

MillLine

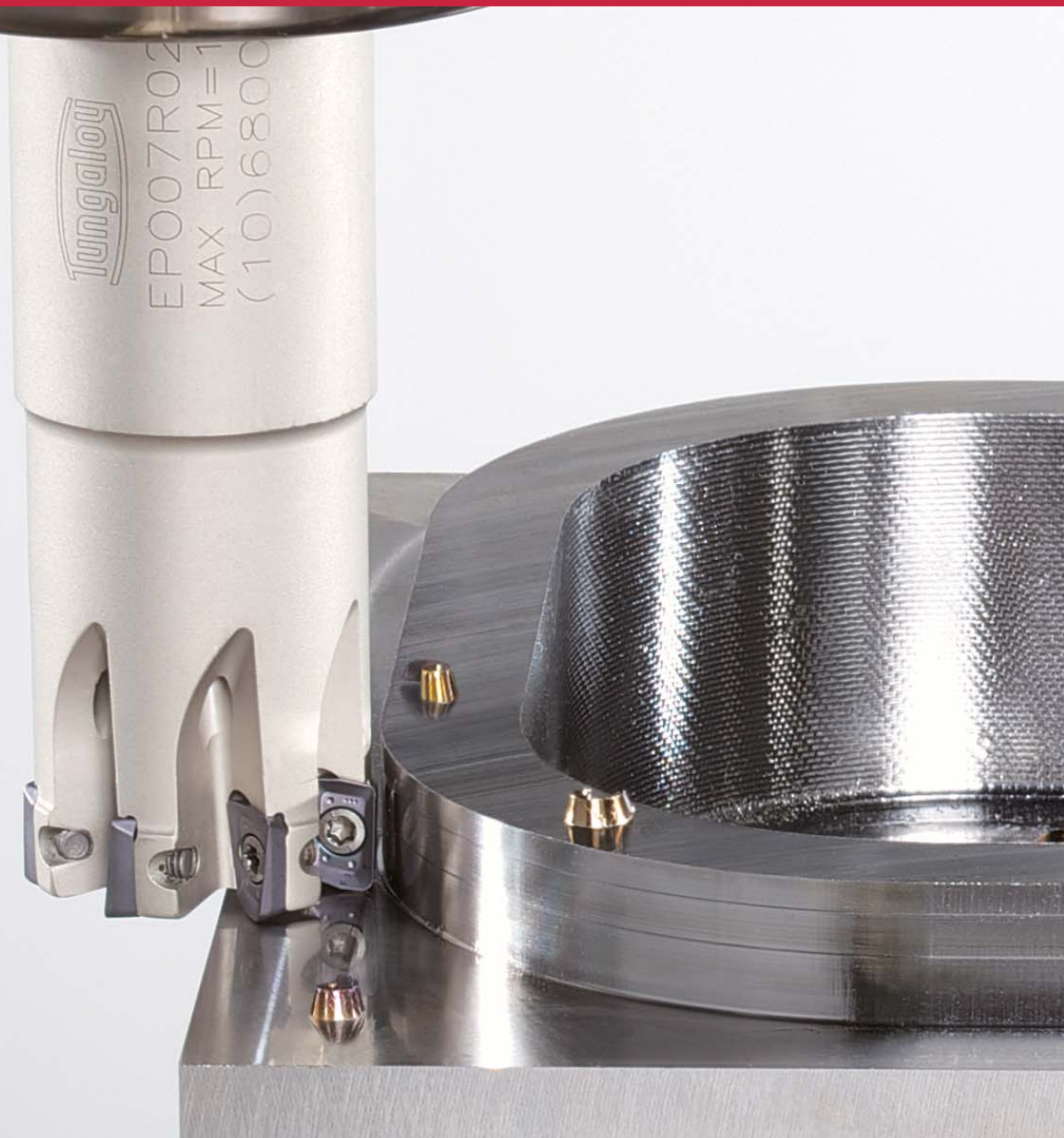
TUNGREC

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Tungaloy Report No. 380-G



Multi-functional high precision cutter



INDUSTRY 4.0
FEED the SPEED!



ACCELERATED MACHINING



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

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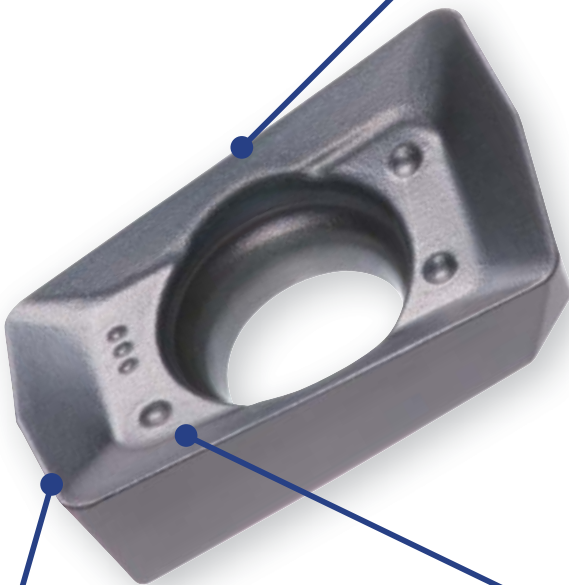
Highly productive semi-finish milling cutter with accurate 90° shoulders
 Helical cutting edges and high axial rake angles provide free cutting.



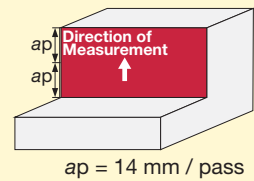
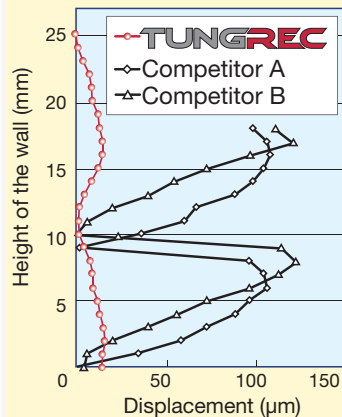
● High performance inserts

Helical cutting edges

Excellent wall straightness!



■ Comparison of straightness

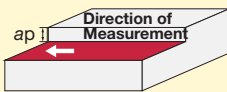
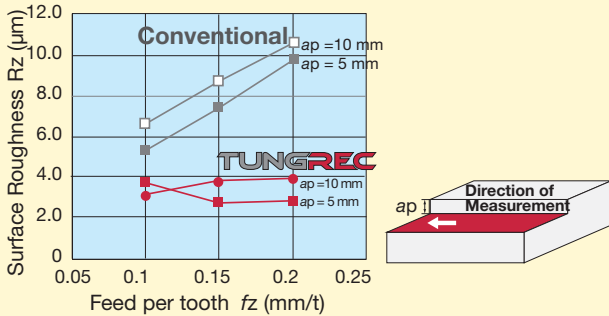


Milling cutter : EPO18R025M25.0-02 (ø25, z = 2)
 Workpiece : S55C / C55
 Cutting speed : Vc = 150 m/min
 Feed per tooth : fz = 0.1 mm/t
 Depth of cut : ap = 14 mm x 2 passes
 Width of cut : ae = 5 mm

Wiper edges

Excellent surface finish!

■ Comparison of surface roughness

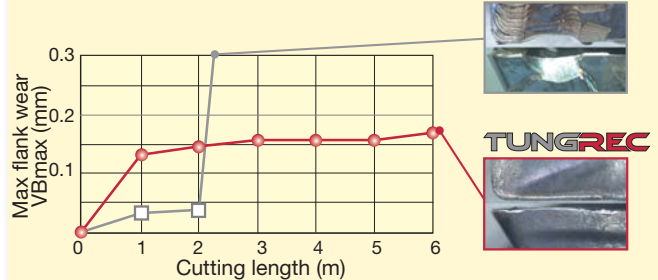


Milling cutter : EPO18R025M25.0-02 (ø25, z = 2)
 Workpiece : S55C / C55
 Cutting speed : Vc = 150 m/min
 Depth of cut : ap = 5 mm / 10 mm
 Width of cut : ae = 20 mm

Optimized rake angle

Provides sharpness and reliability!

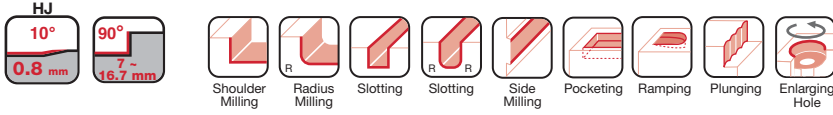
■ Comparison of tool life



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

ASGT11 AOGT07

Rake angle

HJ type
for high feed machining

P M K S
Steel Stainless Cast Iron Superalloys

AOMT07

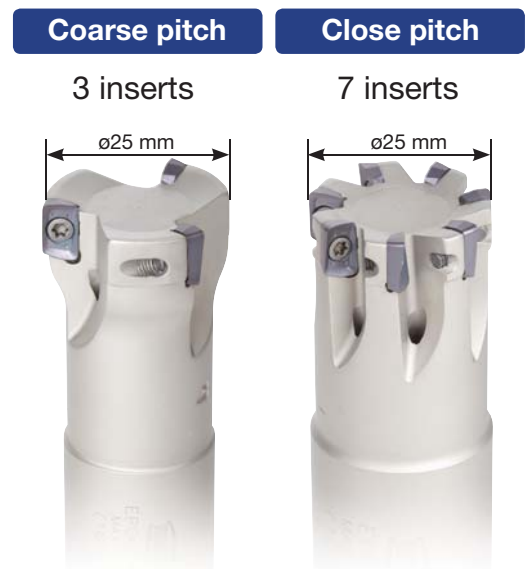
Max. ap = 0.8 mm
10°
Land width
Rake angle

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: a_p / with MJ chipbreaker

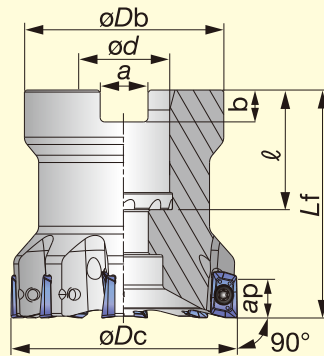
AOMT18
Max. a_p = 16.7 mm

ASMT11
Max. a_p = 10.6 mm

AOMT07
Max. a_p = 7.0 mm

Cutter

Bore type



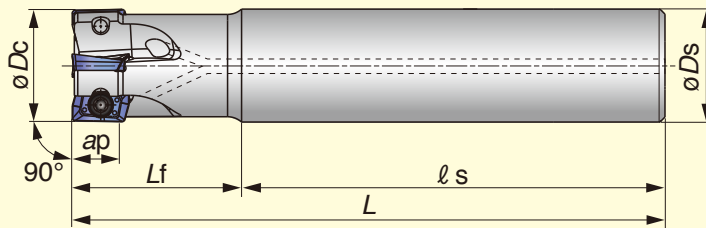
Max. ap :
 MJ = 7 mm
 AJ = 6.4 mm
 HJ = 0.8 mm

Parts

Description	Cat. No.
Wrench	T-7DB

Cat. No.	Stock	No. of inserts	Dimensions (mm)						Weight (kg)	Air hole	Center bolt	Clamping screw	Inserts	
			* ϕDc	ϕDb	ϕd	ℓ	** 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

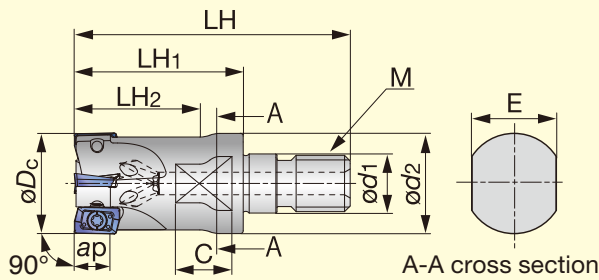
Cat. No.	Stock	No. of inserts	Dimensions (mm)					Weight (kg)	Air hole	Clamping Screw	Inserts
			* ϕDc	ϕDs	ℓ_s	** L_f	** L				
EPO07R012M12.0-02	●	2	12	12	50	18	68	0.1	with	SR-10503833-S	AO□T0702...
EPO07R012M12.0-02L	●	2	12	12	95	30	125	0.1	with	SR-10503833-S	AO□T0702...
EPO07R016M12.0-02	●	2	16	12	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 ϕDc 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



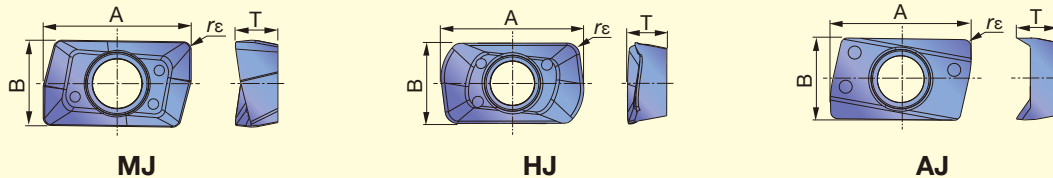
Max. ap:
MJ = 7.0 mm
AJ = 6.4 mm
HJ = 0.8 mm

Parts

Descriptions		Parts Cat. No.
Clamping screw	HPO07R012...	SR-10503833-S
	HPO07R016...- HPO07R025...	CSTB-2.5L046
Wrench		T-7DB

Cat. No.	Stock	No. of Inserts	Dimensions (mm)									Weight (kg)	Air hole	Applicable Insert
			øDc	LH	LH1	LH2	C	E	ød1	ød2	M			
New 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...
New 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
P	Low carbon steel (S15C / C15E4 etc.)	< 200	AH725	90 - 200	0.05 - 0.1	0.4 - 0.9	-
	High carbon steel and alloy steel (S55C / C55, SCM440 / 42CrMo4 etc.)	200 - 300	AH725	90 - 150	0.05 - 0.1	0.4 - 0.9	-
	Tool steel (SKD11 / X153CrMoV12 etc.)	150 - 300	AH725	80 - 120	0.05 - 0.1	0.4 - 0.9	-
M	Stainless steel (SUS304 / X5CrNi18-9 etc.)	-	AH140	90 - 150	0.05 - 0.1	0.4 - 0.9	-
K	Grey cast irons (FC250 / 250 etc.)	150 - 250	AH725	100 - 180	0.05 - 0.1	0.4 - 0.9	-
	Ductile cast irons (FCD450 / 450-10S etc.)	150 - 250	AH725	80 - 150	0.05 - 0.1	0.4 - 0.9	-
N	Aluminium alloys (Si < 13%)	-	KS15F	300 - 1000	-	-	0.08 - 0.2
	Aluminium alloys (Si ≥ 13%)	-	KS15F	100 - 200	-	-	0.08 - 0.2
S	Titanium alloys (Ti-6Al-4V etc.)	-	AH725	20 - 50	0.05 - 0.1	0.4 - 0.9	-
	Superalloys (Inconel 718 etc.)	-	AH725	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.

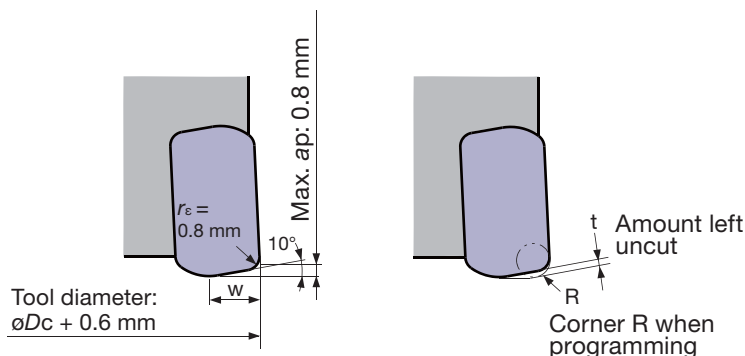
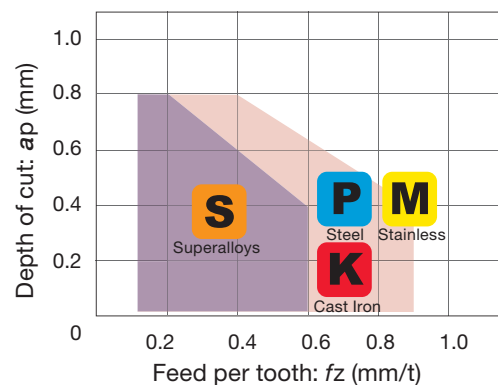
Cautionary points when using HJ inserts

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 ϕD_c shown in the table.

TungRec 07 type HJ inserts Standard conditions

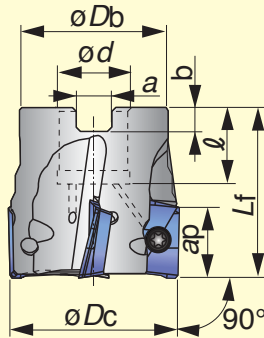


Max. depth of cut max ap (mm)	Main cutting edge length W (mm)	Corner R when programming	Amount left uncut t (mm)
0.8	3.0	R 0.5	0.4
		R 1.0	0.3

Cutter

Bore type

NEW



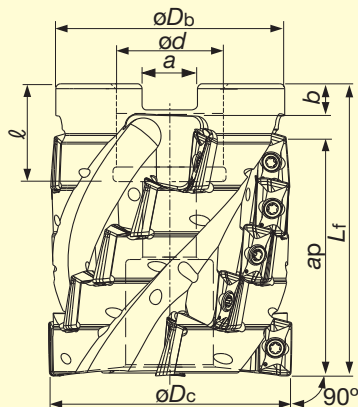
Max. $ap = 10.6$ mm

Parts

Description	Cat. No.
Wrench	IP-8D

Cat. No.	Stock	No. of inserts	Dimensions (mm)							Weight (kg)	Air hole	Center bolt	Clamping screw	Inserts
			ϕD_c	ϕD_b	ϕd	ℓ	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	
			ϕD_c	ϕD_b	ϕd	ℓ	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...

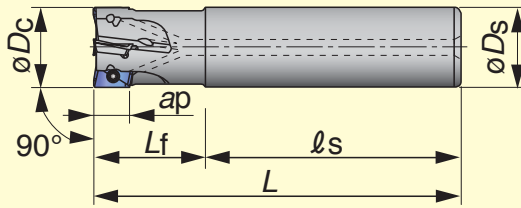
Note: Coolant cannot be supplied through the arbor center (through the clamping screw). Supply coolant through the flange of the arbor pilot.

- : 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
			$\varnothing D_c$	$\varnothing D_s$	l_s	L_f	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-2.5S	AS□T11T3...
EPO11R022M20.0-02L	★	2	22	20	155	30	185	0.42	with	CSPB-2.5S	AS□T11T3...
EPO11R022M20.0-03	★	3	22	20	70	30	100	0.22	with	CSPB-2.5S	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...

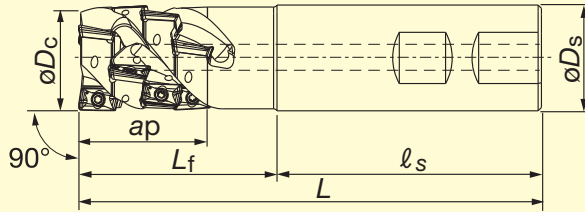
● : Stocked items
★ : Available in 2014

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

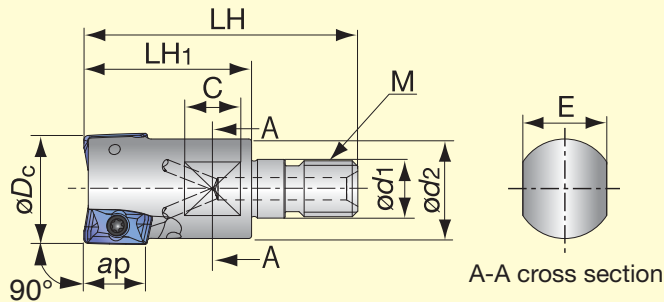


Parts

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
			ϕD_c	ϕD_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

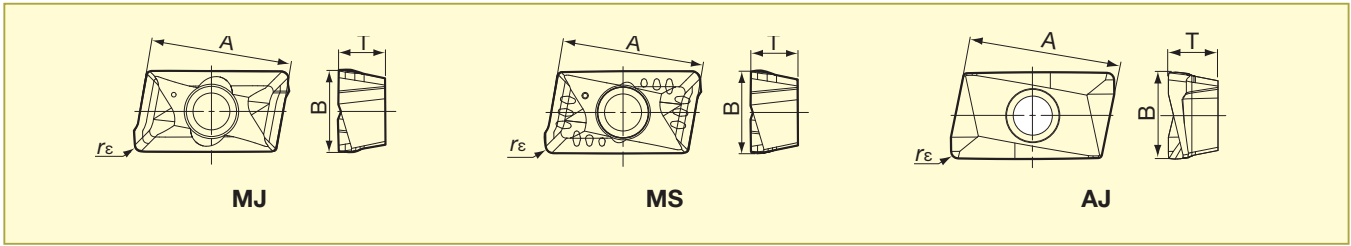
Descriptions	Parts Cat. No.	
Clamping screw	HPO11R020	HPO11R025, HPO11R032
	CSPB-2.5S	CSPB-2.5
Wrench	IP-8D	

Cat. No.	Stock	No. of Inserts	Dimensions (mm)								Weight (kg)	Air hole	Applicable Insert
			ϕD_c	LH	LH ₁	C	E	ϕd_1	ϕd_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_{ϵ}		
		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

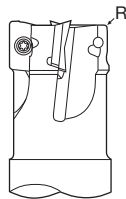
TPS11 / EPS11, HPO11, TPO11 / EPO11 type

ISO	Workpiece materials	Brinell hardness HB	Priority	Grade	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)		
						MJ	MS	AJ
P	Low carbon steel (S15C / C15E4 etc.)	~ 200	First choice	AH725	100 - 250	0.1 - 0.2	-	-
		~ 200	For wear resistance	T3130	100 - 250	0.1 - 0.2	-	-
		~ 200	For surface appearance	NS740	100 - 250	0.05 - 0.15	-	-
	High carbon steel and alloy steel (S55C / C55, SCM440 / 42CrMo4 etc.)	200 ~ 300	First choice	AH725	100 - 200	0.1 - 0.15	-	-
		200 ~ 300	For wear resistance	T3130	100 - 200	0.1 - 0.15	-	-
		200 ~ 300	For surface appearance	NS740	100 - 200	0.05 - 0.12	-	-
Tool steel (SKD11 / X153CrMoV12 etc.)	150 ~ 300	First choice	AH725	100 - 150	0.1 - 0.15	-	-	
	150 ~ 300	For wear resistance	T3130	100 - 150	0.1 - 0.15	-	-	
M	Stainless steel (SUS304 / X5CrNi18-9 etc.)	-	-	AH130	80 - 200	-	0.08 - 0.2	-
K	Grey cast irons (FC250 / 250 etc.)	150 ~ 250	First choice	AH120	100 - 250	0.12 - 0.2	-	-
		150 ~ 250	For wear resistance	T1115	100 - 250	0.12 - 0.2	-	-
	Ductile cast irons (FCD450 / 450-10S etc.)	150 ~ 250	First choice	AH120	80 - 200	0.12 - 0.2	-	-
		150 ~ 250	For wear resistance	T1115	80 - 200	0.12 - 0.2	-	-
N	Aluminium alloys (Si < 13%)	-	-	DS1100	300 - 1000	-	-	0.05 - 0.2
	Aluminium alloys (Si ≥ 13%)	-	-	DS1100	100 - 200	-	-	0.05 - 0.2
	Copper alloys	-	-	KS05F	200 - 500	-	-	0.05 - 0.2
S	Titanium alloys (Ti-6Al-4V etc.)	-	-	AH130	20 - 60	-	0.08 - 0.15	-
	Superalloys (Inconel 718 etc.)	-	-	AH725	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_{ϵ} (mm)	The dimension of modifying (mm)
0.4 ~ 1.6	Unnecessary
2.0 ~ 3.2	2

Roughing type TLS11 / ELS11

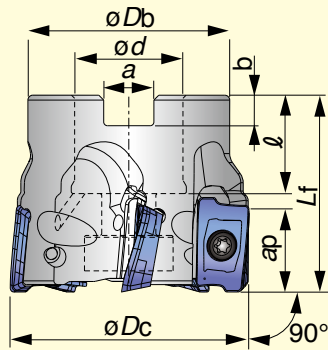
ISO	Workpiece materials	Brinell hardness HB	Priority	Grade	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)		
						MJ	MS	AJ
P	Low carbon steel (S15C / C15E4 etc.)	~ 200	First choice	AH725	100 - 250	0.10 - 0.18	-	-
		~ 200	For wear resistance	T3130	100 - 250	0.10 - 0.18	-	-
	High carbon steel and alloy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

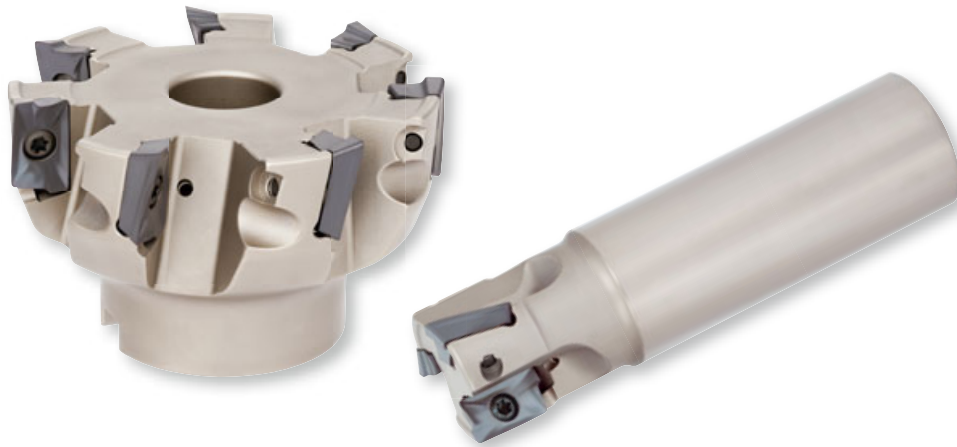


Max. $ap = 16.7$ mm

Parts

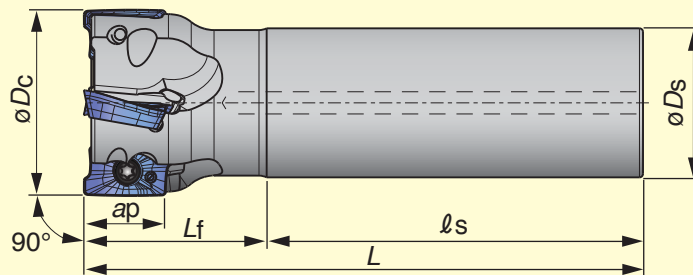
Description		Cat. No.
Applicable cutter		TPO18R...
Wrench	Torx bit	BT15M
	Grip	H-TBS
Mono block type wrench		-

Cat. No.	Stock	No. of inserts	Dimensions (mm)							Weight (kg)	Air hole	Center bolt	Clamping screw	Inserts
			* $\varnothing D_c$	$\varnothing D_b$	$\varnothing d$	ℓ	** 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

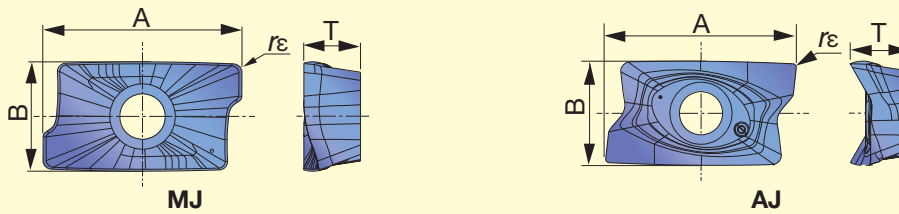
Description	Cat. No.	
Applicable cutter	EPO18R...	
Wrench	Torx bit	-
	Grip	-
Mono block type wrench	T-15DB	

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
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 $\varnothing D_c$ 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 $\varnothing D_c + 0.2$ mm.

● : Stocked items

● Inserts



Cat. No.	Accuracy	Honing	Grades			Dimensions (mm)			
			Coated		Carbide	A	B	T	r ϵ
			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

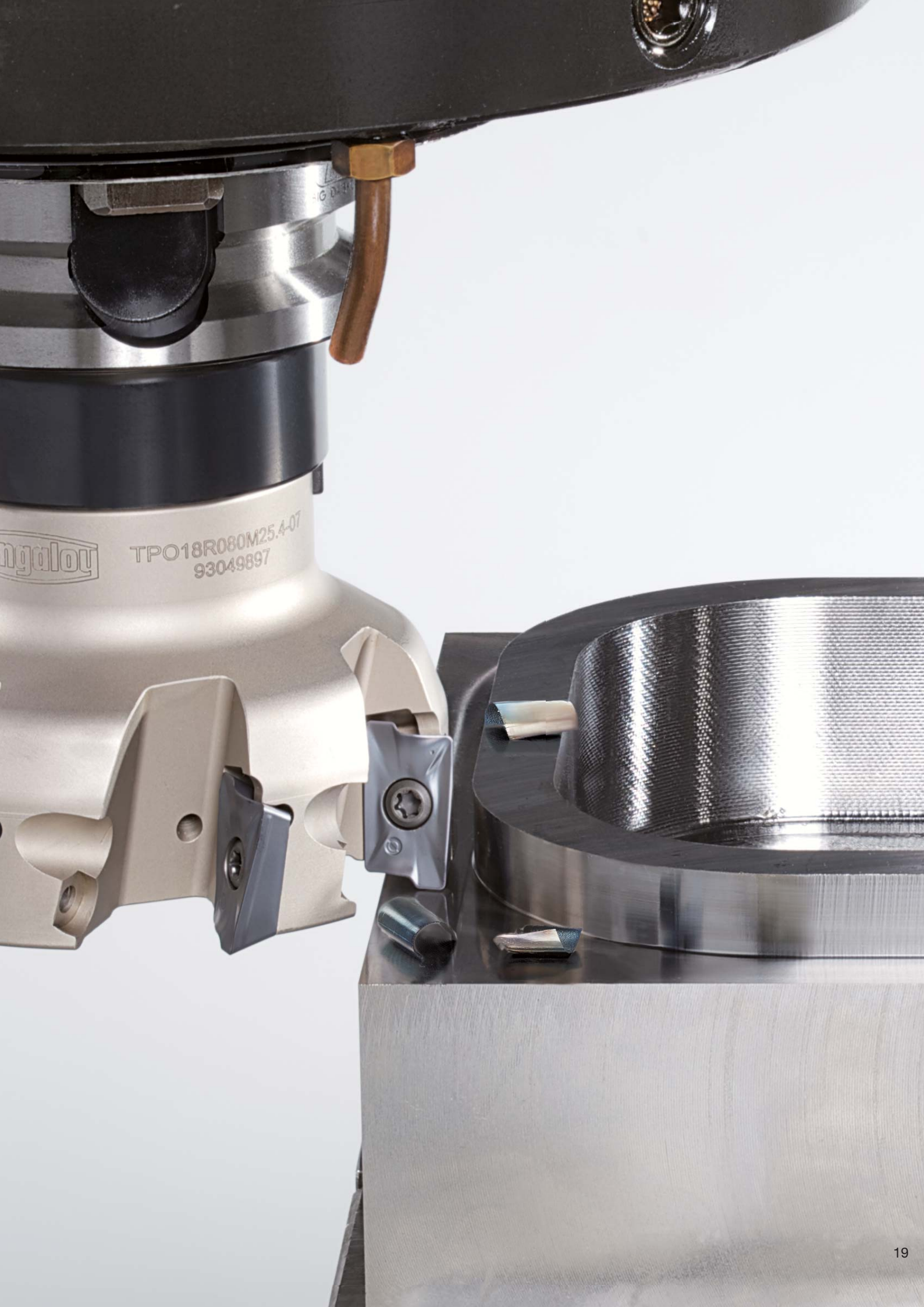
● : Stocked items

● Standard cutting conditions

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

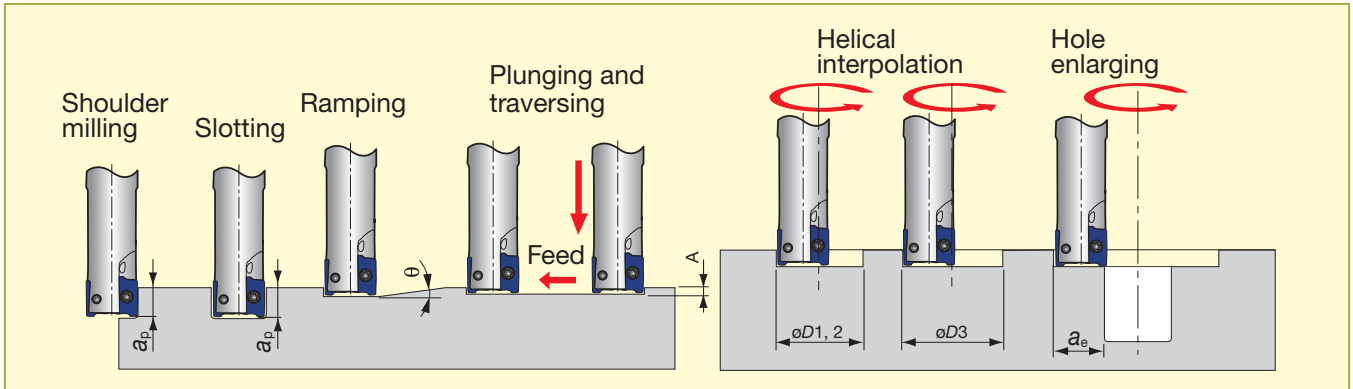
- Cutting conditions are limited by machine power, workpiece rigidity, and spindle output. When the cutting width, depth, or overhang length is large, set Vc and fz to the lower recommended values and check the machine power and vibration.



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● **Machining applications**



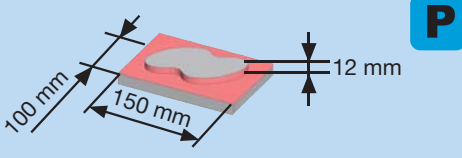
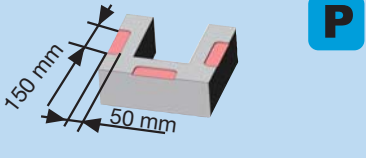
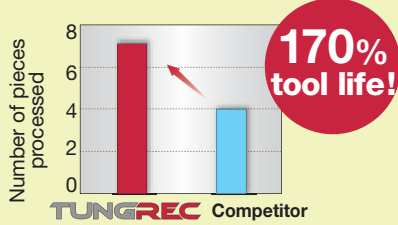
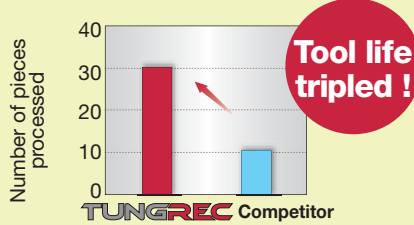
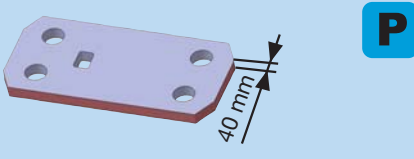
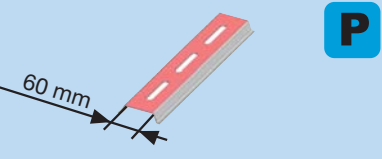


Cat. No.	Tool- ϕ ϕD_c (mm)	Chip-breaker	Max. depth of cut a_p (mm)	Max. ramping angle θ	Max. plunging A (mm)	Min. machining ϕD_1 (mm)	Max. machining ϕD_2 (mm)	*Max. machining ϕD_3 (mm)	Max. cutting width in enlarging a_e (mm)
E/HPO07R012...	$\phi 12$	MJ	7	8	0.5	16	23	20.5	11.5
E/HPO07R016...	$\phi 16$	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 $\varnothing D_c$ (mm)	Chip- breaker	Max. depth of cut a_p (mm)	Max. ramping angle θ	Max. plunging A (mm)	Min. machining $\varnothing D_1$ (mm)	Max. machining $\varnothing D_2$ (mm)	*Max. machining $\varnothing D_3$ (mm)	Max. cutting width in enlarging 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_ϵ 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: a_p (mm)	3.0	5
	Width of cut: a_e (mm)	~ 30	15
	Method of machining	Shoulder milling	Shoulder milling
	Coolant	Dry	Dry
	Machine	Vertical MC, BT40	Vertical MC, BT50
Results		 <p>170% tool life!</p> <p>$V_f = 600 \rightarrow 1000$ mm/min Improves productivity and makes tool life very stable.</p>	 <p>Tool life tripled!</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: a_p (mm)	40	6
	Width of cut: a_e (mm)	5	20
	Method of machining	Shoulder milling	Face milling
	Coolant	Dry	Dry
	Machine	Vertical MC, BT50	Vertical MC, BT50
Results		 <p>130% tool life!</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>125% tool life!</p> <p>Reduces machining noise with low cutting force.</p>



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