | 1.8                         | 0.5                     | 56                                | 63                                | 60.5                               | 31.5  |
| TPO07R040                    | $\phi 40$                       | MJ           | 7                               | 1.2                         | 0.5                     | 72                                | 79                                | 76.5                               | 39.5  |
| TPO07R050...                 | $\phi 50$                       | MJ           | 7                               | 0.9                         | 0.5                     | 92                                | 99                                | 96.5                               | 49.5  |
| E/HPO07R012...               | $\phi 12$                       | AJ           | 6.4                             | 8                           | 0.5                     | 16                                | 23                                | 20.5                               | 11.5  |
| E/HPO07R016...               | $\phi 16$                       | AJ           | 6.4                             | 5                           | 0.5                     | 24                                | 3                                 | 28.5                               | 15.5  |
| EPO07R018...                 | $\phi 18$                       | AJ           | 6.4                             | 4                           | 0.5                     | 28                                | 35                                | 32.5                               | 17.5  |
| E/HPO07R020...               | $\phi 20$                       | AJ           | 6.4                             | 3.5                         | 0.5                     | 32                                | 39                                | 36.5                               | 19.5  |
| EPO07R022...                 | $\phi 22$                       | AJ           | 6.4                             | 3                           | 0.5                     | 36                                | 43                                | 40.5                               | 21.5  |
| E/HPO07R025...               | $\phi 25$                       | AJ           | 6.4                             | 2.5                         | 0.5                     | 42                                | 49                                | 46.5                               | 24.5  |
| EPO07R028...                 | $\phi 28$                       | AJ           | 6.4                             | 2                           | 0.5                     | 48                                | 55                                | 52.5                               | 27.5  |
| TPO07R032...                 | $\phi 32$                       | AJ           | 6.4                             | 1.8                         | 0.5                     | 56                                | 63                                | 60.5                               | 31.5  |
| TPO07R040                    | $\phi 40$                       | AJ           | 6.4                             | 1.2                         | 0.5                     | 72                                | 79                                | 76.5                               | 39.5  |
| TPO07R050...                 | $\phi 50$                       | AJ           | 6.4                             | 0.9                         | 0.5                     | 92                                | 99                                | 96.5                               | 49.5  |
| E/HPO07R012...               | $\phi 12.6$                     | HJ           | 0.8                             | 5                           | 0.5                     | 17                                | 24                                | -                                  | 9.6   |
| E/HPO07R016...               | $\phi 16.6$                     | HJ           | 0.8                             | 3                           | 0.5                     | 25                                | 32                                | -                                  | 13.6  |
| EPO07R018...                 | $\phi 18.6$                     | HJ           | 0.8                             | 2.5                         | 0.5                     | 29                                | 36                                | -                                  | 15.6  |
| E/HPO07R020...               | $\phi 20.6$                     | HJ           | 0.8                             | 2.1                         | 0.5                     | 33                                | 40                                | -                                  | 17.6  |
| EPO07R022...                 | $\phi 22.6$                     | HJ           | 0.8                             | 1.9                         | 0.5                     | 37                                | 44                                | -                                  | 19.6  |
| E/HPO07R025...               | $\phi 25.6$                     | HJ           | 0.8                             | 1.6                         | 0.5                     | 43                                | 50                                | -                                  | 22.6  |
| EPO07R028...                 | $\phi 28.6$                     | HJ           | 0.8                             | 1.3                         | 0.5                     | 49                                | 56                                | -                                  | 25.6  |
| TPO07R032...                 | $\phi 32.6$                     | HJ           | 0.8                             | 1.1                         | 0.5                     | 57                                | 64                                | -                                  | 29.6  |
| TPO07R040                    | $\phi 40.6$                     | HJ           | 0.8                             | 0.8                         | 0.5                     | 73                                | 80                                | -                                  | 37.6  |
| TPO07R050...                 | $\phi 50.6$                     | HJ           | 0.8                             | 0.6                         | 0.5                     | 93                                | 100                               | -                                  | 47.6  |
| EPO11R012..., EPS11012R...   | $\phi 12$                       | MJ, AJ       | 10.6                            | 6                           | 0.5                     | 15                                | 23                                | 21                                 | 11.5  |
| EPO11R016..., EPS11016R...   | $\phi 16$                       | MJ, AJ       | 10.6                            | 5                           | 0.5                     | 20                                | 31                                | 29                                 | 15.5  |
| EPO11R018..., EPS11018R...   | $\phi 18$                       | MJ, AJ       | 10.6                            | 4                           | 0.5                     | 26                                | 35                                | 33                                 | 17.5  |
| E/HPO11R020..., EPS11020R... | $\phi 20$                       | MJ, AJ       | 10.6                            | 3                           | 0.5                     | 28                                | 39                                | 37                                 | 19.5  |
| EPS11021R...                 | $\phi 21$                       | MJ, AJ       | 10.6                            | 3                           | 0.5                     | 30                                | 41                                | 39                                 | 20.5  |
| EPO11R022...                 | $\phi 22$                       | MJ, AJ       | 10.6                            | 2.5                         | 0.5                     | 31                                | 43                                | 41                                 | 21.5  |

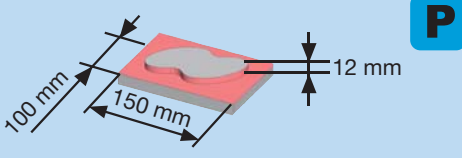
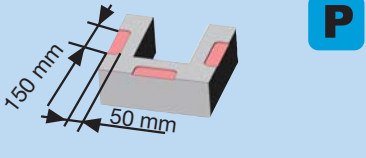
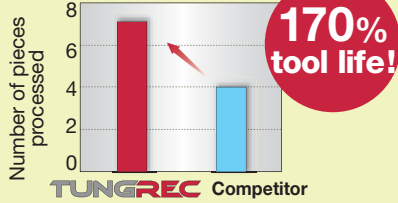
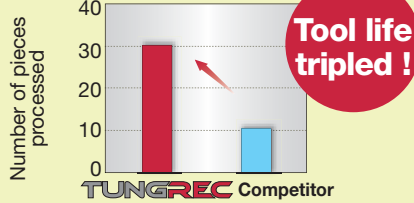
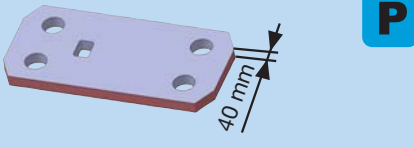
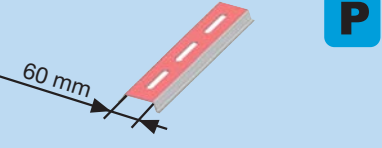
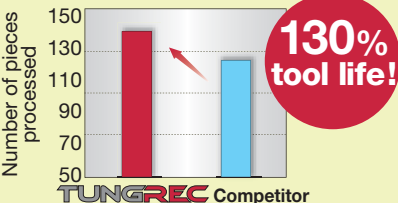
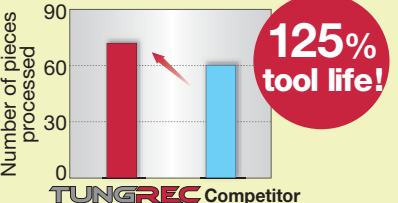


| Cat. No.                       | Tool- $\varnothing$<br>$\varnothing D_c$ (mm) | Chip-<br>breaker | Max. depth<br>of cut<br>$a_p$ (mm) | Max.<br>ramping<br>angle $\theta$ | Max.<br>plunging<br>A (mm) | Min.<br>machining<br>$\varnothing D_1$ (mm) | Max.<br>machining<br>$\varnothing D_2$ (mm) | *Max.<br>machining<br>$\varnothing D_3$ (mm) | Max. cutting<br>width in<br>enlarging<br>$a_e$ (mm) |
|--------------------------------|---|------------------|------------------------------------|-----------------------------------|----------------------------|---|---|--|---|
| E/PO11R025..., EPS11025R...    | $\varnothing 25$                              | MJ, AJ           | 10.6                               | 2                                 | 0.5                        | 38  | 49  | 47   | 24.5  |
| EPS11026R...                   | $\varnothing 26$                              | MJ, AJ           | 10.6                               | 2                                 | 0.5                        | 40  | 51  | 49   | 25.5  |
| EPO11R028...                   | $\varnothing 28$                              | MJ, AJ           | 10.6                               | 1.5                               | 0.5                        | 42  | 53  | 51   | 27.5  |
| EPO11R030..., EPS11030R...     | $\varnothing 30$                              | MJ, AJ           | 10.6                               | 1.5                               | 0.5                        | 48  | 55  | 53   | 29.5  |
| E/PO11R032..., EPS11032R...    | $\varnothing 32$                              | MJ, AJ           | 10.6                               | 1.5                               | 0.5                        | 52  | 59  | 57   | 31.5  |
| EPS11033R...                   | $\varnothing 33$                              | MJ, AJ           | 10.6                               | 1.5                               | 0.5                        | 54  | 65  | 63   | 32.5  |
| EPO11R035...                   | $\varnothing 35$                              | MJ, AJ           | 10.6                               | 1                                 | 0.5                        | 56  | 67  | 65   | 34.5  |
| E/TPO11R040..., E/TPS11040R... | $\varnothing 40$                              | MJ, AJ           | 10.6                               | 1                                 | 0.5                        | 68  | 79  | 77   | 39.5  |
| TPO11R050..., E/TPS11050R...   | $\varnothing 50$                              | MJ, AJ           | 10.6                               | 0.7                               | 0.5                        | 68  | 99  | 97   | 49.5  |
| TPO11R063..., TPS11063RB       | $\varnothing 63$                              | MJ, AJ           | 10.6                               | 0.5                               | 0.5                        | 114   | 125   | 123  | 62.5  |
| TPO11R080..., TPS11080RB       | $\varnothing 80$                              | MJ, AJ           | 10.6                               | 0.4                               | 0.5                        | 148   | 159   | 157  | 79.5  |
| TPO11R100..., TPS1100RB        | $\varnothing 100$                             | MJ, AJ           | 10.6                               | 0.3                               | 0.5                        | 188   | 199   | 197  | 99.5  |
| EPO18R025...                   | $\varnothing 25$                              | MJ, AJ           | 16.7                               | 6                                 | 1                          | 32  | 48  | 44   | 24  |
| EPO18R028...                   | $\varnothing 28$                              | MJ, AJ           | 16.7                               | 4.5                               | 1                          | 38  | 54  | 50   | 27  |
| EPO18R030...                   | $\varnothing 30$                              | MJ, AJ           | 16.7                               | 4                                 | 1                          | 42  | 58  | 54   | 29  |
| EPO18R032...                   | $\varnothing 32$                              | MJ, AJ           | 16.7                               | 3.5                               | 1                          | 46  | 62  | 58   | 31  |
| EPO18R035...                   | $\varnothing 35$                              | MJ, AJ           | 16.7                               | 3                                 | 1                          | 52  | 68  | 64   | 34  |
| E/TPO18R040...                 | $\varnothing 40$                              | MJ, AJ           | 16.7                               | 2.5                               | 1                          | 62  | 78  | 74   | 39  |
| E/TPO18R050...                 | $\varnothing 50$                              | MJ, AJ           | 16.7                               | 1.9                               | 1                          | 82  | 98  | 94   | 49  |
| E/TPO18R063                    | $\varnothing 63$                              | MJ, AJ           | 16.7                               | 1.4                               | 1                          | 108   | 124   | 120  | 62  |
| TPO18R080...                   | $\varnothing 80$                              | MJ, AJ           | 16.7                               | 1                                 | 1                          | 142   | 158   | 154  | 79  |
| TPO18R100...                   | $\varnothing 100$                             | MJ, AJ           | 16.7                               | 0.8                               | 1                          | 182   | 198   | 194  | 99  |
| TPO18R125...                   | $\varnothing 125$                             | MJ, AJ           | 16.7                               | 0.6                               | 1                          | 232   | 248   | 244  | 124   |
| TPO18R160...                   | $\varnothing 160$                             | MJ, AJ           | 16.7                               | 0.4                               | 1                          | 302   | 318   | 314  | 159   |

\*Flat bottom hole

Notes: Corner  $r_\epsilon$  for dimensions of  $\varnothing D_1$ ,  $\varnothing D_2$ , and  $\varnothing D_3$ :  $r_\epsilon = 0.4$  for EPO07 / EPS11 and  $r_\epsilon = 0.8$  for EPO18.

## Practical examples

| Workpiece type     |                              | Machine parts  | Compressor parts   |
|--------------------|------------------------------|--|--|
| Cutter             |                              | TPO07R040M16.0E10 (ø40, z = 10)  | EPS11033RSB (ø33, z = 5)   |
| Insert             |                              | AOMT070208PDPR-MJ  | ASMT11T304PDPR-MJ  |
| Grade              |                              | AH725  | NS740  |
| Workpiece material |                              | SCM440 / 42CrMo4   | SS400 / E275A  |
|                    |                              |   |   |
| Cutting conditions | Cutting speed: $V_c$ (m/min) | 130  | 150  |
|                    | Feed per tooth: $f_z$ (mm/t) | 0.1  | 0.13   |
|                    | Feed speed: $V_f$ (mm/min)   | 1000   | 940  |
|                    | Depth of cut: $ap$ (mm)      | 3.0  | 5  |
|                    | Width of cut: $ae$ (mm)      | ~ 30   | 15   |
|                    | Method of machining          | Shoulder milling   | Shoulder milling   |
|                    | Coolant                      | Dry  | Dry  |
|                    | Machine                      | Vertical MC, BT40  | Vertical MC, BT50  |
| Results            |                              |  <p><b>170% tool life!</b></p> <p><math>V_f = 600 \rightarrow 1000</math> mm/min<br/>Improves productivity and makes tool life very stable.</p>                            |  <p><b>Tool life tripled!</b></p> <p>Improves tool life and surface finish.</p>         |
|                    |                              |  |  |
| Workpiece type     |                              | Machine parts  | Transportation rail  |
| Cutter             |                              | TLS11R050M22.0E04  | TPO18R050M22.0-05 (ø50, z = 5)   |
| Insert             |                              | ASMT11T308PDPR-MJ  | AOMT180516PDPR-MJ  |
| Grade              |                              | AH725  | AH725  |
| Workpiece material |                              | SS400 / E275A  | S20C / C22   |
|                    |                              |   |   |
| Cutting conditions | Cutting speed: $V_c$ (m/min) | 150  | 220  |
|                    | Feed per tooth: $f_z$ (mm/t) | 0.17   | 0.16   |
|                    | Feed speed: $V_f$ (mm/min)   | 649  | 1200   |
|                    | Depth of cut: $ap$ (mm)      | 40   | 6  |
|                    | Width of cut: $ae$ (mm)      | 5  | 20   |
|                    | Method of machining          | Shoulder milling   | Face milling   |
|                    | Coolant                      | Dry  | Dry  |
|                    | Machine                      | Vertical MC, BT50  | Vertical MC, BT50  |
| Results            |                              |  <p><b>130% tool life!</b></p> <p>Even in the machining of low rigid work piece, TungRec enables the productivity to improve 30% higher due to the low cutting force.</p> |  <p><b>125% tool life!</b></p> <p>Reduces machining noise with low cutting force.</p> |
|                    |                              |  |  |



## Tungaloy Corporation (Head office)

11-1 Yoshima-Kogyodanchi  
Iwaki-city, Fukushima, 970-1144 Japan  
Phone: +81-246-36-8501  
Fax: +81-246-36-8542  
www.tungaloy.co.jp

## Tungaloy America, Inc.

3726 N Ventura Drive  
Arlington Heights, IL 60004, U.S.A.  
Phone: +1-888-554-8394  
Fax: +1-888-554-8392  
www.tungaloyamerica.com

## Tungaloy Canada

432 Elgin St. Unit 3  
Brantford, Ontario N3S 7P7, Canada  
Phone: +1-519-758-5779  
Fax: +1-519-758-5791  
www.tungaloy.co.jp/ca

## Tungaloy de Mexico S.A.

C Los Arellano 113,  
Parque Industrial Siglo XXI  
Aguascalientes, AGS, Mexico 20290  
Phone: +52-449-929-5410  
Fax: +52-449-929-5411  
www.tungaloy.co.jp/mx

## Tungaloy do Brasil Ltda.

Avd. Independencia N4158 Residencial Flora  
13280-000 Vinhedo, São Paulo, Brasil  
Phone: +55-19-38262757  
Fax: +55-19-38262757  
www.tungaloy.com.br

## Tungaloy Germany GmbH

An der Alten Ziegelei 1  
D-40789 Monheim, Germany  
Phone: +49-2173-90420-0  
Fax: +49-2173-90420-19  
www.tungaloy.de

## Tungaloy France S.A.S.

ZA Courtaboef - Le Rio  
1 rue de la Terre de feu  
F-91952 Courtaboef Cedex, France  
Phone: +33-1-6486-4300  
Fax: +33-1-6907-7817  
www.tungaloy.fr

## Tungaloy Italia S.r.l.

Via E. Andolfato 10  
I-20126 Milano, Italy  
Phone: +39-02-252012-1  
Fax: +39-02-252012-65  
www.tungaloy.it

## Tungaloy Czech s.r.o.

Turanka 115  
CZ-627 00 Brno, Czech Republic  
Phone: +420-532 123 391  
Fax: +420-532 123 392  
www.tungaloy.cz

## Tungaloy Ibérica S.L.

C/Miquel Servet, 43B, Nau 7  
Pol. Ind. Bufalvent  
ES-08243 Manresa (BCN), Spain  
Phone: +34 93 113 1360  
Fax: +34 93 876 2798  
www.tungaloy.es

## Tungaloy Scandinavia AB

Bultgatan 38  
442 40 Kungälv, Sweden  
Phone: +46-462119200  
www.tungaloy.se

## Tungaloy Rus, LLC

115432, Russian Federation, Moscow,  
Andropova avenue., h.18, bld.7, flt. 11,  
office 3.  
Phone: +7-499-683-01-80/81  
www.tungaloy.co.jp/ru

## Tungaloy East LLC

620075, Russian Federation, Sverdlovsk  
Region, Ekaterinburg, Mamina-Sibiryaka str.,  
bldg. 101, room 202  
Phone: +7-343-286-48-23/24  
Fax: +7-912-284-91-69  
www.tungaloy.co.jp/ru

## Tungaloy Polska Sp. z o.o.

ul. Genewska 24  
03-963 Warszawa, Poland  
Phone: +48-22-617-0890  
Fax: +48-22-617-0890  
www.tungaloy.co.jp/pl

## Tungaloy U.K. Ltd

The Technology Centre,  
Wolverhampton Science Park  
Glaisher Drive, Wolverhampton  
West Midlands WV10 9RU, UK  
Phone: +44 121 4000 231  
Fax: +44 121 270 9694  
www.tungaloy.co.jp/uk  
salesinfo@tungaloyuk.co.uk

## Tungaloy Hungary Kft

Erzsébet királyné útja 125  
H-1142 Budapest, Hungary  
Phone: +36 1 781-6846  
Fax: +36 1 781-6866  
www.tungaloy.co.jp/hu  
info@tungaloytools.hu

## Tungaloy Turkey

Dudullu, OSB 4. Cad No:4  
34776 Umraniye Istanbul, TURKEY  
Phone: +90 216 540 04 67  
Fax: +90 216 540 04 87  
www.tungaloy.com.tr  
info@tungaloy.com.tr

## Tungaloy Benelux b.v.

Tjalk 70  
NL-2411 NZ Bodegraven, Netherlands  
Phone: +31 172 630 420  
Fax: +31 172 630 429  
www.tungaloy-benelux.com

## Tungaloy Croatia

Josipa Kozarca 4  
10432 Bregana, Croatia  
Phone: +385 1 3326 604  
Fax: +385 1 3327 683  
www.tungaloy.hr

## Tungaloy Cutting Tool (Shanghai) Co., Ltd.

Rm No 401 No.88 Zhabei  
Jiangchang No.3 Rd  
Shanghai 200436, China  
Phone: +86-21-3632-1880  
Fax: +86-21-3621-1918  
www.tungaloy.co.jp/tots

## Tungaloy Cutting Tool (Thailand) Co., Ltd.

Interlink tower 4th Fl.  
1858/5-7 Bangna-Trad Road  
km.5 Bangna, Bangna, Bangkok 10260  
Thailand  
Phone: +66-2-751-5711  
Fax: +66-2-751-5715  
www.tungaloy.co.th

## Tungaloy Singapore (Pte.), Ltd.

62 Ubi Road 1, #06-11 Oxley BizHub 2  
Singapore 408734  
Phone: +65-6391-1833  
Fax: +65-6299-4557  
www.tungaloy.co.jp/tspl

## Tungaloy Vietnam

LE 04-38, Lexington Residence  
67 Mai Chi Tho, Dist. 2,  
Ho Chi Minh City, Vietnam  
Phone: +84-8-37406660  
Fax: +84-8-37406662  
www.tungaloy.co.jp/tspl

## Tungaloy India Pvt. Ltd.

Indiabulls Finance Centre,  
Unit # 902-A, 9th Floor,  
Tower 1, Senapati Bapat Marg,  
Elphinstone Road (West),  
Mumbai -400013, India  
Phone: +91-22-6124-8804  
Fax: +91-22-6124-8899  
www.tungaloy.co.jp/in

## Tungaloy Korea Co., Ltd

#1312, Byucksan Digital Valley 5-cha  
Beotkkot-ro 244, Geumcheon-gu  
153-788 Seoul, Korea  
Phone: +82-2-2621-6161  
Fax: +82-2-6393-8952  
www.tungaloy.co.jp/kr

## Tungaloy Malaysia Sdn Bhd

50 K-2, Kelana Mall, Jalan SS6/14  
Kelana Jaya, 47301  
Petaling Jaya, Selangor Darul Ehsan  
Malaysia  
Phone: +603-7805-3222  
Fax: +603-7804-8563  
www.tungaloy.co.jp/my

## Tungaloy Australia Pty Ltd

PO Box 2232, Rowville,  
Victoria 3178, Australia  
Phone: +61-3-9755-8147  
Fax: +61-3-9755-6070  
www.tungaloy.com.au

## PT. Tungaloy Indonesia

Kompleks Grand Wisata Block AA-10 No.3-5  
Cibitung  
Bekasi 17510, Indonesia  
Phone: +62-21-8261-5808  
Fax: +62-21-8261-5809  
www.tungaloy.co.jp/id



www.tungaloy.com

follow us at:  
facebook.com/tungaloyjapan  
twitter.com/tungaloyjapan

To see this product in action visit:

# Tung-TV

www.youtube.com/tungaloycorporation

Distributed by:



DOWNLOAD  
Dr. Carbide App



FIND US ON THE CLOUD!  
machiningcloud.com



Available on the  
App Store



GET IT ON  
Google play



AS9100 Certified  
78006  
2015.11.04  
ISO14001 Certified  
EC97J1123  
1997.11.26