



CUTTING TOOLS

Stellram® Cutting Tools



Since its founding in 1938, Kennametal has developed solutions to improve manufacturing performance and profitability — by innovating high performance products and services to reduce operating costs and lead times.

This catalog brings you the latest in the Stellram® brand of indexable milling, solid carbide milling, turning and threading tools — all specifically engineered to enhance overall productivity, even in the most challenging metalworking applications.

Rely on Kennametal to significantly boost manufacturing competitiveness. To learn more, contact your Kennametal Representative or Authorized Kennametal Distributor.

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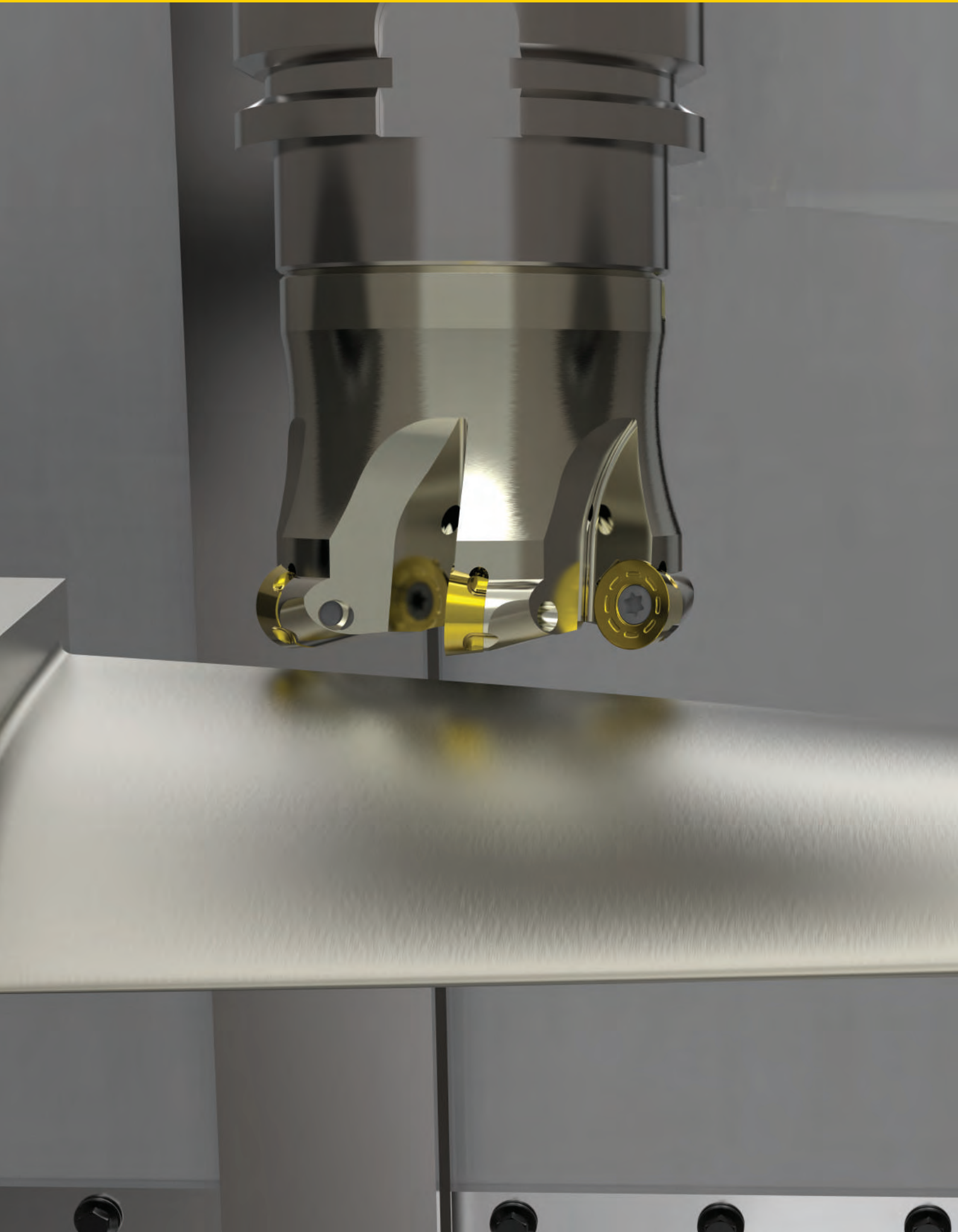
SOLID CARBIDE MILLING

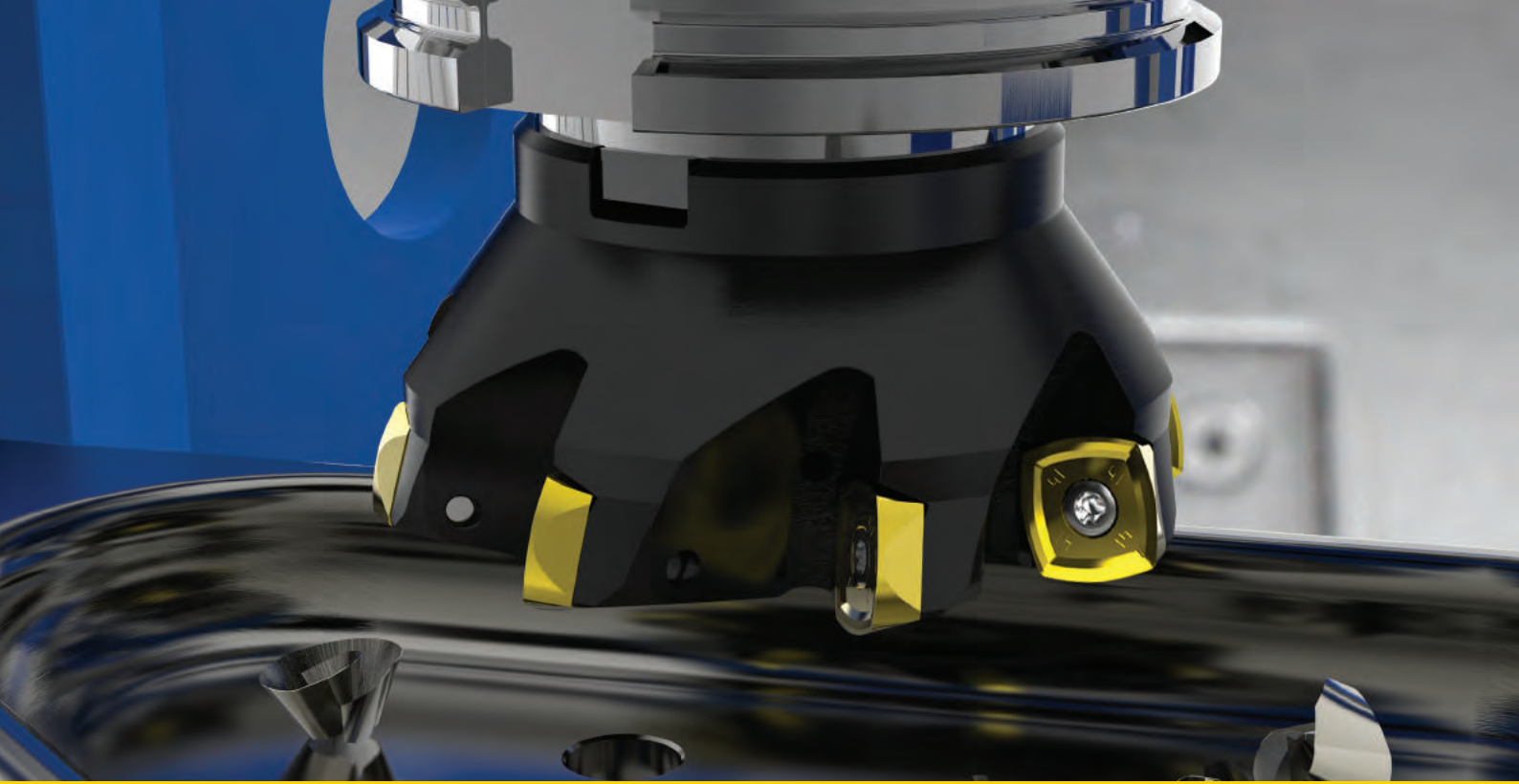
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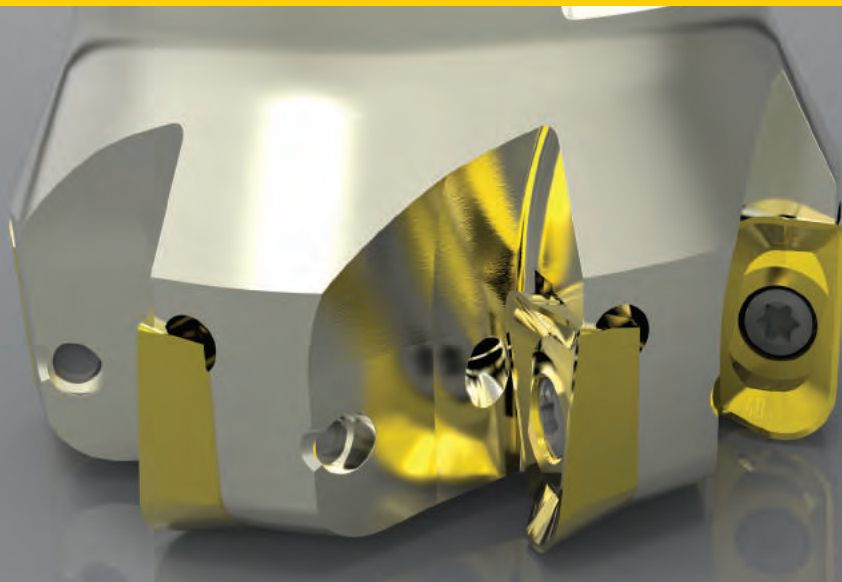
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MILLING

Indexable Milling Solutions



This milling catalogue is your best source for a broad range of advanced indexable and solid carbide machining solutions. These “best in class” milling products include ...

- A complete range of PVD and CVD “First Choice” insert grades featuring the advanced and patented X Grade™ Technology that provides up to 3 times the metal removal rate with no sacrifice in tool life and less risk of tool failure and expensive component damage.
- Geometries that also offer a “First Choice” range from rough to finish machining to meet the increasing demands for greater chip control.
- A comprehensive range of milling products to choose from: facing, slotting, contouring, profiling, ramping, pocketing, helical Interpolation, plunging and chamfering applications.
- A solid carbide end mill program that features XE, XER and RSM technologies specifically designed for machining high performance metals. Their advanced geometric designs featuring deep flutes and robust high helix cutting edges are the result of Stellram’s continuous improvement programme in Aerospace machining.
- Application and customer service support from our sales engineers ready to address your on-site needs and backed by an experienced customer service team.

Rely on Kennametal to achieve “Best in Class” machining solutions for your high performance milling applications.

Please contact us for additional information on any of the products illustrated in this catalogue or any other part of Kennametal’s comprehensive tooling programme.

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Indexable Milling

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6 Step Tool Selection (continued)

- 3 Select the Insert** according to the application and material to be machined.
- 3.1 Application Section**
- Facing, Semi-Finishing and Finishing Or
 - Facing, Slotting and Plunging (7792VX series)

- 3.2 Material to be machined**
- For each insert, a colored symbol will advise you about the performance, as well as the materials which can be machined. The color of the symbol corresponds to the ISO Material designation.

Symbol explanation:

- ◆ 1st choice: Excellent performance
- 2nd choice: Good performance
- 3rd choice: Alternative option

ISO Material designation:

7792VXD09 Milling Inserts & Recommended Feeds

Product	Applications & Material			Dimensions (mm)			
	Facing	Slotting	Plunging	D (mm)	L (mm)	R (mm)	Rmax (mm)
EDP Item Description	0.30 - 2.00	0.30 - 1.50	0.30 - 0.20	9.52	9.52	4.76	0.80 - 0.10
029487 XDLW090408SR-D	◆	◆	◆	9.52	9.52	4.76	0.80 - 0.10
029485 XDLW090408SR-D	◆	◆	◆	9.52	9.52	4.76	0.80 - 0.10
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029595 XDLW090408SR-D	◆	◆	◆	9.52	9.52	4.76	0.80 - 0.10
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029597 XDLW090408SR-D	◆	◆	◆	9.52	9.52	4.76	0.80 - 0.10
029598 XDLW090408SR-D	◆	◆	◆	9.52	9.52	4.76	0.80 - 0.10
029599 XDLW090408SR-D	◆	◆	◆	9.52	9.52	4.76	0.80 - 0.10
029600 XDLW090408SR-D	◆	◆	◆	9.52	9.52	4.76	0.80 - 0.10

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Color Key descriptions found on page A2.

XDLW090408SR-D X500 should be used for Alloyed Steel and Stainless Steel with heavy scale.
XDLT090412SR-D411 is a more positive geometry than the -D411 with a larger radius which increases performance during smaller radial engagements or where chipping may occur when using the -D411 geometry.
XDLT090412SR-D411 uses less power than the -D-411 geometry.

Example:
Material: Alloyed Steel
facing operation
XDLW090408SR-D X400
1st Choice grade / geometry



6 Step Tool Selection (continued)

- 5** Select the recommended **Cutting Speed (vc)** and **Coolant recommendations** according to the material to be machined.

Example:
Speed range for XDLW090408SR-D X400 for Facing in **Alloyed Steel (Rm 950-1200 N/mm² and 280-355 HBN)**
70 – 150 m/min

Material specifications can be found in the Materials Reference Charts pages D1 - D35.

Commercial Name	UNS Number	UK: BS:EN	Sweden: SS	USA: AISI/SAE	Germany: Wnr	Germany: DIN	France: AFNOR	Italy: UNI	Spain: UNF	Japan: JIS
Alloyed Steels										
1.2302		874		1.2302	1.2302	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30200	
1.2304				1.2304	1.2304	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2306				1.2306	1.2306	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2307				1.2307	1.2307	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2308				1.2308	1.2308	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2309				1.2309	1.2309	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2310				1.2310	1.2310	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2311				1.2311	1.2311	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2312				1.2312	1.2312	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2313				1.2313	1.2313	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2314				1.2314	1.2314	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2315				1.2315	1.2315	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2316				1.2316	1.2316	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2317				1.2317	1.2317	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2318				1.2318	1.2318	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2319				1.2319	1.2319	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2320				1.2320	1.2320	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2321				1.2321	1.2321	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2322				1.2322	1.2322	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2323				1.2323	1.2323	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2324				1.2324	1.2324	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2325				1.2325	1.2325	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2326				1.2326	1.2326	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2327				1.2327	1.2327	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2328				1.2328	1.2328	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2329				1.2329	1.2329	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2330				1.2330	1.2330	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2331				1.2331	1.2331	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2332				1.2332	1.2332	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2333				1.2333	1.2333	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2334				1.2334	1.2334	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2335				1.2335	1.2335	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2336				1.2336	1.2336	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2337				1.2337	1.2337	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2338				1.2338	1.2338	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2339				1.2339	1.2339	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2340				1.2340	1.2340	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2341				1.2341	1.2341	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2342				1.2342	1.2342	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2343				1.2343	1.2343	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2344				1.2344	1.2344	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2345				1.2345	1.2345	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2346				1.2346	1.2346	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2347				1.2347	1.2347	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2348				1.2348	1.2348	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2349				1.2349	1.2349	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2350				1.2350	1.2350	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2351				1.2351	1.2351	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2352				1.2352	1.2352	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2353				1.2353	1.2353	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2354				1.2354	1.2354	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2355				1.2355	1.2355	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2356				1.2356	1.2356	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2357				1.2357	1.2357	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2358				1.2358	1.2358	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2359				1.2359	1.2359	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2360				1.2360	1.2360	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2361				1.2361	1.2361	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2362				1.2362	1.2362	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2363				1.2363	1.2363	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2364				1.2364	1.2364	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2365				1.2365	1.2365	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2366				1.2366	1.2366	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2367				1.2367	1.2367	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2368				1.2368	1.2368	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2369				1.2369	1.2369	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2370				1.2370	1.2370	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2371				1.2371	1.2371	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2372				1.2372	1.2372	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2373				1.2373	1.2373	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2374				1.2374	1.2374	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2375				1.2375	1.2375	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2376				1.2376	1.2376	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2377				1.2377	1.2377	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2378				1.2378	1.2378	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2379				1.2379	1.2379	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2380				1.2380	1.2380	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2381				1.2381	1.2381	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2382				1.2382	1.2382	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2383				1.2383	1.2383	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2384				1.2384	1.2384	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2385				1.2385	1.2385	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2386				1.2386	1.2386	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2387				1.2387	1.2387	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2388				1.2388	1.2388	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2389				1.2389	1.2389	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2390				1.2390	1.2390	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2391				1.2391	1.2391	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2392				1.2392	1.2392	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2393				1.2393	1.2393	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2394				1.2394	1.2394	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2395				1.2395	1.2395	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2396				1.2396	1.2396	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2397				1.2397	1.2397	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2398				1.2398	1.2398	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2399				1.2399	1.2399	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	
1.2400				1.2400	1.2400	X20CrNi18-9	X20CrNi18-9	X20CrNi18-9	S30400	

- 6** **Technical information** can be found at the end of each selected family which contains calculation formulas, mounting instructions, etc...



Speed v_c (m/min)		Wear Resistance									
7792VX Series		Speed min - max									
Coolant Recommendation		Coolant Recommendation									
Recommended		Possible									
ISO	Materials	Rm and Hardness	X400	X500	SP619	GH2	SC625	SC3025	SC3025	SC3025	SC3025
P	Unalloy										



<u>Unalloyed Steels</u>		P
<u>Alloyed Steels</u>		
<u>Stainless Steels</u>		M
<u>PH Stainless</u>		
<u>Cast Irons</u>		K
<u>Aluminium & Alloys</u>		N
<u>High Temperature Alloys</u>		S
<u>Hard Materials (42-45 HRC)</u>		H

Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



Milling Introduction

Application

Facing	Shoulder / Profiling / Slotting	Ramping	Pocketing	Helical Interpolation	Helical Interpolation with Bore Hole	Copy / 3D	Spiral / Circular	Trochoidal	Shoulder / Profiling	T-Slotting	Contour Milling	Slotting Shoulder	Chamfering	Plunging
									•					
	•													
	•													
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						•					•			
•	•	•	•	•	•	•	•							

Tool Definition

	Family Range				Dimensions (mm)		Body Fixation					
	Series	Insert Shape and Size	Angle	Page	ap max	Diameter Range	Modular Heads	Weldon	Cylindrical	Shell Mills	Caterpillar Vee Flange	DIN 69871 Fixation Taper 50
	5210VS	SC..09T3 SO..12M6 SO..15M6	Long Edge Cutter (Porcupine) 90°	A165 - A170	57 68 - 77	32 80 - 100		●		●		
	5230VS	SD..09T3 SD..1204	Chevron Long Edge Cutter (Porcupine) 90°	A171 - A182	51 80 57 - 133	50 63 - 100				●		
	5315VA	AD..12T3 AP..1604	Long Edge Cutter (Porcupine) 90°	A183 - A194	23 - 45 31 - 61	25 - 40 50 - 80		●		●		●
	5400VM	MP..0402 MP..0602 MP..0803 MP..1104	T-Slotting	A271 - A277	8 - 9 11 14 18	18 - 21 25 32 40		●				
	5500V	RG.S 08, 10, 12 16, 20, 25	Finishing Ball Nose	A201 - A206	0,4 - 12,1	8 - 25	●		●			
	5505VX	XP..1603, XP..20T3, XP..2504, XP..3206, XP..40T7, XP..50T7	Ball Nose	A195 - A200	16 - 50	16 - 50	●	●	●			
	5702VZ	ZD..1403	Profiling Pocketing Shoulder 90°	A247 - A256	12	20			●			








Milling Introduction

Application

Facing	Shoulder / Profiling / Slotting	Ramping	Pocketing	Helical Interpolation	Helical Interpolation with Bore Hole	Copy / 3D	Spiral / Circular	Trochoidal	Shoulder / Profiling	T-Slotting	Contour Milling	Slotting Shoulder	Chamfering	Plunging
•	•	•	•	•	•	•	•							
												•		
•	•	•	•	•	•		•	•						
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•		•	•	•	•	•	•				•			
•		•	•	•	•	•	•							
•		•	•	•	•	•	•							

Tool Definition

	Family Range				Dimensions (mm)		Body Fixation					
	Series	Insert Shape and Size	Angle	Page	ap max	Diameter Range	Modular Heads	Weldon	Cylindrical	Shell Mills	Caterpillar Vee Flange	DIN 69871 Fixation Taper 50
	5720VZ	ZD..16M5	Profiling Pocketing Shoulder 90°	A247 - A256	16	25 - 80	●		●	●		
	7220VM	MP..0402 MP..0602 MP..0803 MP..1104	Slotting Shoulder	A279 - A288	6 - 8 8 - 10 10 - 14 14 - 20	63 - 80 100 - 125 125 - 160 125 - 160				●		
	7690VA 7690VAP	AD..0903 AD..12T3 AP..1604	Facing Shoulder 90°	A45 - A62	8 11 16	10 - 63 20 - 80 25 - 125	●	●	●	●		
	7700VR	RP..0602 RP..0803 RP..10T3	Copy Contour	A207 - A216	3 4 5	14 - 20 16 - 32 20 - 32	●	●	●			
	7702VRD 7712VRD	RD..0702 RD..1003 RD..12T3 RD..1604	Copy Contour	A217 - A230	3, 5 5 6 8	15 - 20 20 - 35 25 - 80 32 - 100	●	●		●		
	7710VRD20	RD..2006	Copy Contour	A231 - A236	10	63 - 160				●		
	7713VR	RP..10T3 RP..1204	Copy Contour	A237 - A246	5 6	20 - 63 25 - 80	●		●	●		



Milling Introduction

Application

Facing	Shoulder / Profiling / Slotting	Ramping	Pocketing	Helical Interpolation	Helical Interpolation with Bore Hole	Copy / 3D	Spiral / Circular	Trochoidal	Shoulder / Profiling	T-Slotting	Contour Milling	Slotting Shoulder	Chamfering	Plunging
•	•	•	•	•	•	•	•						•	
•													•	
•		•					•						•	
													•	
														•
•		•	•	•	•	•	•					•		•

Tool Definition

	Family Range				Dimensions (mm)		Body Fixation					
	Series	Insert Shape and Size	Angle	Page	ap max	Diameter Range	Modular Heads	Weldon	Cylindrical	Shell Mills	Caterpillar Vee Flange	DIN 69871 Fixation Taper 50
	7745VOD	OD..0404 OD..0605	Facing 42°	A77 - A86	3,5 4,5	25 - 160 50 - 160		●		●		
	7745VS	SC..09T3 SC..12M5	Facing Chamfering 45°	A87 - A94	5 7	16 - 25 40 - 125		●		●		
	7745VSE	SD..09T3 SD..1204	Facing 45°	A95 - A105	5 7	16 - 125 50 - 125		●		●		
	7745VT 7760VT	TP..1102 TC..16T3 TC..16T3	 Chamfering 45° / 60°	 A265 - A270	 7,70 6,10 - 11,30 9,50	 16 20 - 30 16 - 25		 ●				
	7791VS	SC..09T3 SC..12M5	Plunging	A257 - A264	a _e = 8 a _e = 11	25 - 50 63 - 80	●			●		
	7792VXP 7792VXD 7792VXE	XP..0603 XD..0904 XD..1205 XE..1605	 High Feed	 A63 - A75	 1,50 2,50 3,50	 16 - 32 25 - 50 32 - 160 63 - 160	●	●	●	●		
	Tungsten Cylindrical Shank Extensions	-	-	A76	-	16 - 32			●			











Milling Introduction

Application

Facing	Shoulder / Profiling / Slotting	Ramping	Pocketing	Helical Interpolation	Helical Interpolation with Bore Hole	Copy / 3D	Spiral / Circular	Trochoidal	Shoulder / Profiling	T-Slotting	Contour Milling	Slotting Shoulder	Chamfering	Plunging
•	•													
•		•	•	•	•		•					•		
•	•	•	•	•	•		•						•	
•														
•							•							
•		•	•	•	•									
•		•	•	•	•									

Tool Definition

	Family Range				Dimensions (mm)		Body Fixation					
	Series	Insert Shape and Size	Angle	Page	ap max	Diameter Range	Modular Heads	Weldon	Cylindrical	Shell Mills	Caterpillar Vee Flange	DIN 69871 Fixation Taper 50
	8000V-8010V Bodies	-	Facing	A107 - A110	-	100 - 400				●		
	80.0VA90-R-16 Assembly	AP..1604	Facing 90°	A111 - A116	16	106 - 406				●		
	80.0VXD92-R-12 Assembly 80.0VXD92-R-16 Assembly	XD..1205 XE..1605	High Feed Facing	A117 - A124	2,5 3,5	106 - 256				●		
	80.0VOD45-R-04 Assembly 80.0VOD45-R-06 Assembly	OD..0404 OD..0605	Facing	A125 - A134	3,5 4,5	100 - 400				●		
	80.0VS45-R-12 Assembly	SC..12M5	Facing	A135 - A140	7	100 - 400				●		
	80.0VSE45-R-12 Assembly	SD..1204	Facing	A141 - A148	7	100 - 400				●		
	80.0VR00-R-16 Assembly	RP..1606	Facing	A149 - A154	8	116 - 416				●		
	80.0VRD00-R-20 Assembly	RD..2006	Facing	A155 - A159	10	116 - 416				●		



Grade descriptions are listed by toughness to most wear resistant.

SP5419

Coating Type: PVD, TiAlN

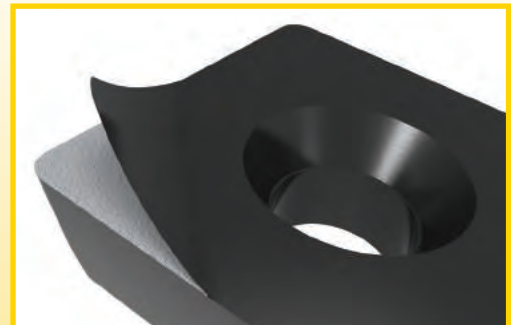
The combination of a tough substrate with a new generation of TiAlN super nano coating, makes this new PVD grade virtually free of residual stress and extremely hard for unmatched performance. Used in Steel and Steel Alloys.



X400

Coating Type: PVD, TiAlN, X-Grade™ Technology

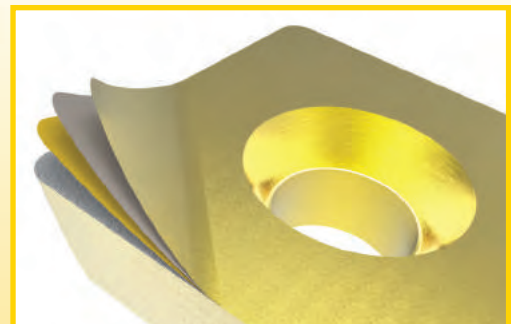
A patented high performance premium carbide grade with a high level of toughness and high wear resistant, thin layer PVD coating. For use in demanding conditions of high metal removal rates or interrupted cuts. This specifically designed grade allows high levels of cutting pressure and offers increased security of the cutting edge. For use on Steel and Steel Alloys, Tool Steels and Hardened Steel (415 - 480 HBN).



X500

Coating Type: CVD, TiN-TiC-TiN, X-Grade™ Technology

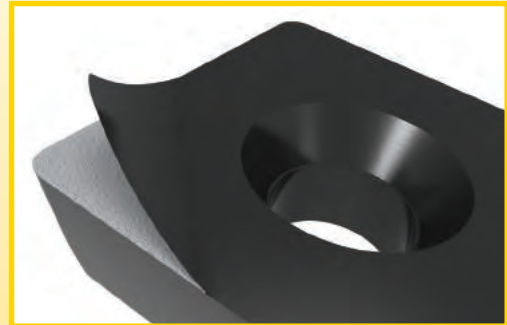
This high performance premium grade with a high level of shock resistance. This unique grade operates at the low to medium cutting speeds and is capable of high metal removal rates, while retaining a secure cutting edge. First choice for Stainless Steel and High Temperature Alloys as well as other materials where conditions are unstable.





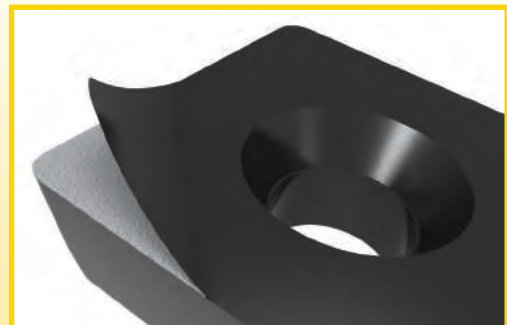
X700

Coating Type: PVD, TiAlN, X-Grade™ Technology
This patented high performance premium carbide grade is the latest in the X-Grade™ Technology programme of coated milling inserts. It is designed for the toughest of applications in Nickel Based Alloys, Cobalt Based Alloys, Titanium and Titanium Alloys, as well as Stainless Steels. It is a combination of a highly durable TiAlN PVD coating and specially developed carbide substrate that gives an excellent tool life during long contact times of the cutting edge.



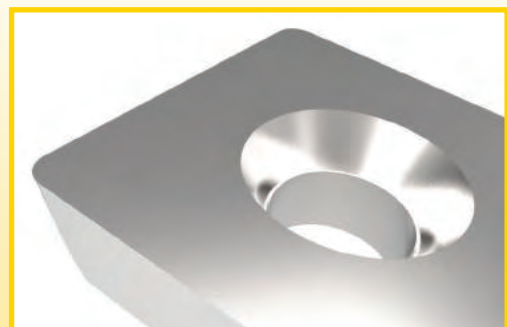
SP6519

Coating Type: PVD, TiAlN
The combination of a tough substrate with a new generation of TiAlN super nano coating, makes this new PVD coating virtually free of residual stress and extremely hard for unmatched performance. Primarily used in Stainless Steel, High Temperature Alloys & Titanium with stable conditions. Also can be used in Steel, Steel Alloys and Cast Irons.



GH2

Uncoated, Micrograin
Micrograin grade designed for use on Cast Irons, Bronzes, Aluminiums, Kevlar, etc. This grade is tough and able to handle high pressure, vibration and shock.

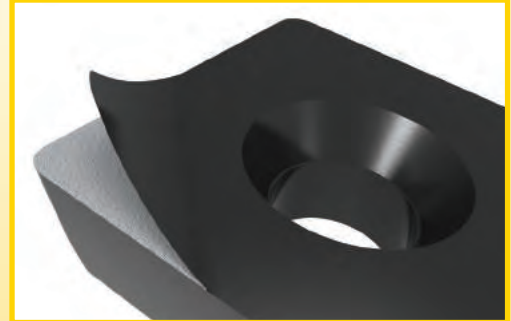




SP4019

Coating Type - PVD TiAlN Micrograin

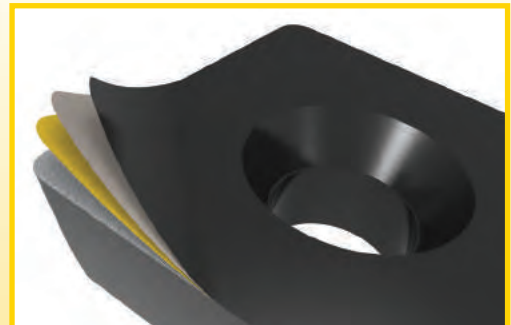
A hard grade for light roughing and finishing operations with lower chip sections. Principle applications are in Stainless Steels, High Temperature Alloys and Cast Irons. Can also be used in Steel, Steel Alloys and Hardened Steels.



MP91M

Coating Type: CVD, TiN-MT-TiCN-Al₂O₃

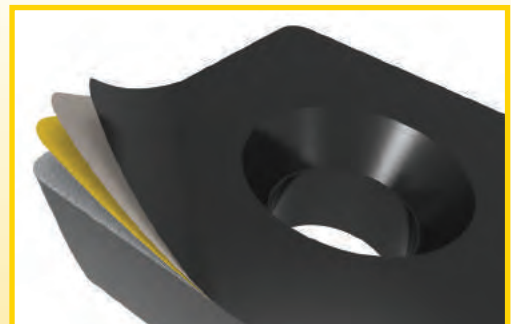
Primarily used on Steel, Steel Alloys and Cast Iron. Can also be used in Hardened Steels. With its aluminium oxide coating, this grade is recommended every time wear characteristics are more important than toughness.



SC6525

Coating Type: CVD, TiN-TiCN-Al₂O₃

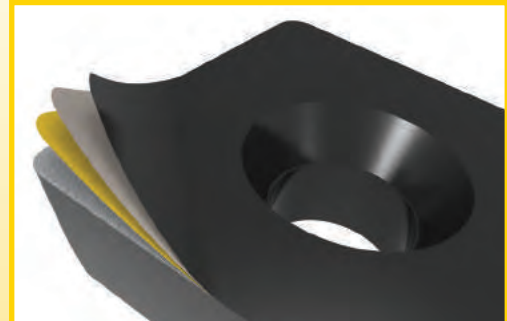
SC6525 has a unique substrate/coating combination, designed specifically for high performance machining of Steel, Steel Alloys and Cast Irons at elevated surface speeds and feeds.





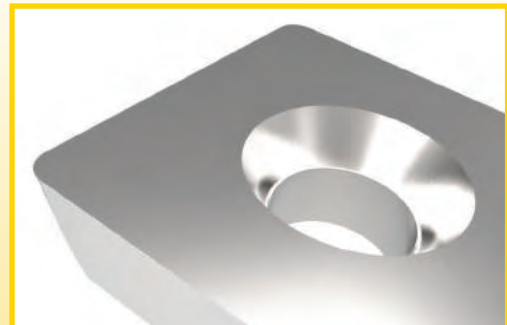
SC3025

Coating Type: CVD, TiN - TiCN - Al₂O₃
A high performance milling grade with multi-layer CVD coating designed to offer wear and abrasion resistance in Cast Iron materials.



GH1

Uncoated, Micrograin
This micrograin grade is designed for use on Cast Irons, and also Bronzes, Aluminiums, Kevlar, etc. The grade GH1 works well with or without coolant with low cutting pressure at high speeds due to sharp cutting edge.



SP1019

Coating Type: PVD, TiAlN, Micrograin
Micrograin carbide substrate with a new generation of TiAlN super nano coating, makes this PVD grade virtually free of residual stress and extremely hard for unmatched performance. Ideal for ball nose cutters at higher surface speeds, or for greater wear resistance. Used in finish machining all Alloys.

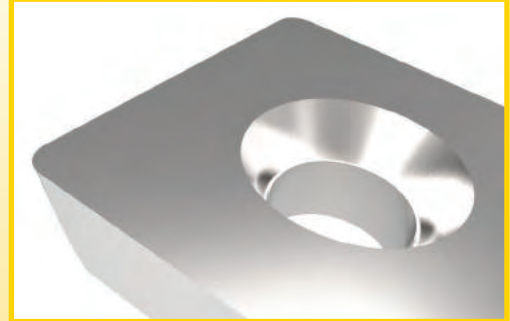




SA9808

Uncoated Cermet (TiCN)

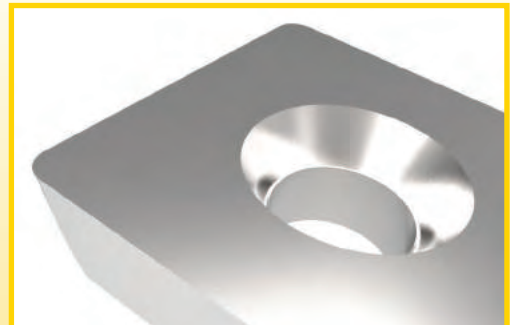
Uncoated Cermet for applications with limited interruptions. Excellent thermal conductivity and wear resistance, providing an excellent surface finish. For finish face milling of Steel, Steel Alloys, Stainless Steels and Cast Irons.



SA9608

Uncoated, Cermet (TiCN)

Uncoated Cermet for finishing applications. Excellent thermal conductivity and wear resistance, providing an excellent surface finish. For finish face milling of Steel, Steel Alloys, Stainless Steel, Cast Irons and High Temperature Alloys with wiper insert SPHX12M512EN.





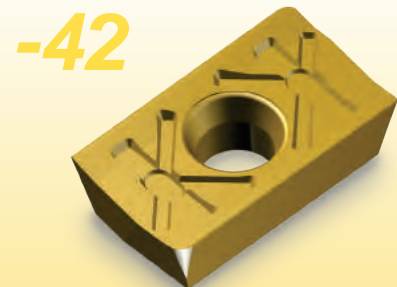
-41

Is a general purpose geometry applied to utility ground inserts. This economical geometry is available with a number of insert styles for use in all approach angles. This geometry has positive cutting action and reinforced cutting edge for roughing applications in Steel, Steel Alloys, Stainless Steel and Cast Iron.



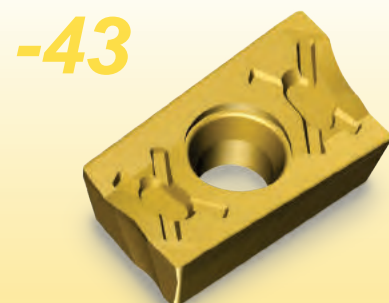
-42

Is a general purpose geometry. The positive rake and T-land combine to create a strong cutting edge. The -42 geometry withstands high cutting forces and interrupted cuts. This geometry can be used for roughing and semi-finishing in Steel, Steel Alloys, Titanium, High Temperature Alloys and Stainless Steel with excellent results.



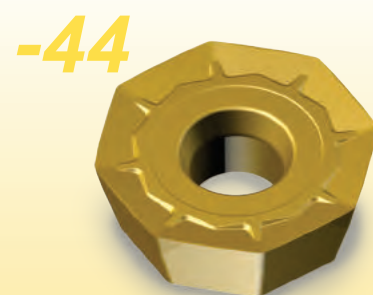
-43

This is a general purpose geometry designed to handle tough conditions and interrupted cuts with larger axial depth of cuts. It is applied to utility ground inserts with ground wiper edges for closer axial runout tolerance. This geometry is primarily used in Steel, Steel Alloys, Stainless Steels and Cast Irons.



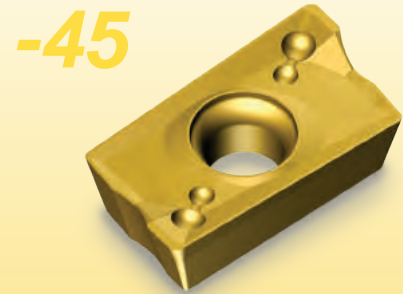
-44

This geometry is peripheral ground with a ground facet for producing the best surface quality in most materials while reducing cutting pressure and power consumption. For finishing applications in Steel, Steel Alloys, Stainless Steels, High Temperature Alloys and Cast Iron.

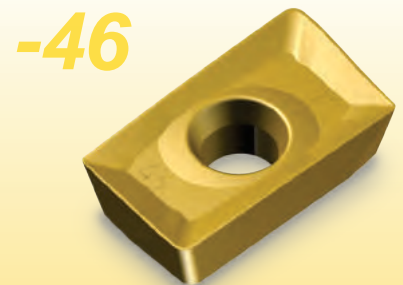


**-45**

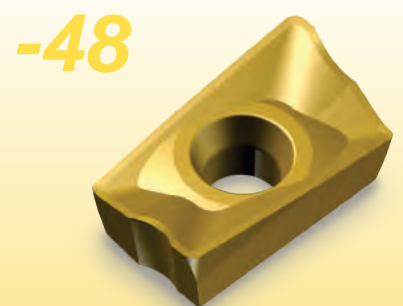
This geometry is designed for machining a wide range of materials and applications. It is available on utility ground inserts with ground wiper edges. The -45 geometry provides freer cutting operations and reduces the "suction effect" associated with higher helical geometries. This geometry is qualified for Steel, Steel Alloys, Stainless Steels, and Cast Iron.

**-46**

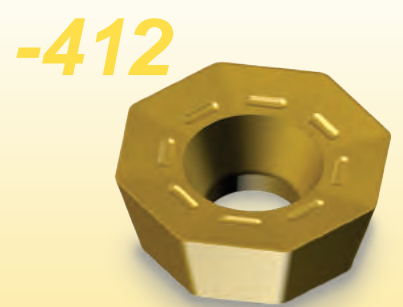
This positive geometry with high accuracy periphery grinding gives a positive cutting action. The precise treatment of the cutting edge ensures effective machining in roughing, semi-finishing and finishing applications, all materials.

**-48**

The geometry design of this insert provides a smooth cutting action with excellent chip control. Once positioned in the cutter body the combined effective cutting geometry produces lower radial forces, specifically in the direction of the feed, leading to a more stable cutting environment. For machining in Steel, Stainless Steel, Titanium and High Temperature Alloys.

**-412**

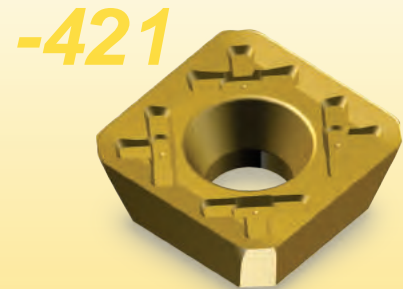
This high positive geometry is slightly more positive than the -41. This geometry improves tool life on several applications when machining Stainless Steel and High Temperature Alloys.





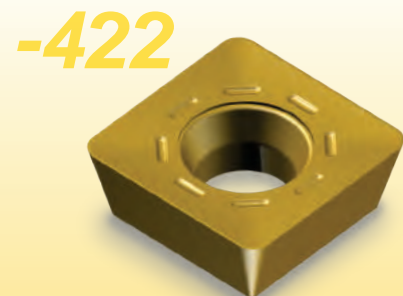
-421

This high positive geometry with high accuracy periphery grinding. For use in semi-finishing and finishing applications. Due to the precise control of the cutting edge, this geometry provides excellent results when machining High Temperature Alloys.



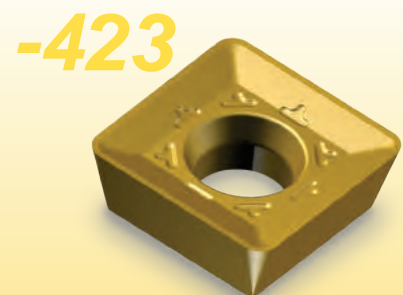
-422

This positive geometry with a 11° chip angle and an “E” edge preparation for roughing and semi finishing applications. Primarily for machining of Stainless Steels and High Temperature Alloys. Also can be used in Steel, Steel Alloys and Cast Irons with very good results.



-423

A strong positive geometry first with a smaller primary angle and a small controlled hone to reduce cutting pressures, followed by a higher secondary angle to allow free cutting of the chip without rubbing on the insert rake face. Chip flow compresses the chip for easy evacuation. For roughing and semi-finishing of Nickel Based Alloys, Cobalt Alloys, Stainless Steels, Titanium Alloys and High Temperature Alloys.



-441

This geometry is a peripheral ground insert with a sharp cutting edge for use on Aluminium Alloys, Copper and Brass. The -441 geometry provides freer cutting operations and reduces the “suction effect” associated with higher helical geometries.

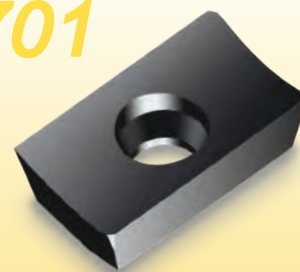


**-442**

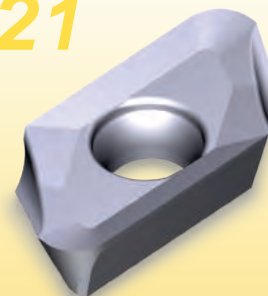
This NEW positive geometry minimizes the pressure from the chip formation. Utilising an 11° chip angle and an “E” edge preparation for roughing and semi finishing applications in Stainless Steel and High Temperature Alloys. This -442 geometry can also be used in machining Steel, Steel Alloys, and Cast Irons with very good results.

-442**-701**

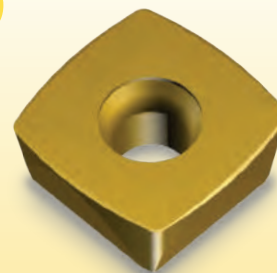
This extreme high positive geometry is highly suitable for finishing a wide range of materials at low feedrates. This geometry provides a freer cutting action particularly in Aluminium. Titanium and High Temperature Alloys can also be finished machined when the -701 geometry is combined with grade SP4019 or SP6519. This geometry is precision ground and gives excellent performance when machining thin-walled components.

-701**-721**

This geometry is periphery ground with a pressed, polished top rake face reducing built up edge. This economical geometry gives excellent results in machining Aluminium Alloys, Copper and Brass.

-721**-D**

This High Feed geometry fully ground with flat top and variable hone has been designed to machine Steel, Steel Alloys, Tool Steel, Cast Irons and Hardened Materials up to 534HBN.

-D



-D41

This positive High Feed geometry primarily used to machine Stainless Steel, High Temperature Alloys and Titanium. It can also be used for machining Steel, Steel Alloys and Cast Iron with excellent results. The -D41 geometry also reduces power consumption .

-D41



-D411

This positive High Feed geometry with larger corner radius 1,2mm reduces cutting energy and provides better edge protection during lower radial engagement applications. Mainly for machining Titanium, High Temperature Alloys and Stainless Steel. It can also be used for machining Steel, Steel Alloys and Cast Irons with extremely good results.

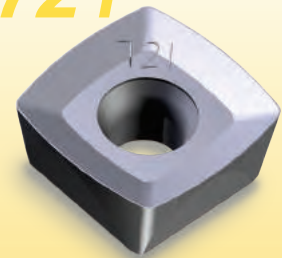
-D411



-D721

This highly positive High Feed geometry is designed for machining Aluminium, Copper and Brass. The periphery ground, polished top rake face and sharp edge allows a freer cutting action and reduces built-up edge.

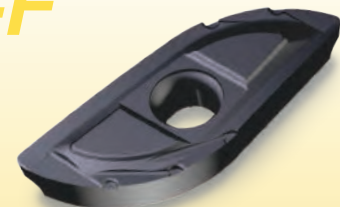
-D721



-F

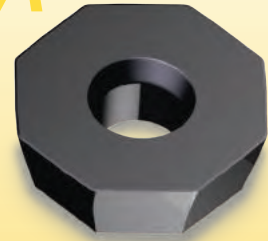
This geometry is a roughing ball nose fully ground insert for roughing and semi-finishing of all Materials except Aluminium. This geometry is designed with chip grooves for better chip control.

-F

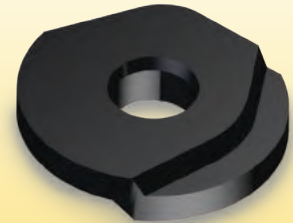


**-RA**

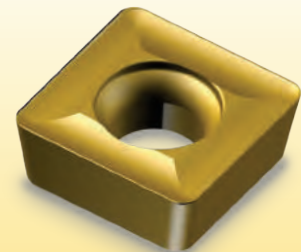
This geometry is a precision insert for milling Cast Iron. The extended wiper-facet on this insert geometry allows a 50% higher feed rate for higher productivity. This geometry is available with SC3025, our leading Cast Iron milling grade.

-RA**-RG..S**

This geometry is designed for finish machining of 3D profiles. It is extremely accurate and delivers a very long tool life. The RG..S is excellent when machining a side wall that is close to 90°. Suitable for machining of all materials.

-RG..S**-T**

This geometry is for general purpose applications when a strong cutting and excellent chip breaking capability is required. This geometry is found on a wide range of Stellram inserts. The design is nearly as tough as flat-top inserts. Mainly to be used when machining Steel, Steel Alloys, Cast Irons and Hardened Steels.

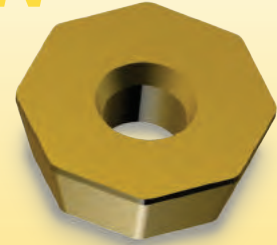
-T



-TN

This geometry is a flat top design with a strong T-land edge preparation for preventing chipping in unstable conditions. This geometry is similar to the -SN geometry, but has a smaller edge preparation which reduces machine power consumption. For machining Steel, Steel Alloys and Cast Iron. Should also be used to machine Stainless Steel and Titanium with heavy scale.

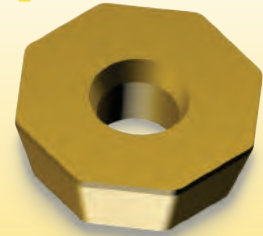
-TN



-SN

This geometry is our strongest cutting edge for general purpose applications and is ideal for unstable cutting conditions, long overhangs and very high feedrates. For heavy duty applications when machining Steel, Steel Alloys and Cast Iron. Ideal solution for heavy scale applications.

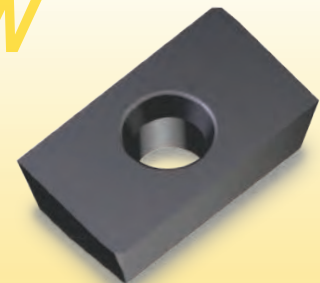
-SN



-W

This geometry is offered in a number of flat-top inserts for numerous milling applications in a wide range of materials. The flat-top inserts are the best choice when toughness is required for all milling applications. This geometry offers a stronger cutting edge than a chip-groove insert.

-W



A

1

P

2

F

3

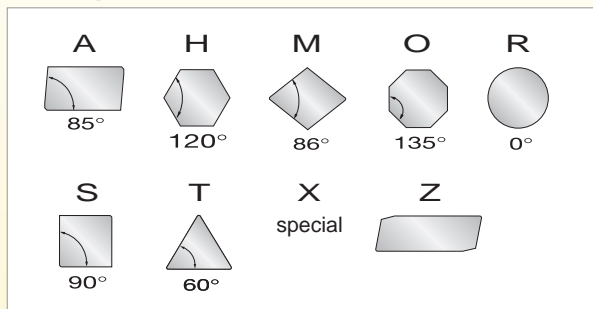
W

4

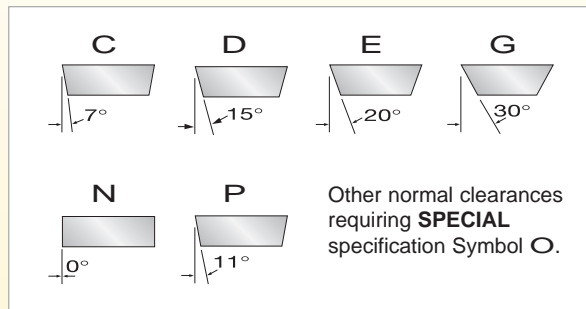
16

5

1 Shape



2 Clearance

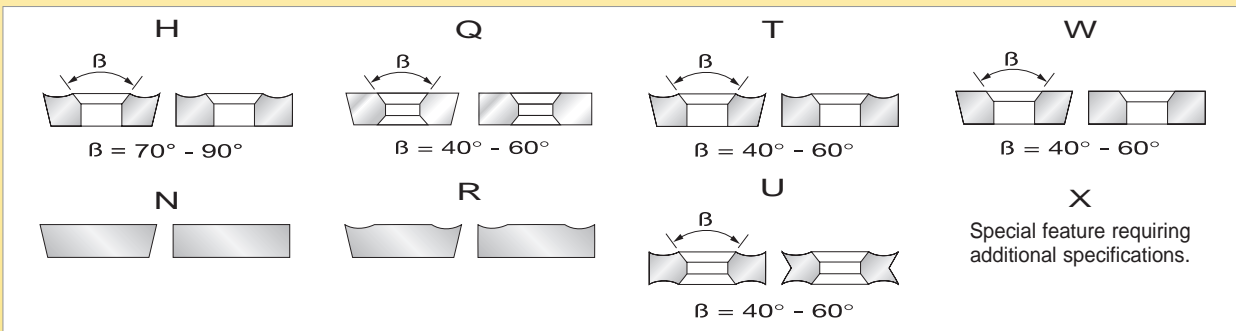


3 Tolerance

	Class	D	M	S	
	A ⁽¹⁾	mm	±0,025	±0,005	
	C ⁽¹⁾	mm	±0,025	±0,013	
	E ⁽¹⁾	mm	±0,025	±0,025	
	F ⁽¹⁾	mm	±0,013	±0,005	
	G	mm	±0,025	±0,025	
	H ⁽¹⁾	mm	±0,013	±0,013	
	J ⁽¹⁾	mm	from ±0,050 to ±0,150	±0,005	
	K ⁽¹⁾	mm	from ±0,050 to ±0,150	±0,013	
	L ⁽¹⁾	mm	from ±0,050 to ±0,150	±0,025	
	M	mm	from ±0,050 to ±0,150	from ±0,080 to ±0,200	±0,13
	N	mm	from ±0,050 to ±0,150	from ±0,080 to ±0,200	±0,025
	U	mm	from ±0,080 to ±0,250	from ±0,130 to ±0,380	±0,13

(1) Indexable inserts with ground wiper edges. (2) Dependent upon the insert size (see ISO 1832 standard)

4 Type



04
6

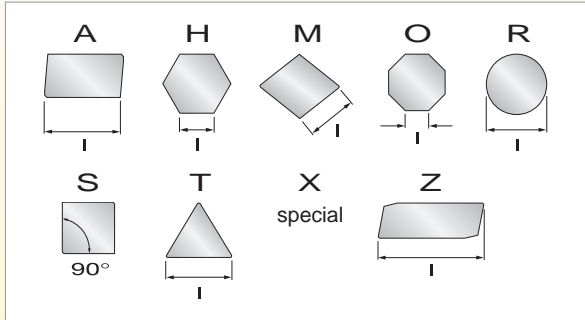
PD
7

T
8

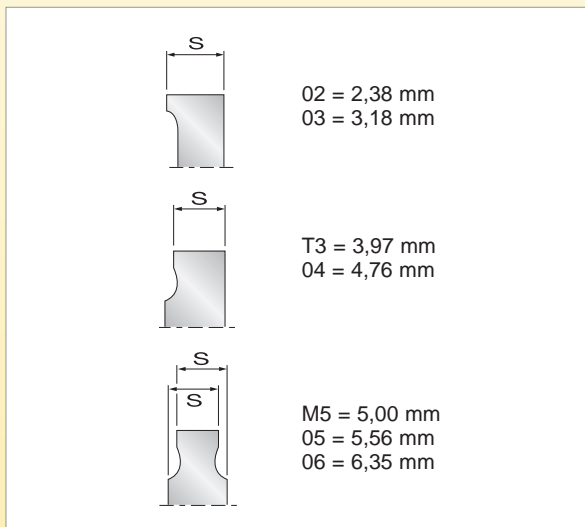
R
9

-
10

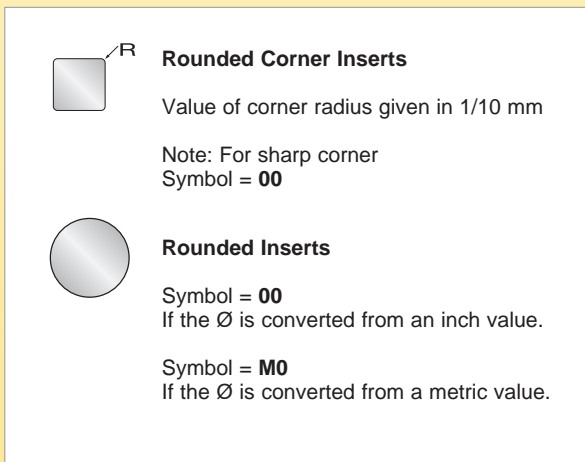
5 Size



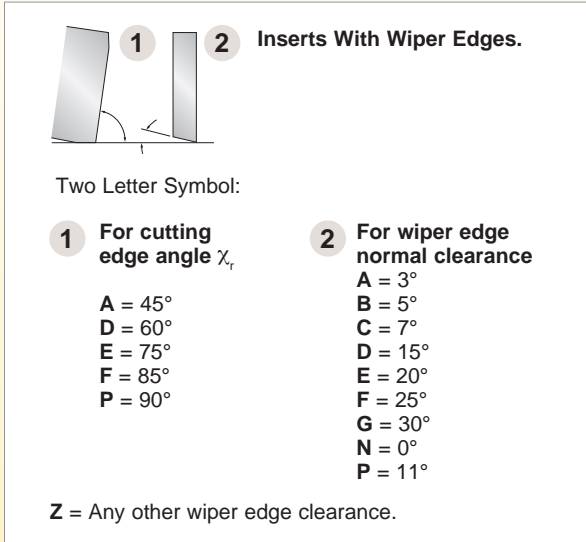
6 Thickness



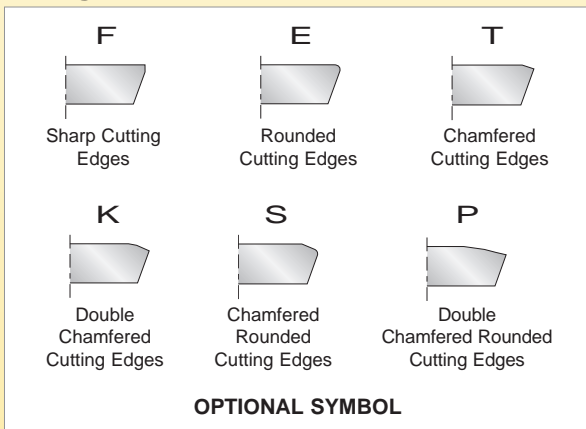
7 Corner



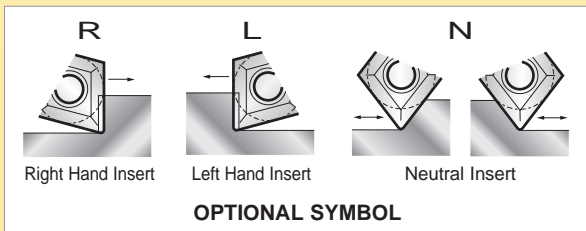
7 Corner continued



8 Edge Condition



9 Cutting Direction

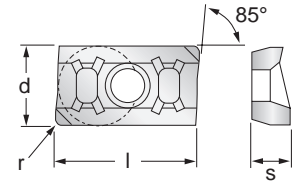


10 Optional

Manufacturers optional symbol consisting of numbers or letters; shall be separated from the standardized designation by a dash (-).
OPTIONAL SYMBOL



Milling Introduction



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	h _m min
031075	ADET090308SR-42	SP6519	6,35	9,20	3,18	0,80	0,10
031076	ADET090308SR-42	X500	6,35	9,20	3,18	0,80	0,10
031094	ADET090310SR-42	SP6519	6,35	9,20	3,18	1,00	0,10
024913	ADET090310SR-42	X500	6,35	9,20	3,18	1,00	0,10
031096	ADET090312SR-42	SP6519	6,35	9,20	3,18	1,20	0,10
031095	ADET090312SR-42	X500	6,35	9,20	3,18	1,20	0,10
030980	ADET090316SR-42	SP6519	6,35	9,20	3,18	1,60	0,10
030942	ADET090316SR-42	X500	6,35	9,20	3,18	1,60	0,10
031098	ADET090320SR-42	SP6519	6,35	9,20	3,18	2,00	0,10
031097	ADET090320SR-42	X500	6,35	9,20	3,18	2,00	0,10
031100	ADET090324SR-42	SP6519	6,35	9,20	3,18	2,40	0,10
031099	ADET090324SR-42	X500	6,35	9,20	3,18	2,40	0,10
031102	ADET090330SR-42	SP6519	6,35	9,20	3,18	3,00	0,10
031101	ADET090330SR-42	X500	6,35	9,20	3,18	3,00	0,10
031104	ADET090332SR-42	SP6519	6,35	9,20	3,18	3,20	0,10
031103	ADET090332SR-42	X500	6,35	9,20	3,18	3,20	0,10
031093	ADET0903PDSR-42	SP6519	6,35	9,20	3,18	Facet	0,10
031092	ADET0903PDSR-42	X500	6,35	9,20	3,18	Facet	0,10



ADET_-42

Ground circumference X 90° one face pressed chip-breaker

030857	ADET12T308ER-48	SP6519	7,87	12,70	3,76	0,80	0,04
030856	ADET12T308ER-48	X500	7,87	12,70	3,76	0,80	0,04
030800	ADET12T312ER-48	SP6519	7,87	12,70	3,76	1,20	0,04
030808	ADET12T312ER-48	X500	7,87	12,70	3,76	1,20	0,04
030771	ADET12T316ER-48	SP6519	7,87	12,70	3,76	1,60	0,04
030809	ADET12T316ER-48	X500	7,87	12,70	3,76	1,60	0,04
030909	ADET12T320ER-48	SP6519	7,87	12,70	3,76	2,00	0,04
030908	ADET12T320ER-48	X500	7,87	12,70	3,76	2,00	0,04
030859	ADET12T324ER-48	SP6519	7,87	12,70	3,76	2,40	0,04
030858	ADET12T324ER-48	X500	7,87	12,70	3,76	2,40	0,04
030911	ADET12T330ER-48	SP6519	7,87	12,70	3,76	3,00	0,04
030910	ADET12T330ER-48	X500	7,87	12,70	3,76	3,00	0,04
030772	ADET12T332ER-48	SP6519	7,87	12,70	3,76	3,20	0,04
030810	ADET12T332ER-48	X500	7,87	12,70	3,76	3,20	0,04
030913	ADET12T340ER-48	SP6519	7,87	12,70	3,76	4,00	0,04
030912	ADET12T340ER-48	X500	7,87	12,70	3,76	4,00	0,04
030770	ADET12T3PDER-48	SP6519	7,87	12,70	3,76	Facet	0,04
030807	ADET12T3PDER-48	X500	7,87	12,70	3,76	Facet	0,04



ADET_-48

Ground circumference X 90° one face pressed chip-breaker

024916	ADET0903PDFR-441	GH1	6,35	9,20	3,18	Facet	0,03
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ADET_-441

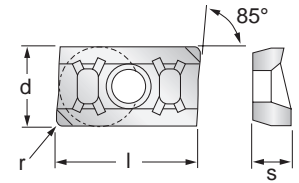
Ground circumference X 90° one face pressed chip-breaker

029098	ADGT12T3PDFR-721	GH1	7,87	12,70	3,76	Facet	0,05
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ADGT_-721

Ground circumference X 90° one face pressed chip-breaker



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	hm min
031526	ADHT12T308ER-46	SP6519	7,87	12,70	3,76	0,80	0,05
029329	ADHT12T308ER-46	X500	7,87	12,70	3,76	0,80	0,05
030406	ADHT12T308ER-46	X700	7,87	12,70	3,76	0,80	0,05
031527	ADHT12T316ER-46	SP6519	7,87	12,70	3,76	1,60	0,05
029331	ADHT12T316ER-46	X500	7,87	12,70	3,76	1,60	0,05
030407	ADHT12T316ER-46	X700	7,87	12,70	3,76	1,60	0,05
031530	ADHT12T320ER-46	SP6519	7,87	12,70	3,76	2,00	0,05
029337	ADHT12T320ER-46	X500	7,87	12,70	3,76	2,00	0,05
030408	ADHT12T320ER-46	X700	7,87	12,70	3,76	2,00	0,05
031528	ADHT12T324ER-46	SP6519	7,87	12,70	3,76	2,40	0,05
029333	ADHT12T324ER-46	X500	7,87	12,70	3,76	2,40	0,05
031531	ADHT12T330ER-46	SP6519	7,87	12,70	3,76	3,00	0,05
029339	ADHT12T330ER-46	X500	7,87	12,70	3,76	3,00	0,05
031515	ADHT12T332ER-46	SP6519	7,87	12,70	3,76	3,20	0,05
029036	ADHT12T332ER-46	X500	7,87	12,70	3,76	3,20	0,05
030409	ADHT12T332ER-46	X700	7,87	12,70	3,76	3,20	0,05
031529	ADHT12T340ER-46	SP6519	7,87	12,70	3,76	4,00	0,05
029335	ADHT12T340ER-46	X500	7,87	12,70	3,76	4,00	0,05
031525	ADHT12T3PDER-46	SP6519	7,87	12,70	3,76	Facet	0,05
029327	ADHT12T3PDER-46	X500	7,87	12,70	3,76	Facet	0,05
017286	ADKT0903PDER-43	MP91M	6,35	9,20	3,18	Facet	0,05
031463	ADKT0903PDER-43	SP6519	6,35	9,20	3,18	Facet	0,05
015150	ADKT0903PDER-43	X500	6,35	9,20	3,18	Facet	0,05
027915	ADKT12T3PDER-45	MP91M	7,87	12,70	3,76	Facet	0,05
027916	ADKT12T3PDER-45	SC3025	7,87	12,70	3,76	Facet	0,05
031514	ADKT12T3PDER-45	SP6519	7,87	12,70	3,76	Facet	0,05
027913	ADKT12T3PDER-45	X500	7,87	12,70	3,76	Facet	0,05
023082	ADKT1505PDER-45	MP91M	9,65	16,05	5,56	Facet	0,06
031464	ADKT1505PDER-45	SP6519	9,65	16,05	5,56	Facet	0,06
023083	ADKT1505PDER-45	X500	9,65	16,05	5,56	Facet	0,06
033179	APET160402TR-42	SP6519	9,52	16,66	4,76	0,20	0,10
033180	APET160408TR-42	SP6519	9,52	16,66	4,76	0,80	0,10
033181	APET160410TR-42	SP6519	9,52	16,66	4,76	1,00	0,10
033182	APET160415TR-42	SP6519	9,52	16,66	4,76	1,50	0,10
033183	APET160420TR-42	SP6519	9,52	16,66	4,76	2,00	0,10
033184	APET160425TR-42	SP6519	9,52	16,66	4,76	2,50	0,10
033185	APET160430TR-42	SP6519	9,52	16,66	4,76	3,00	0,10
033186	APET160440TR-42	SP6519	9,52	16,66	4,76	4,00	0,10
033187	APET160460TR-42	SP6519	9,52	16,66	4,76	6,00	0,10



ADHT_-46

Ground circumference X 90° one face pressed chip-breaker



ADKT_-43

Ground wiper edges X 90° one face pressed chip-breaker



ADKT_-45

Ground wiper edges X 90° one face pressed chip-breaker

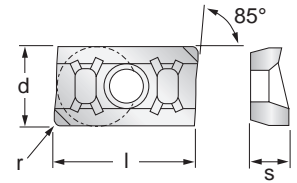


APET_-42

Ground circumference X 90° one face pressed chip-breaker



Milling Introduction



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	hm min
030861	APET160408ER-48	SP6519	9,52	16,66	4,76	0,80	0,04
030860	APET160408ER-48	X500	9,52	16,66	4,76	0,80	0,04
030799	APET160412ER-48	SP6519	9,52	16,66	4,76	1,20	0,04
030812	APET160412ER-48	X500	9,52	16,66	4,76	1,20	0,04
030774	APET160416ER-48	SP6519	9,52	16,66	4,76	1,60	0,04
030813	APET160416ER-48	X500	9,52	16,66	4,76	1,60	0,04
030915	APET160420ER-48	SP6519	9,52	16,66	4,76	2,00	0,04
030914	APET160420ER-48	X500	9,52	16,66	4,76	2,00	0,04
030917	APET160424ER-48	SP6519	9,52	16,66	4,76	2,40	0,04
030916	APET160424ER-48	X500	9,52	16,66	4,76	2,40	0,04
030919	APET160430ER-48	SP6519	9,52	16,66	4,76	3,00	0,04
030918	APET160430ER-48	X500	9,52	16,66	4,76	3,00	0,04
030775	APET160432ER-48	SP6519	9,52	16,66	4,76	3,20	0,04
030814	APET160432ER-48	X500	9,52	16,66	4,76	3,20	0,04
030906	APET160440ER-48	SP6519	9,52	16,66	4,76	4,00	0,04
030907	APET160440ER-48	X500	9,52	16,66	4,76	4,00	0,04
030921	APET160450ER-48	SP6519	9,52	16,66	4,76	5,00	0,04
030920	APET160450ER-48	X500	9,52	16,66	4,76	5,00	0,04
030923	APET160460ER-48	SP6519	9,52	16,66	4,76	6,00	0,04
030922	APET160460ER-48	X500	9,52	16,66	4,76	6,00	0,04
030925	APET160464ER-48	SP6519	9,52	16,66	4,76	6,40	0,04
030924	APET160464ER-48	X500	9,52	16,66	4,76	6,40	0,04
030773	APET1604PDER-48	SP6519	9,52	16,66	4,76	Facet	0,04
030811	APET1604PDER-48	X500	9,52	16,66	4,76	Facet	0,04



APET_-48

Ground circumference X 90° one face pressed chip-breaker

033188	APEX1604PDER-701	SP6519	9,52	16,66	4,76	Facet	0,02
017624	APEX1604PDFL-701	GH1	9,52	16,66	4,76	Facet	0,02
014066	APEX1604PDFR-701	GH1	9,52	16,66	4,76	Facet	0,02
033189	APEX1604PDFR-701	SP4019	9,52	16,66	4,76	Facet	0,02



APEX_-701

Completely ground X 90° concave cutting face

017291	APFW1604PDER	MP91M	9,52	16,66	4,76	Facet	0,04
017630	APFW1604PDTL	GH1	9,52	16,66	4,76	Facet	0,10
034692	APFW1604PDTL	SP4019	9,52	16,66	4,76	Facet	0,10
017628	APFW1604PDTR	GH1	9,52	16,66	4,76	Facet	0,10
027883	APFW1604PDTR	SC3025	9,52	16,66	4,76	Facet	0,10
033191	APFW1604PDTR	SP4019	9,52	16,66	4,76	Facet	0,10
033190	APFW1604PDTR	X400	9,52	16,66	4,76	Facet	0,10



APFW_

Ground circumference X 90° without chip-breaker

033192	APHT1604PDER	SP4019	9,52	16,66	4,76	Facet	0,04
015154	APHT1604PDFR	GH1	9,52	16,66	4,76	Facet	0,02



APHT_

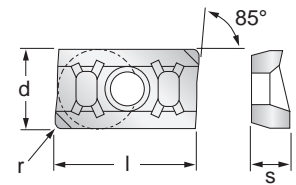
Ground circumference X 90° one face pressed chip-breaker

017292	APHT1604PDTL-42	MP91M	9,52	16,66	4,76	Facet	0,10
031513	APHT1604PDTL-42	SP6519	9,52	16,66	4,76	Facet	0,10
017635	APHT1604PDTL-42	X500	9,52	16,66	4,76	Facet	0,10
017293	APHT1604PDTR-42	MP91M	9,52	16,66	4,76	Facet	0,10
031466	APHT1604PDTR-42	SP6519	9,52	16,66	4,76	Facet	0,10
015155	APHT1604PDTR-42	X500	9,52	16,66	4,76	Facet	0,10



APHT_-42

Ground circumference X 90° one face pressed chip-breaker



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	hm min
031495	APHT160408ER-46	SP6519	9,52	16,66	4,76	0,80	0,10
027869	APHT160408ER-46	X500	9,52	16,66	4,76	0,80	0,10
031496	APHT160416ER-46	SP6519	9,52	16,66	4,76	1,60	0,10
027870	APHT160416ER-46	X500	9,52	16,66	4,76	1,60	0,10
031497	APHT160424ER-46	SP6519	9,52	16,66	4,76	2,40	0,10
027871	APHT160424ER-46	X500	9,52	16,66	4,76	2,40	0,10
031397	APHT160432ER-46	SP6519	9,52	16,66	4,76	3,20	0,10
027872	APHT160432ER-46	X500	9,52	16,66	4,76	3,20	0,10
031542	APHT160440ER-46	SP6519	9,52	16,66	4,76	4,00	0,10
027873	APHT160440ER-46	X500	9,52	16,66	4,76	4,00	0,10
031498	APHT160450ER-46	SP6519	9,52	16,66	4,76	5,00	0,10
027874	APHT160450ER-46	X500	9,52	16,66	4,76	5,00	0,10
031541	APHT160464ER-46	SP6519	9,52	16,66	4,76	6,40	0,10
027875	APHT160464ER-46	X500	9,52	16,66	4,76	6,40	0,10

017861	APKT1003PDFR-3M	GH1	6,68	10,50	3,18	Facet	0,05
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017294	APKT1604PDER-43	MP91M	9,52	16,66	4,76	Facet	0,08
027887	APKT1604PDER-43	SC3025	9,52	16,66	4,76	Facet	0,08
031468	APKT1604PDER-43	SP6519	9,52	16,66	4,76	Facet	0,08
015156	APKT1604PDER-43	X500	9,52	16,66	4,76	Facet	0,08

023112	APKT1003PDER-45	MP91M	6,68	10,50	3,18	Facet	0,05
031467	APKT1003PDER-45	SP6519	6,68	10,50	3,18	Facet	0,05
023113	APKT1003PDER-45	X500	6,68	10,50	3,18	Facet	0,05
023114	APKT1604PDER-45	MP91M	9,52	16,66	4,76	Facet	0,06
031469	APKT1604PDER-45	SP6519	9,52	16,66	4,76	Facet	0,06
023115	APKT1604PDER-45	X500	9,52	16,66	4,76	Facet	0,06

024926	MPEX0602PPFL-701	GH1	6,35	6,35	2,38	Facet	0,02
024927	MPEX0602PPFR-701	GH1	6,35	6,35	2,38	Facet	0,02
024928	MPEX0803PPFL-701	GH1	7,94	7,94	3,18	Facet	0,02
017642	MPEX0803PPFR-701	GH1	7,94	7,94	3,18	Facet	0,02
034527	MPEX0803PPFL-701	SP4019	7,94	7,94	3,18	Facet	0,02
034528	MPEX0803PPFR-701	SP4019	7,94	7,94	3,18	Facet	0,02
017644	MPEX1104PPFL-701	GH1	11,11	11,11	4,76	Facet	0,02
017643	MPEX1104PPFR-701	GH1	11,11	11,11	4,76	Facet	0,02

034523	MPFW0402PPTL	SP4019	4,76	4,76	2,38	Facet	0,07
034524	MPFW0402PPTR	SP4019	4,76	4,76	2,38	Facet	0,07
031508	MPFW0402PPTL	SP6519	4,76	4,76	2,38	Facet	0,07
031507	MPFW0402PPTR	SP6519	4,76	4,76	2,38	Facet	0,07
034525	MPFW0602PPTL	SP4019	6,35	6,35	2,38	Facet	0,07
034526	MPFW0602PPTR	SP4019	6,35	6,35	2,38	Facet	0,07
031571	MPFW0602PPTL	SP6519	6,35	6,35	2,38	Facet	0,07
031570	MPFW0602PPTR	SP6519	6,35	6,35	2,38	Facet	0,07



APHT_-46

Ground circumference X 90° one face pressed chip-breaker



APKT_-3M

Ground wiper edges X 90° one face pressed chip-breaker



APKT_-43

Ground wiper edges X 90° one face pressed chip-breaker



APKT_-45

Ground wiper edges X 90° one face pressed chip-breaker



MPEX_-701

Completely ground X 90° concave cutting face

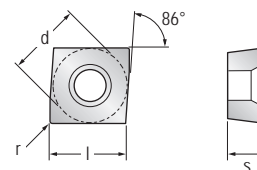


MPFW_

Ground circumference X 90° without chip-breaker



Milling Introduction



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	h _m min
017658	MPFW0803PPTL	GH1	7,94	7,94	3,18	Facet	0,10
017655	MPFW0803PPTR	GH1	7,94	7,94	3,18	Facet	0,10
034529	MPFW0803PPTL	SP4019	7,94	7,94	3,18	Facet	0,10
034530	MPFW0803PPTR	SP4019	7,94	7,94	3,18	Facet	0,10
034532	MPFW0803PPTL	X400	7,94	7,94	3,18	Facet	0,10
034531	MPFW0803PPTR	X400	7,94	7,94	3,18	Facet	0,10
017439	MPFW1104PPTL	GH1	11,11	11,11	4,76	Facet	0,15
017440	MPFW1104PPTR	GH1	11,11	11,11	4,76	Facet	0,15
034533	MPFW1104PPTL	SP4019	11,11	11,11	4,76	Facet	0,15
034534	MPFW1104PPTR	SP4019	11,11	11,11	4,76	Facet	0,15



MPFW_
Ground circumference X 90°
without chip-breaker

017296	MPHT0803PPTL-42	MP91M	7,94	7,94	3,18	Facet	0,10
017297	MPHT0803PPTR-42	MP91M	7,94	7,94	3,18	Facet	0,10
031510	MPHT0803PPTL-42	SP6519	7,94	7,94	3,18	Facet	0,10
031509	MPHT0803PPTR-42	SP6519	7,94	7,94	3,18	Facet	0,10
015138	MPHT0803PPTL-42	X500	7,94	7,94	3,18	Facet	0,10
015140	MPHT0803PPTR-42	X500	7,94	7,94	3,18	Facet	0,10
017298	MPHT1104PPTL-42	MP91M	11,11	11,11	4,76	Facet	0,10
017299	MPHT1104PPTR-42	MP91M	11,11	11,11	4,76	Facet	0,10
031512	MPHT1104PPTL-42	SP6519	11,11	11,11	4,76	Facet	0,10
031511	MPHT1104PPTR-42	SP6519	11,11	11,11	4,76	Facet	0,10
015141	MPHT1104PPTL-42	X500	11,11	11,11	4,76	Facet	0,10
015142	MPHT1104PPTR-42	X500	11,11	11,11	4,76	Facet	0,10



MPHT_-42
Ground circumference X 90° one
face pressed chip-breaker

017667	MPHW0402PPTL	X500	4,76	4,76	2,38	Facet	0,07
017666	MPHW0402PPTR	X500	4,76	4,76	2,38	Facet	0,07
017669	MPHW0602PPTL	X500	6,35	6,35	2,38	Facet	0,07
017668	MPHW0602PPTR	X500	6,35	6,35	2,38	Facet	0,07



MPHW_
Ground circumference X 90°
without chip-breaker

015180	MPMT060204EN-43	X500	6,35	6,35	2,38	0,40	0,04
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MPMT_
As pressed circumference X 90° one
face pressed chip-breaker

022199	ODET0404APEN-44	MP91M	12,70	4,00	4,76	Facet	0,04
031470	ODET0404APEN-44	SP6519	12,70	4,00	4,76	Facet	0,04
022198	ODET0404APEN-44	X500	12,70	4,00	4,76	Facet	0,04
026591	ODET0605APEN-44	MP91M	16,00	6,00	5,55	Facet	0,04
034513	ODET0605APEN-44	SP4019	16,00	6,00	5,55	Facet	0,04
031501	ODET0605APEN-44	SP6519	16,00	6,00	5,55	Facet	0,04
026592	ODET0605APEN-44	X500	16,00	6,00	5,55	Facet	0,04



ODET_-44
Ground circumference X 42° one
face pressed chip-breaker

024911	ODET0404APFN-441	GH1	12,70	4,00	4,76	Facet	0,02
026588	ODET0605APFN-441	GH1	16,00	6,00	5,55	Facet	0,02

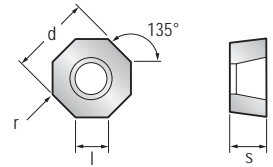


ODET_-441
Ground circumference X 42° one
face pressed chip-breaker

027884	ODEW0404APTR-RA	SC3025	12,70	4,00	4,76	Facet	0,19
027885	ODEW0605APTR-RA	SC3025	16,00	6,00	5,55	Facet	0,19



ODEW_-RA
Ground circumference X 42° without
chip-breaker



Milling Introduction

Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	h _m min
017303	ODMT040408EN-41	MP91M	12,70	4,00	4,76	0,80	0,04
031471	ODMT040408EN-41	SP6519	12,70	4,00	4,76	0,80	0,04
015143	ODMT040408EN-41	X500	12,70	4,00	4,76	0,80	0,04
030330	ODMT040408EN-41	X700	12,70	4,00	4,76	0,80	0,04
017775	ODMT0404APEN-41	MP91M	12,70	4,00	4,76	Facet	0,04
031472	ODMT0404APEN-41	SP6519	12,70	4,00	4,76	Facet	0,04
022061	ODMT0404APEN-41	X500	12,70	4,00	4,76	Facet	0,04
026589	ODMT0605APEN-41	MP91M	16,00	6,00	5,55	Facet	0,04
034514	ODMT0605APEN-41	SP4019	16,00	6,00	5,55	Facet	0,04
031502	ODMT0605APEN-41	SP6519	16,00	6,00	5,55	Facet	0,04
026590	ODMT0605APEN-41	X500	16,00	6,00	5,55	Facet	0,04

031540	ODMT040408EN-412	SP6519	12,70	4,00	4,76	0,80	0,06
030768	ODMT040408EN-412	X500	12,70	4,00	4,76	0,80	0,06
030769	ODMT040408EN-412	X700	12,70	4,00	4,76	0,80	0,06

017304	ODMW040408SN	MP91M	12,70	4,00	4,76	0,80	0,27
029096	ODMW040408SN	SC3025	12,70	4,00	4,76	0,80	0,27
031462	ODMW040408SN	SP6519	12,70	4,00	4,76	0,80	0,27
017672	ODMW040408SN	X500	12,70	4,00	4,76	0,80	0,27
025836	ODMW060512SN	MP91M	16,00	6,00	5,55	1,20	0,27
029097	ODMW060512SN	SC3025	16,00	6,00	5,55	1,20	0,27
031483	ODMW060512SN	SP6519	16,00	6,00	5,55	1,20	0,27
025838	ODMW060512SN	X500	16,00	6,00	5,55	1,20	0,27

026595	ODMW060512TN	MP91M	16,00	6,00	5,55	1,20	0,17
034515	ODMW060512TN	SP4019	16,00	6,00	5,55	1,20	0,17
031503	ODMW060512TN	SP6519	16,00	6,00	5,55	1,20	0,17
026596	ODMW060512TN	X500	16,00	6,00	5,55	1,20	0,17

034556	RDET0702M0E-701	SP4019	7,00	-	2,38	3,50	0,03
034558	RDET1003M0E-701	SP4019	10,00	-	3,18	5,00	0,05
034560	RDET12T3M0E-701-X6	SP4019	12,00	-	3,97	6,00	0,05
034563	RDET1604M0E-701-X8	SP4019	16,00	-	4,76	8,00	0,05

031533	RDHT2006M0E-42-X8	SP6519	20,00	-	6,35	10,00	0,08
029310	RDHT2006M0E-42-X8	X500	20,00	-	6,35	10,00	0,08

034557	RDHW0702M0T	SP4019	7,00	-	2,38	3,50	0,075
034559	RDHW1003M0T	SP4019	10,00	-	3,18	5,00	0,15
034561	RDHW12T3M0T-20-X6	SP4019	12,00	-	3,97	6,00	0,20
031519	RDHW12T3M0T-20-X6	SP5419	12,00	-	3,97	6,00	0,20
034562	RDHW12T3M0T-X6	SP4019	12,00	-	3,97	6,00	0,15
034564	RDHW1604M0T-30-X8	SP4019	16,00	-	4,76	8,00	0,30
031520	RDHW1604M0T-30-X8	SP5419	16,00	-	4,76	8,00	0,30
034565	RDHW1604M0T-X8	SP4019	16,00	-	4,76	8,00	0,15
031653	RDHW1604M0T-X8	SP5419	16,00	-	4,76	8,00	0,15
029309	RDHW2006M0E-X8	X500	20,00	-	6,35	10,00	0,10
031576	RDHW2006M0S-25-X8	SP6519	20,00	-	6,35	10,00	0,25
031660	RDHW2006M0S-25-X8	X500	20,00	-	6,35	10,00	0,25
031662	RDHW2006M0S-X8	SP6519	20,00	-	6,35	10,00	0,12
031661	RDHW2006M0S-X8	X500	20,00	-	6,35	10,00	0,12



ODMT_-41

As pressed circumference X 42° one face pressed chip-breaker



ODMT_-412

As pressed circumference X 42° one face pressed chip-breaker



ODMW_-SN

As pressed circumference X 42° without chip-breaker



ODMW_-TN

As pressed circumference X 42° without chip-breaker



RDET_-701

Ground circumference one face pressed chip-breaker with concave cutting face



RDHT_-42

Ground circumference one face pressed chip-breaker

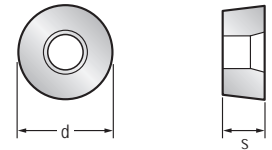


RDHW_

Ground circumference without chip-breaker



Milling Introduction



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	hm min
031523	RDMW12T3M0T-20-X6	SP5419	12,00	-	3,97	6,00	0,20
031524	RDMW12T3M0T-X6	SP5419	12,00	-	3,97	6,00	0,15
031522	RDMW1604M0T-30-X8	SP5419	16,00	-	4,76	8,00	0,30
031521	RDMW1604M0T-X8	SP5419	16,00	-	4,76	8,00	0,15
015183	RDMW1606M0S	X500	16,00	-	6,35	8,00	0,30
031484	RG08S	SP1019	8,00	-	1,75	4,00	0,02
031485	RG10S	SP1019	10,00	-	2,00	5,00	0,02
031486	RG12S	SP1019	12,00	-	2,50	6,00	0,02
031487	RG16S	SP1019	16,00	-	3,00	8,00	0,02
031488	RG20S	SP1019	20,00	-	3,50	10,00	0,02
031489	RG25S	SP1019	25,00	-	4,00	12,50	0,02
034549	RPET1204M0E-X4	SP4019	12,00	-	4,76	6,00	0,03
024755	RPEW0602M0T	X500	6,00	-	2,38	3,00	0,10
034540	RPEX0602M0E-701	SP6519	6,00	-	2,38	3,00	0,02
023313	RPEX0602M0F-701	GH2	6,00	-	2,38	3,00	0,02
034541	RPEX0602M0F-701	SP4019	6,00	-	2,38	3,00	0,02
034543	RPEX0803M3E-701	SP6519	8,00	-	3,18	4,00	0,02
031312	RPEX0803M3E-701	X500	8,00	-	3,18	4,00	0,02
023315	RPEX0803M3F-701	GH1	8,00	-	3,18	4,00	0,02
034544	RPEX0803M3F-701	SP4019	8,00	-	3,18	4,00	0,02
034545	RPEX10T3M0E-701-X4	SP6519	10,00	-	3,97	5,00	0,02
030456	RPEX10T3M0F-701-X4	GH1	10,00	-	3,97	5,00	0,02
034546	RPEX10T3M0F-701-X4	SP4019	10,00	-	3,97	5,00	0,02
029282	RPEX1204M0E-701-X4	X500	12,00	-	4,76	6,00	0,02
029284	RPEX1204M0F-701-X4	GH1	12,00	-	4,76	6,00	0,02
031555	RPHT10T3M0T-X4	SP6519	10,00	-	3,97	5,00	0,075
030329	RPHT10T3M0T-X4	X500	10,00	-	3,97	5,00	0,075
031516	RPHT1204M0T-X4	SP6519	12,00	-	4,76	6,00	0,10
029034	RPHT1204M0T-X4	X500	12,00	-	4,76	6,00	0,10
029699	RPHT1204M0T-X4	X700	12,00	-	4,76	6,00	0,10
030390	RPHT1606M0S	X400	16,00	-	6,35	8,00	0,15
034566	RPHT1606M0T	SP6519	16,00	-	6,35	8,00	0,10
017692	RPHT1606M0T	X500	16,00	-	6,35	8,00	0,10
030449	RPHT10T3M0E-421-X4	X500	10,00	-	3,97	5,00	0,04
030410	RPHT10T3M0E-421-X4	X700	10,00	-	3,97	5,00	0,04
029286	RPHT1204M0E-421-X4	X500	12,00	-	4,76	6,00	0,04
029700	RPHT1204M0E-421-X4	X700	12,00	-	4,76	6,00	0,04



RDMW_

As pressed circumference without chip-breaker



RG..S_

Completely ground



RPET_

Ground circumference one face pressed chip-breaker



RPEW_

Ground circumference without chip-breaker



RPEX_-701

Completely ground concave cutting face



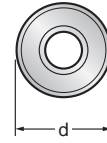
RPHT_

Ground circumference one face pressed chip-breaker



RPHT_-421

Ground circumference one face pressed chip-breaker



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	h _m min
031187	RPHT0803M3E-422	SP6519	8,00	-	3,18	4,00	0,03
031186	RPHT0803M3E-422	X500	8,00	-	3,18	4,00	0,03
031185	RPHT0803M3E-422	X700	8,00	-	3,18	4,00	0,03
030862	RPHT10T3M0E-422-X4	SP6519	10,00	-	3,97	5,00	0,03
030697	RPHT10T3M0E-422-X4	X500	10,00	-	3,97	5,00	0,03
030767	RPHT10T3M0E-422-X4	X700	10,00	-	3,97	5,00	0,03

032128	RPHT1204M0E-442-X4	SP6519	12,00	-	4,76	6,00	0,04
032129	RPHT1204M0E-442-X4	X500	12,00	-	4,76	6,00	0,04
032130	RPHT1204M0E-442-X4	X700	12,00	-	4,76	6,00	0,04

030327	RPMT10T3M0T-X4	X500	10,00	-	3,97	5,00	0,06
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023327	RPMT0602M0E-41	MP91M	6,00	-	2,38	3,00	0,03
034542	RPMT0602M0E-41	SP6519	6,00	-	2,38	3,00	0,03
015219	RPMT0602M0E-41	X500	6,00	-	2,38	3,00	0,03
017308	RPMT0803M3E-41	MP91M	8,00	-	3,18	4,00	0,04
031473	RPMT0803M3E-41	SP6519	8,00	-	3,18	4,00	0,04
015220	RPMT0803M3E-41	X500	8,00	-	3,18	4,00	0,04
030451	RPMT10T3M0E-41-X4	MP91M	10,00	-	3,97	5,00	0,04
031539	RPMT10T3M0E-41-X4	SP6519	10,00	-	3,97	5,00	0,04
030452	RPMT10T3M0E-41-X4	X500	10,00	-	3,97	5,00	0,04
029291	RPMT1204M0E-41-X4	MP91M	12,00	-	4,76	6,00	0,05
031517	RPMT1204M0E-41-X4	SP6519	12,00	-	4,76	6,00	0,05
029272	RPMT1204M0E-41-X4	X500	12,00	-	4,76	6,00	0,05
017311	RPMT1606M0E-41	MP91M	16,00	-	6,35	8,00	0,05
015223	RPMT1606M0E-41	X500	16,00	-	6,35	8,00	0,05

030454	RPMW10T3M0T-X4	X500	10,00	-	3,97	5,00	0,13
029294	RPMW1204M0T-X4	MP91M	12,00	-	4,76	6,00	0,13
031518	RPMW1204M0T-X4	SP6519	12,00	-	4,76	6,00	0,13
029295	RPMW1204M0T-X4	X500	12,00	-	4,76	6,00	0,13

017312	SCCT12M5ACER	MP91M	12,70	12,70	5,00	Facet	0,03
017695	SCCT12M5ACTR	GH1	12,70	12,70	5,00	Facet	0,15
034552	SCCT12M5ACTR	SP4019	12,70	12,70	5,00	Facet	0,15
034591	SCCT12M5ACTR	X400	12,70	12,70	5,00	Facet	0,15

017313	SCHT12M5ACTN	MP91M	12,70	12,70	5,00	Facet	0,15
031504	SCHT12M5ACTN	SP6519	12,70	12,70	5,00	Facet	0,15
017698	SCHT12M5ACTN	X500	12,70	12,70	5,00	Facet	0,15

030671	SCHT12M512EN-422	X700	12,70	12,70	5,00	1,20	0,12
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RPHT_-422

Ground circumference one face pressed chip-breaker



RPHT_-442

Ground circumference one face pressed chip-breaker



RPMT_

As pressed circumference one face pressed chip-breaker



RPMT_-41

As pressed circumference one face pressed chip-breaker



RPMW_

As pressed circumference without chip-breaker



SCCT_

Ground circumference X 45° one face pressed chip-breaker



SCHT_

Ground circumference X 45° one face pressed chip-breaker

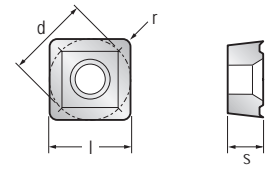


SCHT_-422

Ground circumference X 45° or 90° one face pressed chip-breaker



Milling Introduction



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	h _m min
017314	SCKT12M5ACSN-41	MP91M	12,70	12,70	5,00	Facet	0,12
031556	SCKT12M5ACSN-41	SP6519	12,70	12,70	5,00	Facet	0,12
015144	SCKT12M5ACSN-41	X500	12,70	12,70	5,00	Facet	0,12



SCKT_-41

Ground wiper facet X 45° one face pressed chip-breaker

034668	SCMT09T304T	SP6519	9,52	9,52	3,97	0,40	0,15
034551	SCMT09T308T	SP4019	9,52	9,52	3,97	0,80	0,15
031568	SCMT09T308T	SP6519	9,52	9,52	3,97	0,80	0,15
034550	SCMT09T308T	X400	9,52	9,52	3,97	0,80	0,15
034669	SCMT12M508E	SP6519	12,70	12,70	5,00	0,80	0,15
017316	SCMT12M512T	MP91M	12,70	12,70	5,00	1,20	0,15
034553	SCMT12M512T	SP4019	12,70	12,70	5,00	1,20	0,15
034555	SCMT12M512T	SP6519	12,70	12,70	5,00	1,20	0,15
034554	SCMT12M512T	X400	12,70	12,70	5,00	1,20	0,15
024129	SCMT12M512T	X500	12,70	12,70	5,00	1,20	0,15



SCMT_

As pressed circumference one face pressed chip-breaker

017315	SCMT09T308EN-41	MP91M	9,52	9,52	3,97	0,80	0,04
031474	SCMT09T308EN-41	SP6519	9,52	9,52	3,97	0,80	0,04
015147	SCMT09T308EN-41	X500	9,52	9,52	3,97	0,80	0,04
017317	SCMT12M512EN-41	MP91M	12,70	12,70	5,00	1,20	0,05
031475	SCMT12M512EN-41	SP6519	12,70	12,70	5,00	1,20	0,05
015226	SCMT12M512EN-41	X500	12,70	12,70	5,00	1,20	0,05



SCMT_-41

As pressed circumference one face pressed chip-breaker

031246	SDCT09T3AEEN	SP4019	9,52	9,52	3,97	Facet	0,03
017242	SDCT09T3AEFN	GH1	9,52	9,52	3,97	Facet	0,02
017243	SDCT1204AEFN	GH1	12,70	12,70	4,76	Facet	0,02



SDCT_

Ground circumference X 45° one face pressed chip-breaker

025843	SDCW09T3EEFR	GH1	9,52	9,52	3,97	Facet	0,02
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SDCW_-FR

Ground circumference X 75° without chip-breaker

031404	SDCW1204AETN	SA9808	12,70	12,70	4,76	Facet	0,17
034516	SDCW1204AETN	SP4019	12,70	12,70	4,76	Facet	0,17
034517	SDCW1204AETN	X400	12,70	12,70	4,76	Facet	0,17



Ground circumference X 45° without chip-breaker

034520	SDET09T308EN	SP6519	9,52	9,52	3,97	0,80	0,03
017725	SDET09T308FN	GH1	9,52	9,52	3,97	0,80	0,02



SDET_

Ground circumference X 45° one face chip-breaker

015148	SDEX09T3AEFN-701	GH1	9,52	9,52	3,97	Facet	0,02
034519	SDEX09T3AEFN-701	SP4019	9,52	9,52	3,97	Facet	0,02
015149	SDEX1204AEFN-701	GH1	12,70	12,70	4,76	Facet	0,02
034522	SDEX1204AEFN-701	SP4019	12,70	12,70	4,76	Facet	0,02



SDEX_-701

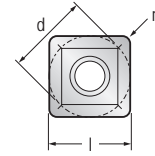
Completely ground X 45° concave cutting face

017322	SDHT1204AETN-42	MP91M	12,70	12,70	4,76	Facet	0,15
031478	SDHT1204AETN-42	SP6519	12,70	12,70	4,76	Facet	0,15
017729	SDHT1204AETN-42	X500	12,70	12,70	4,76	Facet	0,15



SDHT_-42

Ground circumference X 45° one face pressed chip-breaker



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	h _m min
017320	SDHT09T3AEEN-421	MP91M	9,52	9,52	3,97	Facet	0,03
031476	SDHT09T3AEEN-421	SP6519	9,52	9,52	3,97	Facet	0,03
015186	SDHT09T3AEEN-421	X500	9,52	9,52	3,97	Facet	0,03
017321	SDHT1204AEEN-421	MP91M	12,70	12,70	4,76	Facet	0,04
031477	SDHT1204AEEN-421	SP6519	12,70	12,70	4,76	Facet	0,04
015187	SDHT1204AEEN-421	X500	12,70	12,70	4,76	Facet	0,04



SDHT_-421
Ground circumference X 45° one face pressed chip-breaker



SDHT_-422
Ground circumference X 45° or 90° one face pressed chip-breaker



SDHT_-423
Ground circumference X 45° or 90° one face pressed chip-breaker

033075	SDHT09T308EN-422	SP6519	9,52	9,52	3,97	0,80	0,05
031261	SDHT09T308EN-422	X500	9,52	9,52	3,97	0,80	0,05
030890	SDHT09T3AEEN-422	SP6519	9,52	9,52	3,97	Facet	0,05
030766	SDHT09T3AEEN-422	X500	9,52	9,52	3,97	Facet	0,05
030728	SDHT120412EN-422	SP6519	12,70	12,70	4,76	1,20	0,06
030717	SDHT120412EN-422	X500	12,70	12,70	4,76	1,20	0,06

033074	SDHT09T308EN-423	SP6519	9,52	9,52	3,97	0,80	0,05
031260	SDHT09T308EN-423	X500	9,52	9,52	3,97	0,80	0,05
031321	SDHT120412EN-423	SP6519	12,70	12,70	4,76	1,20	0,06
031218	SDHT120412EN-423	X500	12,70	12,70	4,76	1,20	0,06

017323	SDHW09T3AETN	MP91M	9,52	9,52	3,97	Facet	0,10
031575	SDHW09T3AETN	SP6519	9,52	9,52	3,97	Facet	0,10
015231	SDHW09T3AETN	X500	9,52	9,52	3,97	Facet	0,10
017324	SDHW1204AETN	MP91M	12,70	12,70	4,76	Facet	0,15
017730	SDHW1204AETN	X500	12,70	12,70	4,76	Facet	0,15
017731	SDHW1505AETN	X500	15,88	15,88	5,56	Facet	0,15



SDHW_
Ground circumference X 45° without chip-breaker

026600	SDKT09T3AEEN-45	MP91M	9,52	9,52	3,97	Facet	0,05
031481	SDKT09T3AEEN-45	SP6519	9,52	9,52	3,97	Facet	0,05
026602	SDKT09T3AEEN-45	X500	9,52	9,52	3,97	Facet	0,05
029456	SDKT1204AEEN-45	MP91M	12,70	12,70	4,76	Facet	0,05
031532	SDKT1204AEEN-45	SP6519	12,70	12,70	4,76	Facet	0,05
029457	SDKT1204AEEN-45	X500	12,70	12,70	4,76	Facet	0,05



SDKT_-45
Ground wiper facet X 45° one face pressed chip-breaker

017325	SDMT09T308EN-41	MP91M	9,52	9,52	3,97	0,80	0,04
031479	SDMT09T308EN-41	SP6519	9,52	9,52	3,97	0,80	0,04
014410	SDMT09T308EN-41	X500	9,52	9,52	3,97	0,80	0,04
017326	SDMT120412EN-41	MP91M	12,70	12,70	4,76	1,20	0,05
031480	SDMT120412EN-41	SP6519	12,70	12,70	4,76	1,20	0,05
014411	SDMT120412EN-41	X500	12,70	12,70	4,76	1,20	0,05



SDMT_-41
As pressed circumference one face pressed chip-breaker

017327	SDMW09T308TN	MP91M	9,52	9,52	3,97	0,80	0,15
031482	SDMW09T308TN	SP6519	9,52	9,52	3,97	0,80	0,15
015232	SDMW09T308TN	X500	9,52	9,52	3,97	0,80	0,15
034518	SDMW120412TN	SP6519	12,70	12,70	4,76	1,20	0,15
015233	SDMW120412TN	X500	12,70	12,70	4,76	1,20	0,15



SDMW_
As pressed circumference without chip-breaker

012470	SEHT1204AFER	MP91M	12,70	12,70	4,76	Facet	0,12
034670	SEHT1204AFER	SP6519	12,70	12,70	4,76	Facet	0,12

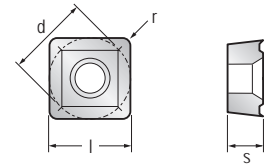


SEHT_
Ground circumference X 45° one face pressed chip-breaker

012990	SEHW1204AFER	MP91M	12,70	12,70	4,76	Facet	0,12
012991	SEHW1504AFER	MP91M	15,88	15,88	4,76	Facet	0,12



SEHW_
Ground circumference X 45° without chip-breaker



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	h _m min
034699	SEKN1203AFEN	MP91M	12,70	12,70	3,18	Facet	0,12
034671	SEKN1203AFEN	SP6519	12,70	12,70	3,18	Facet	0,12
034700	SEKN1204AFEN	MP91M	12,70	12,70	4,76	Facet	0,12
034701	SEKN1504AFEN	MP91M	15,88	15,88	4,76	Facet	0,12
034672	SEKN1504AFEN	SP6519	15,88	15,88	4,76	Facet	0,12
034702	SEKR1203AFEN	MP91M	12,70	12,70	3,18	Facet	0,12
034673	SEKR1203AFEN	SP6519	12,70	12,70	3,18	Facet	0,12
017863	SEKR1203AFFN	GH1	12,70	12,70	3,18	Facet	0,03
031505	SEKR1203AFTN	SP6519	12,70	12,70	3,18	Facet	0,12
034703	SEKR1204AFEN	MP91M	12,70	12,70	4,76	Facet	0,12
034704	SEKR1504AFEN	MP91M	15,88	15,88	4,76	Facet	0,12
030387	SEKT13T3AZEN-41	MP91M	13,41	13,41	3,96	Facet	0,04
030386	SEKT13T3AZEN-41	SC3025	13,41	13,41	3,96	Facet	0,04
031537	SEKT13T3AZEN-41	SP6519	13,41	13,41	3,96	Facet	0,04
030384	SEKT13T3AZEN-41	X500	13,41	13,41	3,96	Facet	0,04
022114	SEKT1204AFER-45	MP91M	12,70	12,70	4,76	Facet	0,05
022113	SEKT1204AFER-45	X500	12,70	12,70	4,76	Facet	0,05
029693	SEMN1203AFEN	MP91M	12,70	12,70	3,18	Facet	0,10
029694	SEMR1203AFEN	MP91M	12,70	12,70	3,18	Facet	0,10
017329	SOMT12M612SN-B	MP91M	12,70	12,70	6,00	1,20	0,15
031506	SOMT12M612SN-B	SP6519	12,70	12,70	6,00	1,20	0,15
015190	SOMT12M612SN-B	X500	12,70	12,70	6,00	1,20	0,15
017330	SOMT15M612SN-B	MP91M	15,88	15,88	6,00	1,20	0,15
031557	SOMT15M612SN-B	SP6519	15,88	15,88	6,00	1,20	0,15
015192	SOMT15M612SN-B	X500	15,88	15,88	6,00	1,20	0,15
014413	SPEW060304SN	X500	6,35	6,35	3,18	0,40	0,15
034674	SPGH120412E-2C	SP6519	12,70	12,10	4,76	1,20	0,04



SEKN_

Ground wiper facet χ 45° one face pressed chip-breaker



SEKR_

Ground wiper facet χ 45° one face pressed chip-breaker



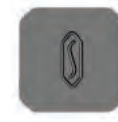
SEKT_-41

As pressed circumference with ground wiper facets χ 45° with one face pressed chip-breaker



SEKT_-45

As pressed circumference with ground wiper facets χ 45° with one face pressed chip-breaker



SEMN_

As pressed circumference without chip-breaker



SEMR_

As pressed circumference one face pressed chip-breaker



SOMT_

As pressed circumference one face pressed chip-breaker



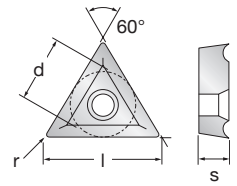
SPEW_

Ground circumference without chip-breaker



SPGH_-2C

Ground circumference without chip-breaker



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	h _m min
011341	SPGN090308E	MP91M	9,52	9,52	3,18	0,80	0,03
011342	SPGN120308E	MP91M	12,70	12,70	3,18	0,80	0,03
011343	SPGN120412E	MP91M	12,70	12,70	4,76	1,20	0,03
011641	SPGN190412E	MP91M	19,05	19,05	4,76	1,20	0,04

017237	SPHX12M512EN	GH1	12,70	12,70	5,00	1,20	0,02
031455	SPHX12M512EN	SA9608	12,70	12,70	5,00	1,20	0,02

034675	SPKN1203EDR	SP6519	12,70	12,70	3,18	Facet	0,10
012476	SPKN1203EDKR	MP91M	12,70	12,70	3,18	Facet	0,20

011770	SPUN190412E	MP91M	19,05	19,05	4,76	1,20	0,05
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017740	TCHW2204PDTR	GH1	12,70	22,00	4,76	Facet	0,10
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034676	TCLT16T3PPTR	SP4019	9,52	16,50	3,97	Facet	0,15
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024139	TCMT16T308E	MP91M	9,52	16,50	3,97	0,80	0,05
031569	TCMT16T308E	SP6519	9,52	16,50	3,97	0,80	0,05
034536	TCMT16T308E	X400	9,52	16,50	3,97	0,80	0,05
024140	TCMT16T308E	X500	9,52	16,50	3,97	0,80	0,05
034537	TCMT16T308T	SP4019	9,52	16,50	3,97	0,80	0,15
034539	TCMT16T308T	SP6519	9,52	16,50	3,97	0,80	0,15
034538	TCMT16T308T	X400	9,52	16,50	3,97	0,80	0,15

034535	TCMX16T308E-ZR	SP4019	9,52	16,50	3,97	0,80	0,05
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011340	TPGN160308E	MP91M	9,52	16,50	3,18	0,80	0,05
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SPGN_

Ground circumference one face without chip-breaker



SPHX_

Ground circumference with ground chip-breaker—special wiper insert



SPKN_

As pressed circumference χ 45° with ground facet without chip-breaker



SPUN_

As pressed circumference χ 45° without chip-breaker



TCHW_

Ground circumference with ground chip-breaker



TCLT_

As pressed circumference one face pressed chip-breaker



TCMT_

As pressed circumference one face pressed chip-breaker



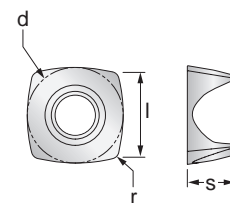
TCMX_-ZR

Ground clearance χ 45° especially for 7745VT 16 WA020R, with pressed chip-breaker



TPGN_

Ground circumference without chip-breaker



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	hm min
012499	TPKN1603PDTR	MP91M	9,52	16,50	3,18	Facet	0,05
034681	TPKN1603PDTR	SP6519	9,52	16,50	3,18	Facet	0,05
012501	TPKN2204PDTR	MP91M	12,70	22,00	4,76	Facet	0,05
034682	TPKN2204PDTR	SP6519	12,70	22,00	4,76	Facet	0,05



TPKN_

As pressed circumference χ 60° with ground face and without chip-breaker

024947	TPMT110204E-M	X500	6,35	11,00	2,38	0,40	0,03
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TPMT_-M

As pressed circumference one face pressed chip-breaker χ 45° and χ 60°.

012503	TPUN220408E	MP91M	12,70	22,00	4,76	0,80	0,05
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TPUN_

As pressed circumference without chip-breaker

033067	XDLT090408ER-D41	SC6525	9,52	9,52	4,76	0,80	0,05
031535	XDLT090408ER-D41	SP6519	9,52	9,52	4,76	0,80	0,05
029685	XDLT090408ER-D41	X500	9,52	9,52	4,76	0,80	0,05
033068	XDLT120508ER-D41	SC6525	12,70	12,70	5,56	0,80	0,05
031534	XDLT120508ER-D41	SP6519	12,70	12,70	5,56	0,80	0,05
029682	XDLT120508ER-D41	X500	12,70	12,70	5,56	0,80	0,05



XDLT_-D41

Ground circumference one face pressed chip-breaker

030854	XDLT090412ER-D411	SP6519	9,52	9,52	4,76	1,20	0,05
030853	XDLT090412ER-D411	X500	9,52	9,52	4,76	1,20	0,05
030792	XDLT120512ER-D411	SP6519	12,70	12,70	5,56	1,20	0,05
030783	XDLT120512ER-D411	X500	12,70	12,70	5,56	1,20	0,05



XDLT_-D411

Ground circumference one face pressed chip-breaker

029637	XDLT090408ER-D721	GH2	9,52	9,52	4,76	0,80	0,03
029638	XDLT120508ER-D721	GH2	12,70	12,70	5,56	0,80	0,03



XDLT_-D721

Ground circumference one face pressed chip-breaker

029486	XDLW090408SR-D	SC3025	9,52	9,52	4,76	0,80	0,25
029487	XDLW090408SR-D	X400	9,52	9,52	4,76	0,80	0,25
029485	XDLW090408SR-D	X500	9,52	9,52	4,76	0,80	0,25
029489	XDLW120508SR-D	SC3025	12,70	12,70	5,56	0,80	0,30
029490	XDLW120508SR-D	X400	12,70	12,70	5,56	0,80	0,30
029488	XDLW120508SR-D	X500	12,70	12,70	5,56	0,80	0,30



XDLW_-D

Ground circumference without chip-breaker

033069	XELT160512ER-D41	SC6525	16,80	16,80	5,56	1,20	0,10
031294	XELT160512ER-D41	SP6519	16,80	16,80	5,56	1,20	0,10
031293	XELT160512ER-D41	X500	16,80	16,80	5,56	1,20	0,10



XELT_-D41

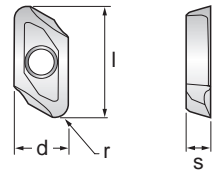
Ground circumference one face pressed chip-breaker

031292	XELW160512SR-D	SC3025	16,80	16,80	5,56	1,20	0,30
031291	XELW160512SR-D	X400	16,80	16,80	5,56	1,20	0,30



XELW_-D

Ground circumference without chip-breaker



Product			Dimensions (mm)				
EDP	Item Description	Grade	d (IC)	l	s	r	h _m min
033066	XPLT060308ER-D41	SC6525	7,00	7,00	3,18	0,80	0,04
031538	XPLT060308ER-D41	SP6519	7,00	7,00	3,18	0,80	0,04
030403	XPLT060308ER-D41	X400	7,00	7,00	3,18	0,80	0,04
030402	XPLT060308ER-D41	X500	7,00	7,00	3,18	0,80	0,04



XPLT_-D41

Ground circumference one face pressed chip-breaker

030737	XPNT16/160308.R-F	SP6519	7,39	17,40	3,18	8,00	0,04
030743	XPNT20/20T306.R-F	SP6519	9,00	20,85	3,97	10,00	0,04
030746	XPNT25/250408.R-F	SP6519	11,00	26,00	4,76	12,50	0,04
030749	XPNT32/320612.R-F	SP6519	14,10	33,40	6,35	16,00	0,04
030755	XPNT40/40T716.R-F	SP6519	18,00	41,84	7,95	20,00	0,04
030758	XPNT50/50T716.R-F	SP6519	22,25	52,86	7,95	25,00	0,04



XPNT_-F

Ground circumference one face pressed chip-breaker

029028	ZDCX140320FR-701	GH1	7,59	16,83	3,18	2,00	0,02
026019	ZDCX140325FR-701	GH1	7,59	16,83	3,18	2,50	0,02
029029	ZDCX140330FR-701	GH1	7,59	16,83	3,18	3,00	0,02
026020	ZDCX140340FR-701	GH1	7,59	16,83	3,18	4,00	0,02
029027	ZDCX1403PDFR-701	GH1	7,59	16,83	3,18	Facet	0,02



ZDCX_-701

Completely ground X 90° concave cutting face

031384	ZDET16M504FR-721	GH1	11,30	22,92	5,00	0,40	0,02
030928	ZDET16M508FR-721	GH1	11,30	22,92	5,00	0,80	0,02
031385	ZDET16M512FR-721	GH1	11,30	22,92	5,00	1,20	0,02
030929	ZDET16M516FR-721	GH1	11,30	22,92	5,00	1,60	0,02
030930	ZDET16M520FR-721	GH1	11,30	22,92	5,00	2,00	0,02
030931	ZDET16M525FR-721	GH1	11,30	22,92	5,00	2,50	0,02
030932	ZDET16M530FR-721	GH1	11,30	22,92	5,00	3,00	0,02
030933	ZDET16M532FR-721	GH1	11,30	22,92	5,00	3,20	0,02
030934	ZDET16M540FR-721	GH1	11,30	22,92	5,00	4,00	0,02
030935	ZDET16M550FR-721	GH1	11,30	22,92	5,00	5,00	0,02
030936	ZDET16M560FR-721	GH1	11,30	22,92	5,00	6,00	0,02
030927	ZDET16M5PDFR-721	GH1	11,30	22,92	5,00	Facet	0,02



ZDET_-721

Ground circumference X 90° one face pressed chip-breaker

4 Examples (continued on next page)

5720	V	Z	-	16	C	A
5505	V	X	-	16	C	A
7220	V	M	-	11	-	-
5230	V	S	-	12	-	A
1	2	3	4	5	6	7

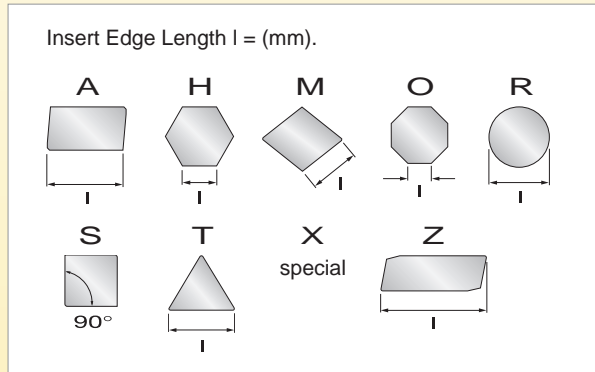
1 Series Type

Series Number 5720

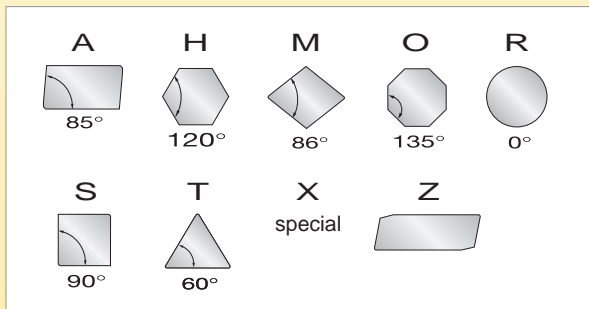
2 Insert Fixation

V = Screw

5 Insert Size



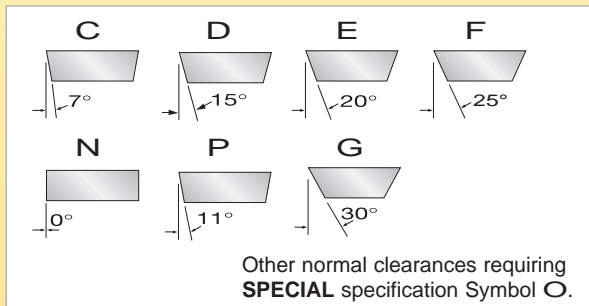
3 Insert Shape



6 Body Fixation

- = Shell Mill
- C = Cylindrical Shank
- F = Caterpillar Vee Flange
- G = ISO 50 Taper DIN 6987
- H = HSK
- S = Modular head
- W = Weldon Shank

4 Insert Clearance Angle

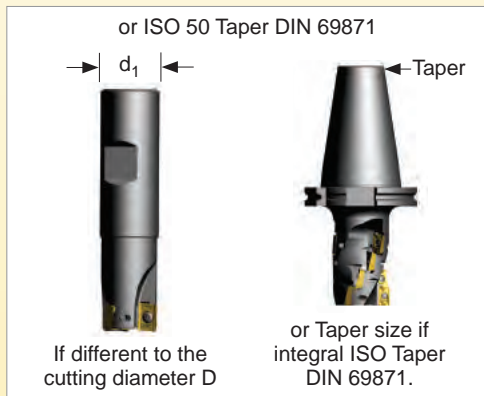


7 Coolant

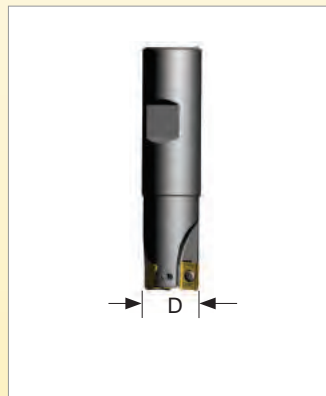
A = Through tool coolant
 No "A" = without through tool coolant

-	025	Z03	R	75	-	8	-
20 /	016	-	R	30	-	-	-
-	160	-	R	18/20	-	-	N
-	063	Z04	R	94	-	-	-
8	9	10	11	12	13	14	

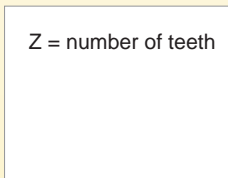
8 Shank Diameter



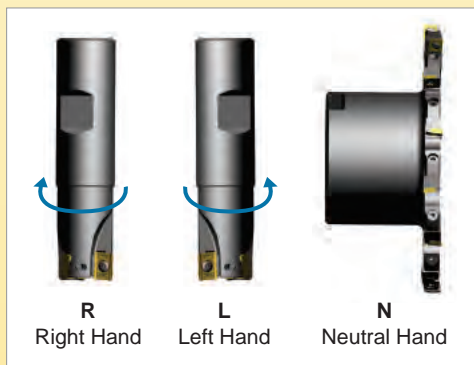
9 Cutting Diameter



10 Teeth



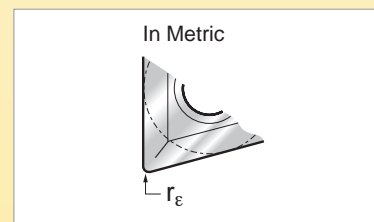
11 Position



12 Reach Length

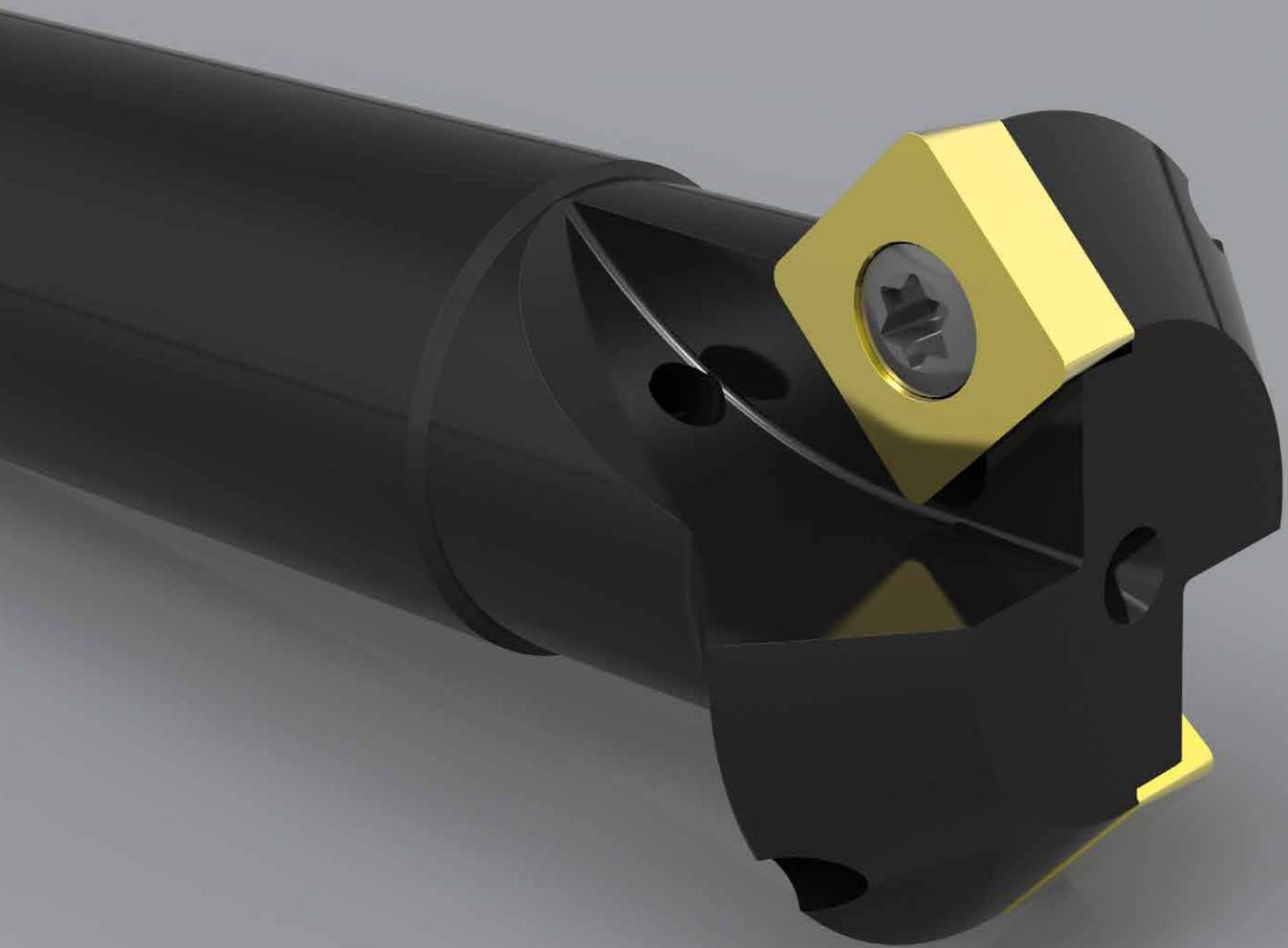


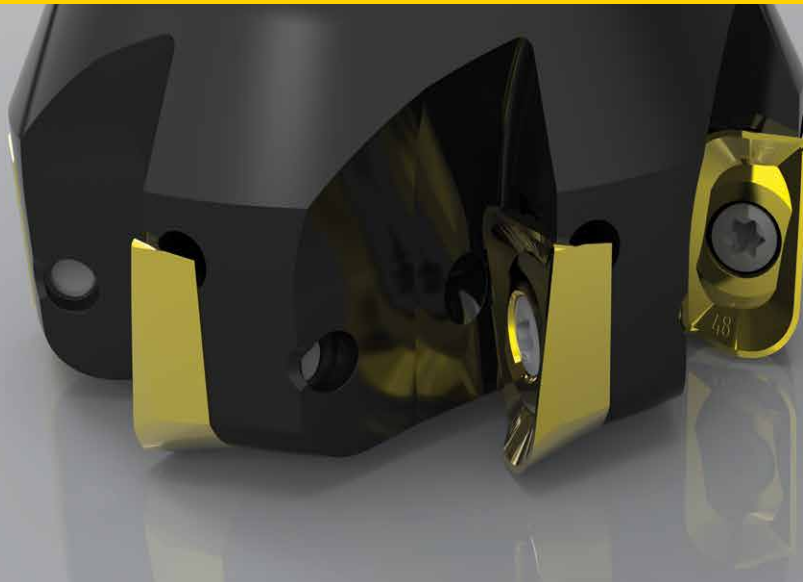
13 Max. Insert Radius



14 Assembly

R = Right hand
L = Left hand
N = Neutral





90 DEGREE CUTTERS

Kennametal offers a number of 90 degree cutters for shoulder milling, face milling and slotting.

7690VA cutters are available in a wide range of depth-of-cut variations. Inserts are available in 9mm, 12mm and 16mm sizes. An extensive range of geometries and grades are available for all applications.

Applications:

The 7690VA series are ideal for roughing, semi-finishing and finishing of Steel, Alloyed Steel, Stainless Steel, Cast Iron, High Temperature Alloys and Aluminium Alloys.

The **7690VAP** series are ideal for roughing, semi-finishing and finishing of Stainless Steel, High Temperature Alloys plus Low Carbon Steels. This cutter is designed to utilise one geometry of insert only - APET1604...ER-48

Note: When an approx. 90° shoulder is required then the following geometries need to be used.

- 7690VA09: Geometry -42
- 7690VA12: Geometry -46
- 7690VA16: Geometry -42, -46 and the flat insert APFW...
- 7690VAP16: Geometry -48

See the 90° deviations charts on pages A59 - A62.

7690VA

7690VA09:

Maximum $a_p = 8,00\text{mm}$
Diameter Range = 10mm to 63mm

7690VA12:

Maximum $a_p = 11,00\text{mm}$
Diameter Range = 20mm to 80mm

7690VA16:

Maximum $a_p = 16,00\text{mm}$
Diameter Range = 25mm to 125mm

Note: Larger diameter Shell Mill Fixation cutters with interchangeable cartridges are available. Please see page A112

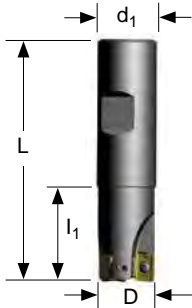
7690VAP16:

Maximum $a_p = 15,80\text{mm}$
Diameter Range = 40mm to 100mm

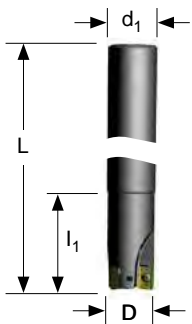




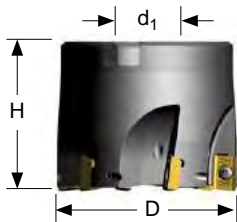
End Mills & Face Mills



Weldon Shank



Cylindrical Shank



Shell Mill Fixation



Modular Head



Depth of Cut (ap)

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7690VA09 Weldon Shank												
021693	7690VA09WA010R	10	68	20	16	8,50	1	015267	F2505TP	018488	T7	0,80
021694	7690VA09WA012R	12	70	22	16	8,50	1	015267	F2505TP	018488	T7	0,80
021695	7690VA09WA014R	14	73	25	16	8,50	1	015267	F2505TP	018488	T7	0,80
021696	7690VA09WA016R	16	75	27	16	8,50	2	015267	F2505TP	018488	T7	0,80
021697	7690VA09WA018R	18	80	30	20	8,50	2	015267	F2505TP	018488	T7	0,80
021698	7690VA09WA020R	20	82	32	20	8,50	3	015267	F2505TP	018488	T7	0,80
021699	7690VA09WA025R	25	96	40	25	8,50	4	015268	F2506TP	018488	T7	0,80
023055	7690VA09WA032R	32	96	40	25	8,50	5	015268	F2506TP	018488	T7	0,80
7690VA09 Cylindrical Shank - Medium and Fine Pitch												
031084	7690VA09CA016Z2R30	16	150	30	16	8,50	2	015267	F2505TP	018488	T7	0,80
031107	7690VA09CA020Z2R40	20	180	40	20	8,50	2	015267	F2505TP	018488	T7	0,80
031108	7690VA09CA020Z3R40	20	180	40	20	8,50	3	015267	F2505TP	018488	T7	0,80
031109	7690VA09CA025Z3R50	25	200	50	25	8,50	3	015268	F2506TP	018488	T7	0,80
7690VA09 Shell Mill Fixation												
021690	7690VA09-A032R	32	28	-	13	8,50	5	015268	F2506TP	018488	T7	0,80
017986	7690VA09-A040R	40	32	-	16	8,50	6	015268	F2506TP	018488	T7	0,80
021691	7690VA09-A050R	50	40	-	22	8,50	7	015268	F2506TP	018488	T7	0,80
021692	7690VA09-A063R	63	40	-	22	8,50	8	015268	F2506TP	018488	T7	0,80

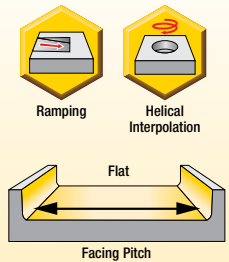
Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	M	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7690VA09 Modular Head - Medium and Fine Pitch												
031114	7690VA09SA016Z2R25	16	25	M8	8,50	8,50	2	015267	F2505TP	018488	T7	0,80
031115	7690VA09SA020Z3R35	20	35	M10	10,50	8,50	3	015267	F2505TP	018488	T7	0,80
031116	7690VA09SA025Z3R35	25	35	M12	12,50	8,50	3	015268	F2506TP	018488	T7	0,80
031117	7690VA09SA025Z4R35	25	35	M12	12,50	8,50	4	015268	F2506TP	018488	T7	0,80
031118	7690VA09SA032Z5R35	32	35	M16	17,00	8,50	5	015268	F2506TP	018488	T7	0,80

Note: For cylindrical shank extensions in high density alloy with through coolant refer to page A76.

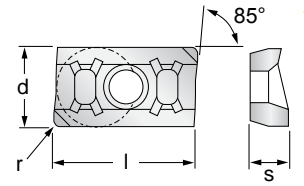
Note: To use radius larger than 1,20mm the cutter body needs to be modified for additional clearance by the end user.

7690VA09 Technical Information (mm)

Product		Dimensions						Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a _p max Helical / Linear		
021693	7690VA09WA010R	10	9.60	9	18	1,00	8500	
021694	7690VA09WA012R	12	8.60	13	22	1,00	8300	
021695	7690VA09WA014R	14	6.60	17	26	1,00	7100	
021696	7690VA09WA016R	16	5.10	21	30	1,00	6350	
021697	7690VA09WA018R	18	4.10	25	34	1,00	5750	
021698	7690VA09WA020R	20	3.40	29	38	1,00	5300	
021699	7690VA09WA025R	25	2.40	39	48	1,00	4550	
023055	7690VA09WA032R	32	1.70	53	62	1,00	3850	
031084	7690VA09CA016Z2R30	16	5.10	21	30	1,00	6350	
031107	7690VA09CA020Z2R40	20	3.40	29	38	1,00	5300	
031108	7690VA09CA020Z3R40	20	3.40	29	38	1,00	5300	
031109	7690VA09CA025Z3R50	25	2.40	39	48	1,00	4550	
021690	7690VA09-A032R	32	1.70	53	62	1,00	3850	
017986	7690VA09-A040R	40	1.25	69	78	1,00	3400	
021691	7690VA09-A050R	50	1.00	89	98	1,00	2950	
021692	7690VA09-A063R	63	0.80	115	124	1,00	2600	
031114	7690VA09SA016Z2R25	16	5.10	21	30	1,00	6350	
031115	7690VA09SA020Z3R35	20	3.40	29	38	1,00	5300	
031116	7690VA09SA025Z3R35	25	2.40	39	48	1,00	4550	
031117	7690VA09SA025Z4R35	25	2.40	39	48	1,00	4550	
031118	7690VA09SA032Z5R35	32	1.70	53	62	1,00	3850	



Note: If using a insert with radius, then the facing pitch for all 7690VA series cutters is equal to the cutting diameter (D) minus 2 x chosen radius.



End Mills & Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max 8,50	a _p min - max 1,00 - 4,00	a _p min - max 0,10 - 1,00					
031076	ADET090308SR-42	X500	◆◆◆	◆◆◆	-	6,35	9,20	3,18	0,80	0,10
031075	ADET090308SR-42	SP6519	◆◆◆	◆◆◆	◆◆◆	6,35	9,20	3,18	0,80	0,10
024913	ADET090310SR-42	X500	◆◆◆	◆◆◆	-	6,35	9,20	3,18	1,00	0,10
031094	ADET090310SR-42	SP6519	◆◆◆	◆◆◆	◆◆◆	6,35	9,20	3,18	1,00	0,10
031095	ADET090312SR-42	X500	◆◆◆	◆◆◆	-	6,35	9,20	3,18	1,20	0,10
031096	ADET090312SR-42	SP6519	◆◆◆	◆◆◆	◆◆◆	6,35	9,20	3,18	1,20	0,10
030942	ADET090316SR-42	X500	◆◆◆	◆◆◆	-	6,35	9,20	3,18	1,60	0,10
030980	ADET090316SR-42	SP6519	◆◆◆	◆◆◆	◆◆◆	6,35	9,20	3,18	1,60	0,10
031097	ADET090320SR-42	X500	◆◆◆	◆◆◆	-	6,35	9,20	3,18	2,00	0,10
031098	ADET090320SR-42	SP6519	◆◆◆	◆◆◆	◆◆◆	6,35	9,20	3,18	2,00	0,10
031099	ADET090324SR-42	X500	◆◆◆	◆◆◆	-	6,35	9,20	3,18	2,40	0,10
031100	ADET090324SR-42	SP6519	◆◆◆	◆◆◆	◆◆◆	6,35	9,20	3,18	2,40	0,10
031101	ADET090330SR-42	X500	◆◆◆	◆◆◆	-	6,35	9,20	3,18	3,00	0,10
031102	ADET090330SR-42	SP6519	◆◆◆	◆◆◆	◆◆◆	6,35	9,20	3,18	3,00	0,10
031103	ADET090332SR-42	X500	◆◆◆	◆◆◆	-	6,35	9,20	3,18	3,20	0,10
031104	ADET090332SR-42	SP6519	◆◆◆	◆◆◆	◆◆◆	6,35	9,20	3,18	3,20	0,10
031092	ADET0903PDSR-42	X500	◆◆◆	◆◆◆	-	6,35	9,20	3,18	Facet	0,10
031093	ADET0903PDSR-42	SP6519	◆◆◆	◆◆◆	◆◆◆	6,35	9,20	3,18	Facet	0,10
024916	ADET0903PDFR-441	GH1	◆	◆	◆	6,35	9,20	3,18	Facet	0,03
015150	ADKT0903PDER-43	X500	●●●	●●●	-	6,35	9,20	3,18	Facet	0,07
031463	ADKT0903PDER-43	SP6519	◆◆◆	◆◆◆	-	6,35	9,20	3,18	Facet	0,07
017286	ADKT0903PDER-43	MP91M	◆◆	◆◆	-	6,35	9,20	3,18	Facet	0,07

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

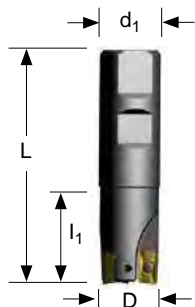
7690VA09 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
SR-42	X500	Facing	-	-	0,06 - 0,14	0,06 - 0,12	-	-	-	-	-	0,06 - 0,10	0,06 - 0,10	0,06 - 0,10	0,06 - 0,11	-	-
SR-42	SP6519	Facing	0,06 - 0,14	0,06 - 0,12	0,06 - 0,12	0,06 - 0,10	-	-	-	-	-	0,06 - 0,10	0,06 - 0,10	0,06 - 0,10	0,06 - 0,11	-	-
FR-441	GH1	Facing	-	-	-	-	-	-	-	0,03 - 0,15	0,03 - 0,13	-	-	-	-	-	-
ER-43	X500	Facing	0,05 - 0,14	0,05 - 0,12	-	0,05 - 0,10	-	-	-	-	-	-	-	-	-	-	-
ER-43	SP6519	Facing	0,05 - 0,12	0,05 - 0,10	0,05 - 0,10	-	0,05 - 0,14	0,05 - 0,14	0,05 - 0,14	-	-	-	-	-	-	-	-
ER-43	MP91M	Facing	0,05 - 0,12	-	-	-	0,05 - 0,14	0,05 - 0,14	0,05 - 0,14	-	-	-	-	-	-	-	-

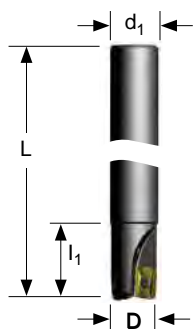
Note: HTA = High Temperature Alloys. | Speed recommendations can be found on page A58.



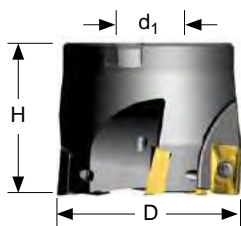
End Mills & Face Mills



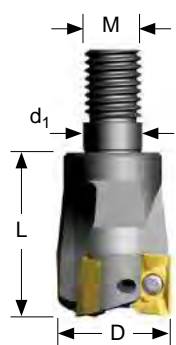
Weldon Shank



Cylindrical Shank



Shell Mill Fixation



Modular Head



Depth of Cut (ap)

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7690VA12 Weldon Shank - Medium and Fine Pitch												
027917	7690VA12WA020Z02R032	20	82	32	20	11,00	2	027860	F3007T	022157	T8	1,40
027918	7690VA12WA025Z02R040	25	96	40	25	11,00	2	027860	F3007T	022157	T8	1,40
027921	7690VA12WA025Z03R040	25	96	40	25	11,00	3	027860	F3007T	022157	T8	1,40
027919	7690VA12WA032Z03R040	32	100	40	32	11,00	3	027860	F3007T	022157	T8	1,40
027922	7690VA12WA032Z04R040	32	100	40	32	11,00	4	027860	F3007T	022157	T8	1,40
027920	7690VA12WA040Z04R050	40	110	50	32	11,00	4	027860	F3007T	022157	T8	1,40
027923	7690VA12WA040Z05R050	40	110	50	32	11,00	5	027860	F3007T	022157	T8	1,40
7690VA12 Cylindrical Shank - Medium and Fine Pitch												
031655	7690VA12CA020Z02R032	20	204	32	20	11,00	2	027860	F3007T	022157	T8	1,40
031646	7690VA12CA020Z02R32-3	20	115	32	20	11,00	2	027860	F3007T	022157	T8	1,40
031656	7690VA12CA025Z02R040	25	130	40	25	11,00	2	027860	F3007T	022157	T8	1,40
031648	7690VA12CA025Z03R040	25	210	40	25	11,00	3	027860	F3007T	022157	T8	1,40
031647	7690VA12CA025Z03R40-3	25	130	40	25	11,00	3	027860	F3007T	022157	T8	1,40
031649	7690VA12CA032Z03R040	32	250	40	32	11,00	3	027860	F3007T	022157	T8	1,40
031657	7690VA12CA032Z04R040	32	250	40	32	11,00	4	027860	F3007T	022157	T8	1,40
7690VA12 Shell Mill Fixation - Medium and Fine Pitch												
027927	7690VA12-A040Z04R	40	32	-	16	11,00	4	027860	F3007T	022157	T8	1,40
027931	7690VA12-A040Z05R	40	32	-	16	11,00	5	027860	F3007T	022157	T8	1,40
027928	7690VA12-A050Z05R	50	40	-	22	11,00	5	027860	F3007T	022157	T8	1,40
027932	7690VA12-A050Z06R	50	40	-	22	11,00	6	027860	F3007T	022157	T8	1,40
027929	7690VA12-A063Z06R	63	40	-	22	11,00	6	027860	F3007T	022157	T8	1,40
027933	7690VA12-A063Z08R	63	40	-	22	11,00	8	027860	F3007T	022157	T8	1,40
027930	7690VA12-A080Z07R	80	50	-	27	11,00	7	027860	F3007T	022157	T8	1,40
027934	7690VA12-A080Z10R	80	50	-	27	11,00	10	027860	F3007T	022157	T8	1,40

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	M	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7690VA12 Modular Head - Medium and Fine Pitch												
031105	7690VA12SA020Z2R35	20	35	M10	10,50	11,00	2	027860	F3007T	022157	T8	1,40
031197	7690VA12SA025Z2R35	25	35	M12	12,50	11,00	2	027860	F3007T	022157	T8	1,40
031106	7690VA12SA025Z3R35	25	35	M12	12,50	11,00	3	027860	F3007T	022157	T8	1,40
031198	7690VA12SA032Z3R43	32	43	M16	17,00	11,00	3	027860	F3007T	022157	T8	1,40
031199	7690VA12SA032Z4R43	32	43	M16	17,00	11,00	4	027860	F3007T	022157	T8	1,40

Note: For cylindrical shank extensions in high density alloy with through coolant refer to page A76.

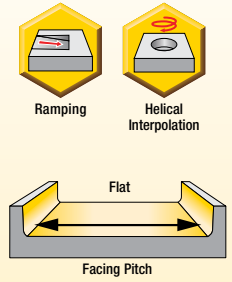
Note: To use radius larger than 1,60mm the cutter body needs to be modified for additional clearance by the end user.



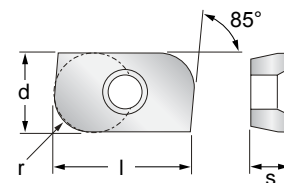
End Mills & Face Mills

7690VA12 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle α	Helical Hole min. - max.		a_p max Helical / Linear	Max RPM
027917	7690VA12WA020Z02R032	20	5.58	26	38	1,50	43000
027918	7690VA12WA025Z02R040	25	3.67	36	48	1,50	36000
027921	7690VA12WA025Z03R040	25	3.67	36	48	1,50	36000
027919	7690VA12WA032Z03R040	32	2.30	50	62	1,50	30000
027922	7690VA12WA032Z04R040	32	2.30	50	62	1,50	30000
027920	7690VA12WA040Z04R050	40	1.60	66	78	1,50	26000
027923	7690VA12WA040Z05R050	40	1.60	66	78	1,50	26000
031655	7690VA12CA020Z02R032	20	5.58	26	38	1,50	43000
031646	7690VA12CA020Z02R32-3	20	5.58	26	38	1,50	43000
031656	7690VA12CA025Z02R040	25	3.67	36	48	1,50	36000
031648	7690VA12CA025Z03R040	25	3.67	36	48	1,50	36000
031647	7690VA12CA025Z03R40-3	25	3.67	36	48	1,50	36000
031649	7690VA12CA032Z03R040	32	2.30	50	62	1,50	30000
031657	7690VA12CA032Z04R040	32	2.30	50	62	1,50	30000
027927	7690VA12-A040Z04R	40	1.60	66	78	1,50	26000
027931	7690VA12-A040Z05R	40	1.60	66	78	1,50	26000
027928	7690VA12-A050Z05R	50	1.22	86	98	1,50	23000
027932	7690VA12-A050Z06R	50	1.22	86	98	1,50	23000
027929	7690VA12-A063Z06R	63	0.91	112	124	1,50	20000
027933	7690VA12-A063Z08R	63	0.91	112	124	1,50	20000
027930	7690VA12-A080Z07R	80	0.68	146	158	1,50	17500
027934	7690VA12-A080Z10R	80	0.68	146	158	1,50	17500
031105	7690VA12SA020Z2R35	20	5.58	26	38	1,50	43000
031197	7690VA12SA025Z2R35	25	3.67	36	48	1,50	36000
031106	7690VA12SA025Z3R35	25	3.67	36	48	1,50	36000
031198	7690VA12SA032Z3R43	32	2.30	50	62	1,50	30000
031199	7690VA12SA032Z4R43	32	2.30	50	62	1,50	30000



Note: If using an insert with radius, then the facing pitch for all 7690VA series cutters is equal to the cutting diameter (D) minus 2 x chosen radius.



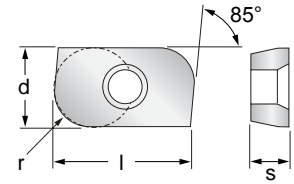
End Mills & Face Mills

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			a _p max 11,00	a _p min - max 1,50 - 5,00	a _p min - max 0,10 - 1,50					
030856	ADET12T308ER-48	X500	■ □ ◆	■ □ ◆	-	7,87	12,70	3,97	0,80	0,04
030857	ADET12T308ER-48	SP6519	● ○ ■	● ○ ■	● ■ ◆	7,87	12,70	3,97	0,80	0,04
030808	ADET12T312ER-48	X500	■ □ ◆	■ □ ◆	-	7,87	12,70	3,97	1,20	0,04
030800	ADET12T312ER-48	SP6519	● ○ ■	● ○ ■	● ■ ◆	7,87	12,70	3,97	1,20	0,04
030809	ADET12T316ER-48	X500	■ □ ◆	■ □ ◆	-	7,87	12,70	3,97	1,60	0,04
030771	ADET12T316ER-48	SP6519	● ○ ■	● ○ ■	● ■ ◆	7,87	12,70	3,97	1,60	0,04
030908	ADET12T320ER-48	X500	■ □ ◆	■ □ ◆	-	7,87	12,70	3,97	2,00	0,04
030909	ADET12T320ER-48	SP6519	● ○ ■	● ○ ■	● ■ ◆	7,87	12,70	3,97	2,00	0,04
030858	ADET12T324ER-48	X500	■ □ ◆	■ □ ◆	-	7,87	12,70	3,97	2,40	0,04
030859	ADET12T324ER-48	SP6519	● ○ ■	● ○ ■	● ■ ◆	7,87	12,70	3,97	2,40	0,04
030910	ADET12T330ER-48	X500	■ □ ◆	■ □ ◆	-	7,87	12,70	3,97	3,00	0,04
030911	ADET12T330ER-48	SP6519	● ○ ■	● ○ ■	● ■ ◆	7,87	12,70	3,97	3,00	0,04
030810	ADET12T332ER-48	X500	■ □ ◆	■ □ ◆	-	7,87	12,70	3,97	3,20	0,04
030772	ADET12T332ER-48	SP6519	● ○ ■	● ○ ■	● ■ ◆	7,87	12,70	3,97	3,20	0,04
030912	ADET12T340ER-48	X500	■ □ ◆	■ □ ◆	-	7,87	12,70	3,97	4,00	0,04
030913	ADET12T340ER-48	SP6519	● ○ ■	● ○ ■	● ■ ◆	7,87	12,70	3,97	4,00	0,04
030807	ADET12T3PDER-48	X500	■ □ ◆	■ □ ◆	-	7,87	12,70	3,97	Facet	0,04
030770	ADET12T3PDER-48	SP6519	● ○ ■	● ○ ■	● ■ ◆	7,87	12,70	3,97	Facet	0,04
029098	ADGT12T3PDFR-721	GH1	◆	◆	◆	7,87	12,70	3,97	Facet	0,04
029329	ADHT12T308ER-46	X500	■ □ ■	■ □ ■	-	7,87	12,70	3,97	0,80	0,05
030406	ADHT12T308ER-46	X700	● ○	■ □ ■	◆ ◆ ■	7,87	12,70	3,97	0,80	0,05
031526	ADHT12T308ER-46	SP6519	◆ □	■ □ ■	◆ ◆ ■ ◆	7,87	12,70	3,97	0,80	0,05
029331	ADHT12T316ER-46	X500	■ □ ■	■ □ ■	-	7,87	12,70	3,97	1,60	0,05
030407	ADHT12T316ER-46	X700	● ○	■ □ ■	◆ ◆ ■	7,87	12,70	3,97	1,60	0,05
031527	ADHT12T316ER-46	SP6519	◆ □	■ □ ■	◆ ◆ ■ ◆	7,87	12,70	3,97	1,60	0,05
029337	ADHT12T320ER-46	X500	■ □ ■	■ □ ■	-	7,87	12,70	3,97	2,00	0,05
030408	ADHT12T320ER-46	X700	● ○	■ □ ■	◆ ◆ ■	7,87	12,70	3,97	2,00	0,05
031530	ADHT12T320ER-46	SP6519	◆ □	■ □ ■	◆ ◆ ■ ◆	7,87	12,70	3,97	2,00	0,05



Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: Feed recommendations can be found on page A51. Speed recommendations can be found on page A58.



End Mills & Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max 11,00	a _p min - max 1,50 - 5,00	a _p min - max 0,10 - 1,50					
029333	ADHT12T324ER-46	X500	■◆	◆●	-	7,87	12,70	3,97	2,40	0,05
031528	ADHT12T324ER-46	SP6519	◆	◆◆	◆◆◆◆	7,87	12,70	3,97	2,40	0,05
029339	ADHT12T330ER-46	X500	■◆	◆●	-	7,87	12,70	3,97	3,00	0,05
031531	ADHT12T330ER-46	SP6519	◆	◆◆	◆◆◆◆	7,87	12,70	3,97	3,00	0,05
029036	ADHT12T332ER-46	X500	■◆	◆●	-	7,87	12,70	3,97	3,20	0,05
030409	ADHT12T332ER-46	X700	●○	◆◆	◆◆◆	7,87	12,70	3,97	3,20	0,05
031515	ADHT12T332ER-46	SP6519	◆	◆◆	◆◆◆◆	7,87	12,70	3,97	3,20	0,05
029335	ADHT12T340ER-46	X500	■◆	◆●	-	7,87	12,70	3,97	4,00	0,05
031529	ADHT12T340ER-46	SP6519	◆	◆◆	◆◆◆◆	7,87	12,70	3,97	4,00	0,05
029327	ADHT12T3PDER-46	X500	■◆	◆●	-	7,87	12,70	3,97	Facet	0,05
031525	ADHT12T3PDER-46	SP6519	◆	◆◆	◆◆◆◆	7,87	12,70	3,97	Facet	0,05
027913	ADKT12T3PDER-45	X500	●●●	●●●	-	7,87	12,70	3,97	Facet	0,08
031514	ADKT12T3PDER-45	SP6519	◆◆◆	◆◆◆	◆◆	7,87	12,70	3,97	Facet	0,08
027915	ADKT12T3PDER-45	MP91M	◆●●	◆◆●	●	7,87	12,70	3,97	Facet	0,08
027916	ADKT12T3PDER-45	SC3025	◆	◆	◆	7,87	12,70	3,97	Facet	0,08

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: ADKT12T3PDER-45 X500 should only be used in steel applications for difficult conditions.

7690VA12 Feeds f_z (mm/tooth)

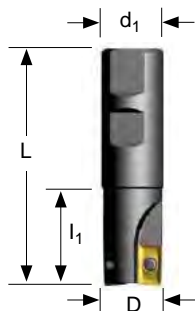
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1.400 N/mm ² >415 HBN	Chilled Cast Iron >1.400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
ER-48	X500	Facing	-	-	0,04 - 0,18	0,04 - 0,14	-	-	-	-	-	0,04 - 0,10	0,04 - 0,10	0,04 - 0,10	0,04 - 0,14	-	-
ER-48	SP6519	Facing	0,04 - 0,20	-	0,04 - 0,16	0,04 - 0,12	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08	0,04 - 0,08	0,04 - 0,12	-	-
FR-721	GH1	Facing	-	-	-	-	-	-	-	0,04 - 0,20	0,04 - 0,18	-	-	-	-	-	-
ER-46	X500	Facing	-	-	0,05 - 0,18	0,05 - 0,14	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,14	-	-
ER-46	X700	Facing	-	-	0,05 - 0,16	0,05 - 0,12	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,08	0,05 - 0,12	-	-
ER-46	SP6519	Facing	0,05 - 0,22	0,05 - 0,18	0,05 - 0,16	0,05 - 0,12	0,08 - 0,16	0,08 - 0,16	0,08 - 0,16	-	-	-	-	-	-	-	-
ER-45	X500	Facing	0,08 - 0,25	0,08 - 0,22	0,05 - 0,18	-	-	-	-	-	-	-	-	-	-	-	-
ER-45	SP6519	Facing	0,08 - 0,25	0,08 - 0,22	-	-	0,08 - 0,16	0,08 - 0,16	0,08 - 0,16	-	-	-	-	-	-	-	-
ER-45	MP91M	Facing	0,08 - 0,25	0,08 - 0,22	-	-	0,08 - 0,20	0,08 - 0,20	0,08 - 0,20	-	-	-	-	-	-	-	-
ER-45	SC3025	Facing	-	-	-	-	0,08 - 0,16	0,08 - 0,16	0,08 - 0,16	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

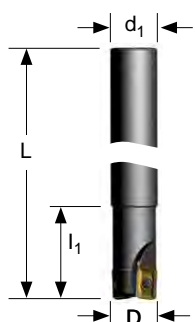
Note: Speed recommendations can be found on page A58.



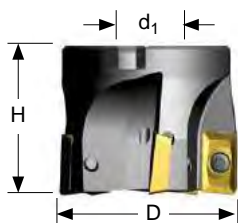
End Mills & Face Mills



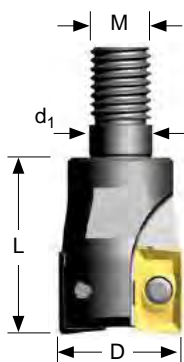
Weldon Shank



Cylindrical Shank



Shell Mill Fixation



Modular Head



Depth of Cut (a_p)

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l_1	d_1	a_p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7690VA16 Weldon Shank												
021707	7690VA16WA025R	25	96	40	25	16,00	2	015260	D4008T	015240	T15	3,10
021708	7690VA16WA032R	32	100	40	32	16,00	3	015262	D4010T	015240	T15	3,10
021709	7690VA16WA040R	40	110	50	32	16,00	4	015262	D4010T	015240	T15	3,10
7690VA16 Cylindrical Shank - Medium and Fine Pitch												
031168	7690VA16CA025Z2R50	25	200	50	25	16,00	2	015260	D4008T	015240	T15	3,10
031169	7690VA16CA032Z2R70	32	250	70	32	16,00	2	015262	D4010T	015240	T15	3,10
031170	7690VA16CA032Z3R70	32	250	70	32	16,00	3	015262	D4010T	015240	T15	3,10
7690VA16 Shell Mill Fixation												
017985	7690VA16-A040R	40	40	-	16	16,00	4	015262	D4010T	015240	T15	3,10
021700	7690VA16-A050R	50	40	-	22	16,00	5	015262	D4010T	015240	T15	3,10
021701	7690VA16-A063R	63	40	-	22	16,00	5	015262	D4010T	015240	T15	3,10
021702	7690VA16-A080R	80	50	-	27	16,00	6	015262	D4010T	015240	T15	3,10
021703	7690VA16-A100R	100	50	-	32	16,00	7	015262	D4010T	015240	T15	3,10
021704	7690VA16-A125R	125	63	-	40	16,00	8	015262	D4010T	015240	T15	3,10

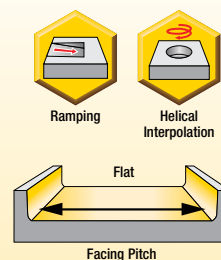
Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	M	d_1	a_p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7690VA16 Modular Head - Medium and Fine Pitch												
031174	7690VA16SA025Z2R35	25	35	M12	12,50	16,00	2	015260	D4008T	015240	T15	3,10
031175	7690VA16SA032Z2R43	32	43	M16	17,00	16,00	2	015262	D4010T	015240	T15	3,10
031176	7690VA16SA032Z3R43	32	43	M16	17,00	16,00	3	015262	D4010T	015240	T15	3,10

Note: For cylindrical shank extensions in high density alloy with through coolant refer to page A76.

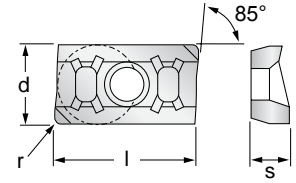
Note: To use radius larger than 2,00mm the cutter body needs to be modified for additional clearance by the end user.

7690VA16 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a_p max Helical / Linear	Max RPM
021707	7690VA16WA025R	25	2.50	33	48	2,00	38000
021708	7690VA16WA032R	32	1.50	47	62	2,00	31500
021709	7690VA16WA040R	40	1.00	63	78	2,00	27000
031168	7690VA16CA025Z2R50	25	2.50	33	48	2,00	38000
031169	7690VA16CA032Z2R70	25	1.50	47	62	2,00	31500
031170	7690VA16CA032Z3R70	32	1.50	47	62	2,00	31500
017985	7690VA16-A040R	40	1.00	63	78	2,00	27000
021700	7690VA16-A050R	50	0.70	83	98	2,00	23500
021701	7690VA16-A063R	63	0.50	109	124	2,00	20500
021702	7690VA16-A080R	80	0.30	143	158	2,00	18000
021703	7690VA16-A100R	100	0.20	183	198	2,00	15500
021704	7690VA16-A125R	125	0.10	233	248	2,00	14000
031174	7690VA16SA025Z2R35	25	2.50	33	48	2,00	38000
031175	7690VA16SA032Z2R43	32	1.50	47	62	2,00	31500
031176	7690VA16SA032Z3R43	32	1.50	47	62	2,00	31500



Note: If using a insert with radius, then the facing pitch for all 7690VA series cutters is equal to the cutting diameter (D) minus 2 x chosen radius.



End Mills & Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max 16,00	a _p min - max 1,50 - 5,00	a _p min - max 0,10 - 1,50					
033179	APET160402TR-42	SP6519	●●●○	■●●○	■●	9,52	16,66	4,76	0,20	0,10
033180	APET160408TR-42	SP6519	●●●○	■●●○	■●	9,52	16,66	4,76	0,80	0,10
033181	APET160410TR-42	SP6519	●●●○	■●●○	■●	9,52	16,66	4,76	1,00	0,10
033182	APET160415TR-42	SP6519	●●●○	■●●○	■●	9,52	16,66	4,76	1,50	0,10
033183	APET160420TR-42	SP6519	●●●○	■●●○	■●	9,52	16,66	4,76	2,00	0,10
033184	APET160425TR-42	SP6519	●●●○	■●●○	■●	9,52	16,66	4,76	2,50	0,10
033185	APET160430TR-42	SP6519	●●●○	■●●○	■●	9,52	16,66	4,76	3,00	0,10
033186	APET160440TR-42	SP6519	●●●○	■●●○	■●	9,52	16,66	4,76	4,00	0,10
033187	APET160460TR-42	SP6519	●●●○	■●●○	■●	9,52	16,66	4,76	6,00	0,10
015155	APHT1604PDTR-42	X500	●○	-	-	9,52	16,66	4,76	Facet	0,10
031466	APHT1604PDTR-42	SP6519	●●●○	■●●○	■●	9,52	16,66	4,76	Facet	0,10
017293	APHT1604PDTR-42	MP91M	-	■●	■●	9,52	16,66	4,76	Facet	0,10
033188	APEX1604PDER-701	SP6519	-	-	●	9,52	16,66	4,76	Facet	0,02
033189	APEX1604PDFR-701	SP4019	●	●	●	9,52	16,66	4,76	Facet	0,02
014066	APEX1604PDFR-701	GH1	◆	◆	◆	9,52	16,66	4,76	Facet	0,02
033190	APFW1604PDTR	X400	●	◆	●	9,52	16,66	4,76	Facet	0,10
033191	APFW1604PDTR	SP4019	●	■	◆	9,52	16,66	4,76	Facet	0,10
027883	APFW1604PDTR	SC3025	■	◆	◆	9,52	16,66	4,76	Facet	0,10
017628	APFW1604PDTR	GH1	-	●	●	9,52	16,66	4,76	Facet	0,10
033192	APHT1604PDER	SP4019	-	-	●	9,52	16,66	4,76	Facet	0,05
015154	APHT1604PDFR	GH1	■	■	■	9,52	16,66	4,76	Facet	0,02

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: APHT1604PDTR-42 X500 should be used for Stainless Steel with heavy scale

Note: APFW1604PDTR X400 should be used for Alloyed Steel with heavy scale

Note: APFW1604PDTR SP4019 should be used for High Temperature Alloys with heavy scale

Note: Feed recommendations can be found on page A55. Speed recommendations can be found on page A58.



End Mills & Face Mills



APHT16-46



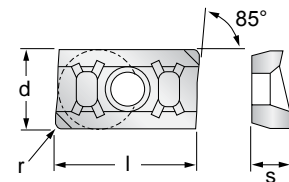
APET16-48



APKT16-43



APKT16-45



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			a _p max 16,00	a _p min - max 1,50 - 5,00	a _p min - max 0,10 - 1,50					
027869	APHT160408ER-46	X500	■◆	◆	●	9,52	16,66	4,76	0,80	0,05
031495	APHT160408ER-46	SP6519	◆	◆	◆◆◆	9,52	16,66	4,76	0,80	0,05
027870	APHT160416ER-46	X500	■◆	◆	●	9,52	16,66	4,76	1,60	0,05
031496	APHT160416ER-46	SP6519	◆	◆	◆◆◆	9,52	16,66	4,76	1,60	0,05
027871	APHT160424ER-46	X500	■◆	◆	●	9,52	16,66	4,76	2,40	0,05
031497	APHT160424ER-46	SP6519	◆	◆	◆◆◆	9,52	16,66	4,76	2,40	0,05
027872	APHT160432ER-46	X500	■◆	◆	●	9,52	16,66	4,76	3,20	0,05
031397	APHT160432ER-46	SP6519	◆	◆	◆◆◆	9,52	16,66	4,76	3,20	0,05
027873	APHT160440ER-46	X500	■◆	◆	●	9,52	16,66	4,76	4,00	0,05
031542	APHT160440ER-46	SP6519	◆	◆	◆◆◆	9,52	16,66	4,76	4,00	0,05
027874	APHT160450ER-46	X500	■◆	◆	●	9,52	16,66	4,76	5,00	0,05
031498	APHT160450ER-46	SP6519	◆	◆	◆◆◆	9,52	16,66	4,76	5,00	0,05
027875	APHT160464ER-46	X500	■◆	◆	●	9,52	16,66	4,76	6,40	0,05
031541	APHT160464ER-46	SP6519	◆	◆	◆◆◆	9,52	16,66	4,76	6,40	0,05
030811	APET1604PDER-48	X500	◆	◆	■	9,52	16,66	4,76	Facet	0,04
030773	APET1604PDER-48	SP6519	●	●	●◆◆◆	9,52	16,66	4,76	Facet	0,04
030860	APET160408ER-48	X500	◆	◆	■	9,52	16,66	4,76	0,80	0,04
030861	APET160408ER-48	SP6519	●	●	●◆◆◆	9,52	16,66	4,76	0,80	0,04
015156	APKT1604PDER-43	X500	●	-	-	9,52	16,66	4,76	Facet	0,08
031468	APKT1604PDER-43	SP6519	◆◆	-	-	9,52	16,66	4,76	Facet	0,08
017294	APKT1604PDER-43	MP91M	■◆●	-	-	9,52	16,66	4,76	Facet	0,08
027887	APKT1604PDER-43	SC3025	◆	-	-	9,52	16,66	4,76	Facet	0,08
023115	APKT1604PDER-45	X500	-	■	-	9,52	16,66	4,76	Facet	0,08
031469	APKT1604PDER-45	SP6519	-	◆◆	-	9,52	16,66	4,76	Facet	0,08
023114	APKT1604PDER-45	MP91M	-	●	-	9,52	16,66	4,76	Facet	0,08



Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: APKT1604PDER-43 X500 should be used for Steel with heavy scale.

Note: Feed recommendations can be found on page A55. Speed recommendations can be found on page A58.



End Mills & Face Mills

7690VA16 Feeds f_z (mm/tooth)

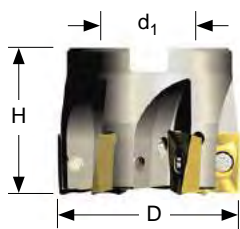
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN	
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
TR-42	X500	Facing	-	-	0,10 - 0,25	0,10 - 0,22	-	-	-	-	-	-	-	-	-	-	-	
TR-42	SP6519	Facing	0,10 - 0,28	0,10 - 0,23	0,10 - 0,22	0,10 - 0,20	-	-	-	-	-	-	-	-	-	-	-	
TR-42	MP91M	Facing	-	-	-	-	0,08 - 0,25	0,08 - 0,20	0,08 - 0,20	-	-	-	-	-	-	-	0,03 - 0,06	0,05 - 0,08
ER-701	SP6519	Facing	-	-	-	-	-	-	-	-	-	0,02 - 0,05	0,02 - 0,05	0,02 - 0,05	0,02 - 0,05	-	-	
FR-701	SP4019	Facing	-	-	-	-	-	-	-	0,03 - 0,20	0,03 - 0,18	-	-	-	-	-	-	
FR-701	GH1	Facing	-	-	-	-	-	-	-	0,03 - 0,20	0,03 - 0,18	-	-	-	-	-	-	
TR	X400	Facing	-	0,10 - 0,25	-	-	-	-	-	-	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	
TR	SP4019	Facing	-	-	-	-	-	-	-	-	-	0,08 - 0,10	0,08 - 0,10	0,08 - 0,10	0,08 - 0,12	0,05 - 0,10	0,05 - 0,10	
TR	SC3025	Facing	-	-	-	-	0,10 - 0,22	0,10 - 0,22	0,10 - 0,22	-	-	-	-	-	-	-	-	
TR	GH1	Facing	-	-	-	-	0,10 - 0,22	0,10 - 0,22	0,10 - 0,22	-	-	-	-	-	-	-	-	
ER	SP4019	Facing	-	-	0,05 - 0,18	-	-	-	-	-	-	-	-	-	-	-	-	
FR	GH1	Facing	-	-	-	-	-	-	-	0,03 - 0,20	0,03 - 0,18	-	-	-	-	-	-	
ER-46	X500	Facing	-	-	0,04 - 0,25	0,04 - 0,22	-	-	-	-	-	0,04 - 0,10	0,04 - 0,10	0,04 - 0,10	0,04 - 0,14	-	-	
ER-46	SP6519	Facing	0,04 - 0,25	0,04 - 0,20	0,04 - 0,24	0,04 - 0,20	-	-	-	-	-	-	-	-	-	-	-	
ER-48	X500	Facing	-	-	-	-	-	-	-	-	-	0,04 - 0,10	0,04 - 0,10	0,04 - 0,10	0,04 - 0,14	-	-	
ER-48	SP6519	Facing	0,05 - 0,20	0,05 - 0,18	0,04 - 0,16	0,04 - 0,12	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08	0,04 - 0,08	0,04 - 0,12	-	-	
ER-43	X500	Facing	0,08 - 0,30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ER-43	SP6519	Facing	0,05 - 0,28	0,05 - 0,23	-	-	-	-	-	-	-	-	-	-	-	-	-	
ER-43	MP91M	Facing	0,06 - 0,27	0,06 - 0,22	-	-	0,06 - 0,25	0,06 - 0,25	0,06 - 0,20	-	-	-	-	-	-	-	-	
ER-43	SC3025	Facing	-	-	-	-	0,06 - 0,25	0,06 - 0,25	0,06 - 0,20	-	-	-	-	-	-	-	-	
ER-45	X500	Facing	-	0,08 - 0,22	-	-	-	-	-	-	-	-	-	-	-	-	-	
ER-45	SP6519	Facing	0,06 - 0,25	0,06 - 0,20	-	-	-	-	-	-	-	-	-	-	-	-	-	
ER-45	MP91M	Facing	0,08 - 0,25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Note: HTA = High Temperature Alloys



Speed recommendations can be found on page A58.



End Mills & Face Mills



Shell Mill Fixation

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7690VAP16 Shell Mill Fixation												
034573	7690VAP16-A040Z05R	40	40	-	16	15,8	5	015262	D4010T	015240	T15	3,10
034574	7690VAP16-A050Z06R	50	40	-	22	15,8	6	015262	D4010T	015240	T15	3,10
034575	7690VAP16-A063Z07R	63	40	-	22	15,8	7	015262	D4010T	015240	T15	3,10
034576	7690VAP16-A080Z08R	80	50	-	27	15,8	8	015262	D4010T	015240	T15	3,10
034584	7690VAP16-A100Z10R	100	55	-	32	15,8	10	015262	D4010T	015240	T15	3,10

Note: To use radius larger than 2,00mm the cutter body needs to be modified for additional clearance by the end user. The 7690VAP series are ideal for roughing, semi-finishing and finishing of Stainless Steel, High Temperature Alloys plus Low Carbon Steels. **This cutter is designed to utilise one geometry of insert only - APET1604...ER-48**

7690VAP16 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a _p max Helical / Linear	Max RPM
034573	7690VAP16-A040Z05R	40	-	-	-	-	27000
034574	7690VAP16-A050Z06R	50	-	-	-	-	23500
034575	7690VAP16-A063Z07R	63	-	-	-	-	20500
034576	7690VAP16-A080Z08R	80	-	-	-	-	18000
034584	7690VAP16-A100Z10R	100	-	-	-	-	15500

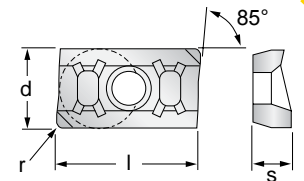
Note: If using a insert with radius, then the facing pitch for all 7690VA series cutters is equal to the cutting diameter (D) minus 2 x chosen radius.



Depth of Cut (a_p)



APET16-48



End Mills & Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			ap max. 15,80	ap min. - max. 1,50 - 5,00	ap min. - max. 0,10 - 1,50					
030811	APET1604PDER-48	X500	■◆◆	◆◆◆◆	◆◆◆	9,52	16,66	4,76	Facet	0,04
030733	APET1604PDER-48	SP6519	◆◆◆	◆◆◆◆◆	◆◆◆◆◆	9,52	16,66	4,76	Facet	0,04
030860	APET160408ER-48	X500	■◆◆	◆◆◆◆	◆◆◆	9,52	16,66	4,76	0,80	0,04
030861	APET160408ER-48	SP6519	◆◆◆	◆◆◆◆◆	◆◆◆◆◆	9,52	16,66	4,76	0,80	0,04
030812	APET160412ER-48	X500	■◆◆	◆◆◆◆	◆◆◆	9,52	16,66	4,76	1,20	0,04
030799	APET160412ER-48	SP6519	◆◆◆	◆◆◆◆◆	◆◆◆◆◆	9,52	16,66	4,76	1,20	0,04
030813	APET160416ER-48	X500	■◆◆	◆◆◆◆	◆◆◆	9,52	16,66	4,76	1,60	0,04
030774	APET160416ER-48	SP6519	◆◆◆	◆◆◆◆◆	◆◆◆◆◆	9,52	16,66	4,76	1,60	0,04
030914	APET160420ER-48	X500	■◆◆	◆◆◆◆	◆◆◆	9,52	16,66	4,76	2,00	0,04
030915	APET160420ER-48	SP6519	◆◆◆	◆◆◆◆◆	◆◆◆◆◆	9,52	16,66	4,76	2,00	0,04
030916	APET160424ER-48	X500	■◆◆	◆◆◆◆	◆◆◆	9,52	16,66	4,76	2,40	0,04
030917	APET160424ER-48	SP6519	◆◆◆	◆◆◆◆◆	◆◆◆◆◆	9,52	16,66	4,76	2,40	0,04
030918	APET160430ER-48	X500	■◆◆	◆◆◆◆	◆◆◆	9,52	16,66	4,76	3,00	0,04
030919	APET160430ER-48	SP6519	◆◆◆	◆◆◆◆◆	◆◆◆◆◆	9,52	16,66	4,76	3,00	0,04
030814	APET160432ER-48	X500	■◆◆	◆◆◆◆	◆◆◆	9,52	16,66	4,76	3,20	0,04
030775	APET160432ER-48	SP6519	◆◆◆	◆◆◆◆◆	◆◆◆◆◆	9,52	16,66	4,76	3,20	0,04
030907	APET160440ER-48	X500	■◆◆	◆◆◆◆	◆◆◆	9,52	16,66	4,76	4,00	0,04
030906	APET160440ER-48	SP6519	◆◆◆	◆◆◆◆◆	◆◆◆◆◆	9,52	16,66	4,76	4,00	0,04
030920	APET160450ER-48	X500	■◆◆	◆◆◆◆	◆◆◆	9,52	16,66	4,76	5,00	0,04
030921	APET160450ER-48	SP6519	◆◆◆	◆◆◆◆◆	◆◆◆◆◆	9,52	16,66	4,76	5,00	0,04
030922	APET160460ER-48	X500	■◆◆	◆◆◆◆	◆◆◆	9,52	16,66	4,76	6,00	0,04
030923	APET160460ER-48	SP6519	◆◆◆	◆◆◆◆◆	◆◆◆◆◆	9,52	16,66	4,76	6,00	0,04
030924	APET160464ER-48	X500	■◆◆	◆◆◆◆	◆◆◆	9,52	16,66	4,76	6,40	0,04
030925	APET160464ER-48	SP6519	◆◆◆	◆◆◆◆◆	◆◆◆◆◆	9,52	16,66	4,76	6,40	0,04

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

The 7690VAP series are ideal for roughing, semi-finishing and finishing of Stainless Steel, High Temperature Alloys plus Low Carbon Steels. This cutter is designed to utilise one geometry of insert only - APET1604...ER-48

7690VAP16 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Grey Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
ER-48	X500	Facing	0,05 - 0,25	-	0,05 - 0,25	0,05 - 0,20	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,13	0,05 - 0,18	-	-
ER-48	SP6519	Facing	0,05 - 0,20	-	0,05 - 0,20	0,05 - 0,18	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	0,05 - 0,15	-	-

Note: HTA = High Temperature Alloys

Note: Speed recommendations can be found on page A58.



Speed v_c (m/min.)		Wear Resistance																
7690VA & 7690VAP Series		Speed min. - max.																
Coolant Recommendation		Recommended ● Possible ○																
ISO	Materials	Rm and Hardness	PVD X Grade		CVD X Grade		PVD X Grade		PVD Standard		PVD Standard		CVD Standard		CVD Standard		Uncoated Micrograin	
			Water	No Water	Water	No Water	Water	No Water	Water	No Water	Water	No Water	Water	No Water	Water	No Water		
P	Unalloyed Steel	<600 N/mm ² <180 HBN																
		<950 N/mm ² <280 HBN																
	Alloyed Steel	700-950 N/mm ² 200-280 HBN																
		950-1200 N/mm ² 280-355 HBN																
		1200-1400 N/mm ² 355-415 HBN																
M	Stainless Steel	Austenitic + Ferritic 300 series																
		Martensitic 400 series																
	PH Stainless	Refractory P.H.																
K	Cast Iron	Grey GG-FI																
		Spheroidal-Ductile GGG-FGS																
		Malleable GTS - MN/MPP																
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN																
		Aluminium + Silicon > 16% Si 92 HBN																
S	High Temperature Alloys	Iron Based																
		Cobalt Based																
		Nickel Based																
		Titanium Based																
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN																
		Chilled Cast Iron >1400 N/mm ² > 400 HBN																

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness

a_e = Radial engagement

f_z = Feed per tooth

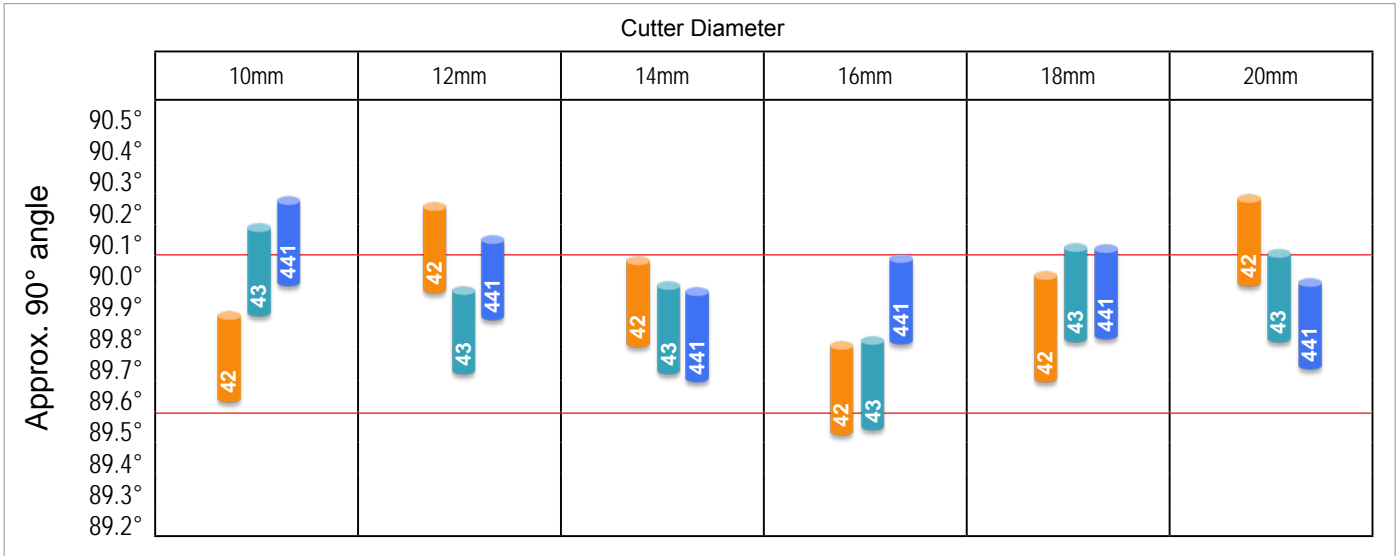
d = Cutter diameter

Formula: Average Chip Thickness (h_m)

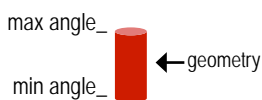
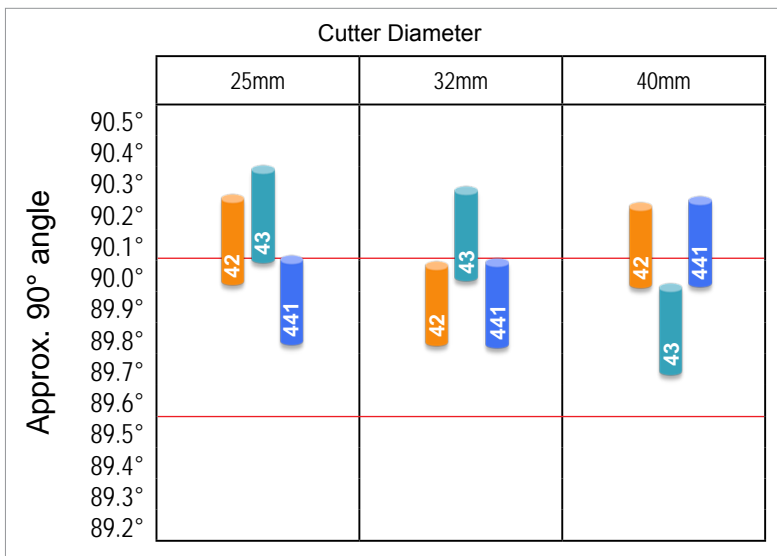
$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$



7690VA09 90° Angle Deviation

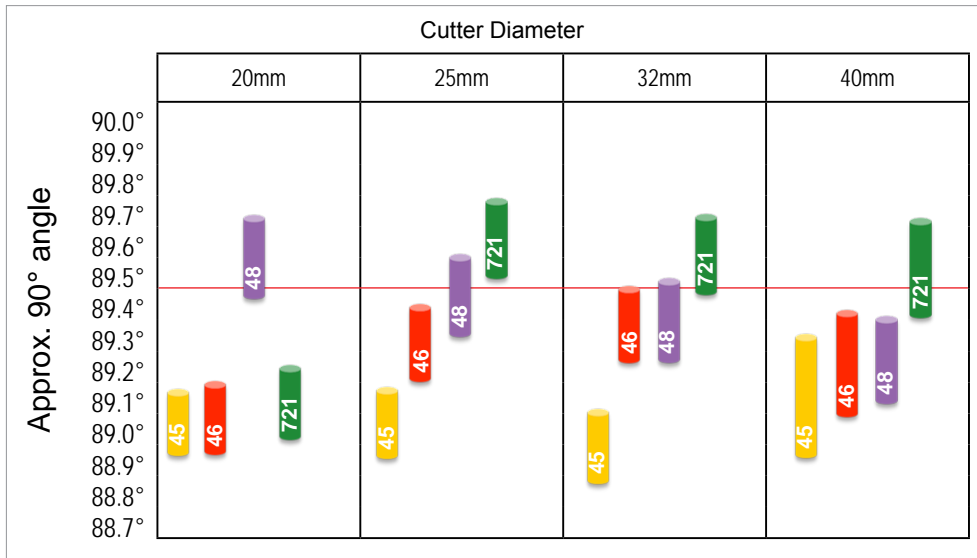


7690VA09 90° Angle Deviation

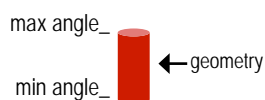
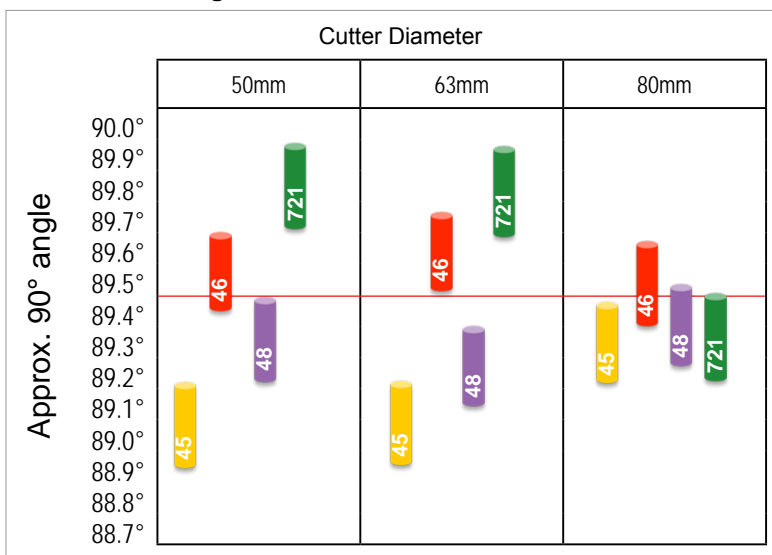




7690VA12 90° Angle Deviation

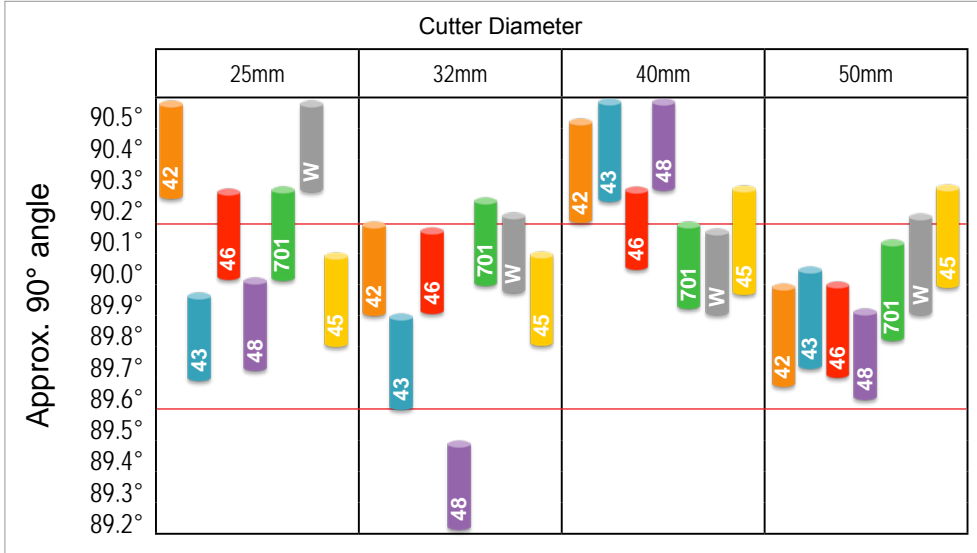


7690VA12 90° Angle Deviation

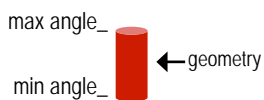
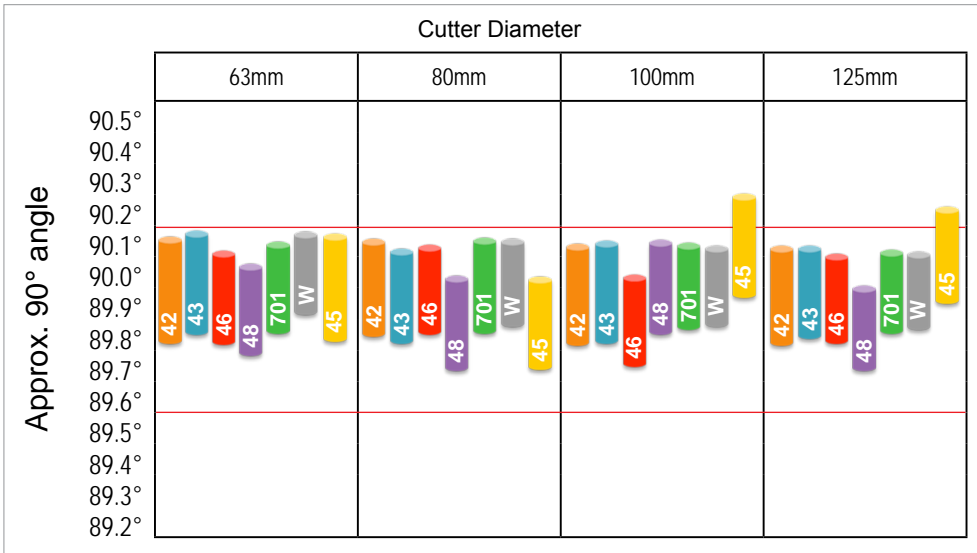




7690VA16 90° Angle Deviation

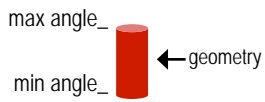
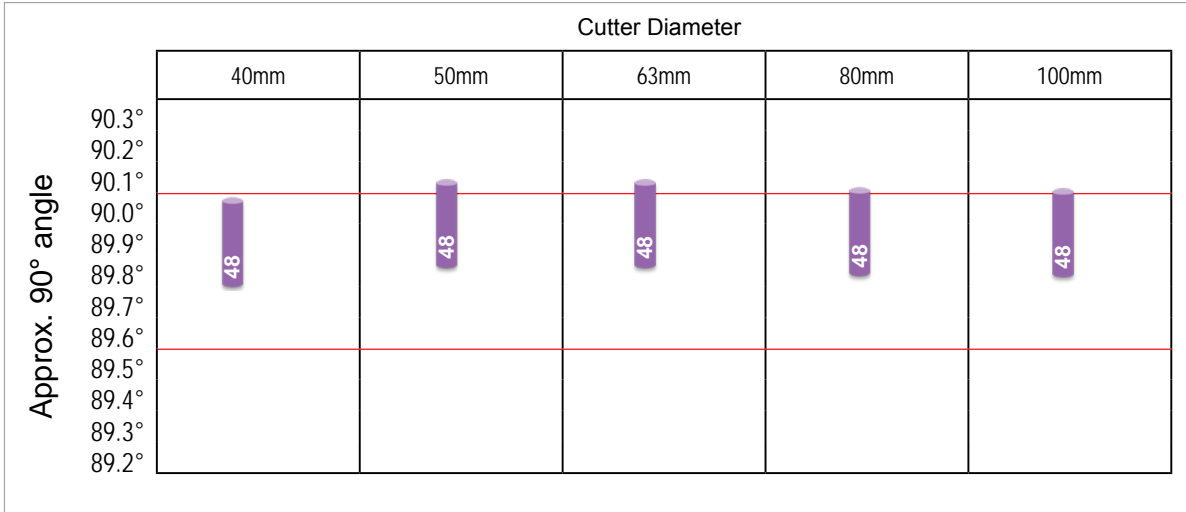


7690VA16 90° Angle Deviation





7690VAP16 90° Angle Deviation





HIGH FEED CUTTERS

7792VX high feed milling cutters are capable of high metal removal in facing, plunging and slotting applications. The patented insert design offers better performance than round insert cutters.

The 7792VX high feed cutters are the best solution when specifically focusing on reducing cycle times or removing the maximum volume of material in the shortest time.

Our high feed cutter has the capacity to achieve 5 times higher feed rate than other existing cutters in the market. This is due to its unique design and insert positioning. 7792VX cutters also has a tremendous advantage, when used in a long (extended) toolholder. These cutters absorb vibration and greatly reduces the instability and deflection of the tool.

7792VX cutters are designed for a wide range of applications. Facing, pocketing, ramping, helical interpolation and plunging. They are capable of machining all materials such as, Steel, Stainless Steel, Cast Iron and High Temperature Alloys.

Also suitable for machining Aluminium Alloys.

7792VX

7792VXP06:

Maximum $a_p = 0,90\text{mm}$
Diameter Range = 16mm to 32mm

7792VXD09:

Maximum $a_p = 1,50\text{mm}$
Diameter Range = 25mm to 50mm

7792VXD12:

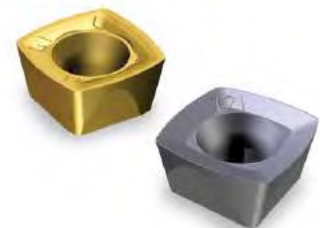
Maximum $a_p = 2,50\text{mm}$
Diameter Range = 32mm to 160mm

Note: Larger diameter Shell Mill Fixation cutters with interchangeable cartridges are available. Please see page A118.

7792VXE16:

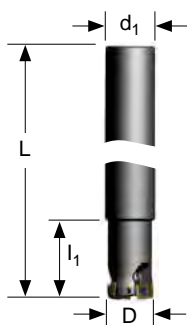
Maximum $a_p = 3,50\text{mm}$
Diameter Range = 63mm to 160mm

Note: Larger diameter Shell Mill Fixation cutters with interchangeable cartridges are available. Please see page A120.

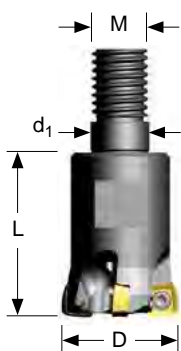




End Mills & Face Mills



Cylindrical Shank



Modular Head

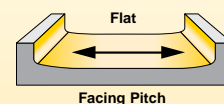
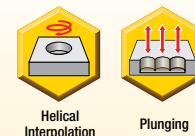
Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7792VXP06 Cylindrical Shank												
031644	7792VXP06CA016Z2R140	16	188	25	16	0,90	2	031449	FP2506T	031452	TP7	1,00
031629	7792VXP06CA020Z3R154	20	204	32	20	0,90	3	031449	FP2506T	031452	TP7	1,00
031630	7792VXP06CA025Z4R154	25	210	40	25	0,90	4	031450	FP2507T	031452	TP7	1,00
031631	7792VXP06CA032Z5R190	32	250	40	32	0,90	5	031450	FP2507T	031452	TP7	1,00

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	M	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7792VXP06 Modular Head - Medium and Fine Pitch												
031632	7792VXP06SA016Z2R25	16	25	M8	8,50	0,90	2	031449	FP2506T	031452	TP7	1,00
031633	7792VXP06SA020Z2R35	20	35	M10	10,50	0,90	2	031449	FP2506T	031452	TP7	1,00
031634	7792VXP06SA020Z3R35	20	35	M10	10,50	0,90	3	031449	FP2506T	031452	TP7	1,00
031636	7792VXP06SA025Z3R35	25	35	M12	12,50	0,90	3	031450	FP2507T	031452	TP7	1,00
031637	7792VXP06SA025Z4R35	25	35	M12	12,50	0,90	4	031450	FP2507T	031452	TP7	1,00
031638	7792VXP06SA032Z5R43	32	43	M16	17,00	0,90	5	031450	FP2507T	031452	TP7	1,00

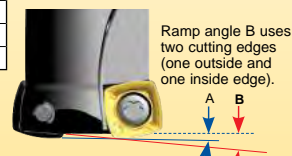
Note: For cylindrical shank extensions in high density alloy with through coolant refer to page A76.

7792VXP06 Technical Information (mm)

Product		Dimensions								Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle		Helical Hole		a _p max Helical / Linear	a _e max Plunging		
			A °	B °	min.	max.				
031644	7792VXP06CA016Z2R140	7,60	5,94	8,03	22	30	0,60	3,00	65000	
031629	7792VXP06CA020Z3R154	11,60	3,42	6,12	30	38	0,60	3,00	57000	
031630	7792VXP06CA025Z4R154	16,60	2,23	4,24	40	48	0,60	3,00	49000	
031631	7792VXP06CA032Z5R190	23,60	1,39	2,60	54	62	0,60	3,00	41500	
031632	7792VXP06SA016Z2R25	7,60	5,94	8,03	22	30	0,60	3,00	65000	
031633	7792VXP06SA020Z2R35	11,60	3,42	6,12	30	38	0,60	3,00	57000	
031634	7792VXP06SA020Z3R35	11,60	3,42	6,12	30	38	0,60	3,00	57000	
031636	7792VXP06SA025Z3R35	16,60	2,84	4,24	40	48	0,60	3,00	49000	
031637	7792VXP06SA025Z4R35	16,60	2,23	4,24	40	48	0,60	3,00	49000	
031638	7792VXP06SA032Z5R43	23,60	1,39	2,60	54	62	0,60	3,00	41500	



Ramp angle A uses one outside cutting edge only.



A = max ramp angle utilising full face contact

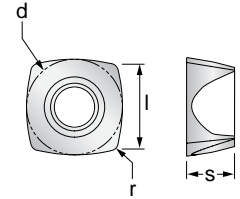
B = max ramp angle utilising full contact + internal corner radius



Depth of Cut (a_p)



XPLT06-D41



End Mills & Face Mills

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Facing	Slotting	Plunging	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max. 0,90	a _p max. 0,90	a _e max. 3,00					
030403	XPLT060308ER-D41	X400	◆◆◆	◆◆◆	◆◆◆	7,00	7,00	3,18	0,80	0,04
030402	XPLT060308ER-D41	X500	◆◆◆	◆◆◆	◆◆◆	7,00	7,00	3,18	0,80	0,04
031538	XPLT060308ER-D41	SP6519	●◆◆◆◆	●◆◆◆◆	●◆◆◆◆	7,00	7,00	3,18	0,80	0,04
033066	XPLT060308ER-D41	SC6525	◆◆◆	◆◆◆	◆◆◆	7,00	7,00	3,18	0,80	0,04

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.



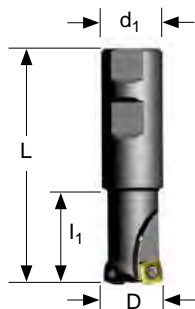
7792VXP06 Feeds f _z (mm/tooth)																	
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
ER-D41	X400	Facing	0,20 - 1,10	0,20 - 0,90	-	-	-	-	-	-	-	-	-	-	-	0,20 - 0,60	0,20 - 0,60
ER-D41	X400	Slotting	0,20 - 0,90	0,20 - 0,80	-	-	-	-	-	-	-	-	-	-	-	0,20 - 0,50	0,20 - 0,50
ER-D41	X400	Plunging	0,04 - 0,30	0,04 - 0,20	-	-	-	-	-	-	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08
ER-D41	X500	Facing	-	-	0,15 - 1,00	0,15 - 0,90	-	-	-	-	-	0,15 - 0,50	0,15 - 0,50	0,15 - 0,50	0,15 - 0,60	-	-
ER-D41	X500	Slotting	-	-	0,15 - 0,80	0,15 - 0,75	-	-	-	-	-	0,10 - 0,40	0,10 - 0,40	0,10 - 0,40	0,10 - 0,45	-	-
ER-D41	X500	Plunging	-	-	0,04 - 0,20	0,04 - 0,15	-	-	-	-	-	0,04 - 0,06	0,04 - 0,06	0,04 - 0,06	0,04 - 0,06	-	-
ER-D41	SP6519	Facing	0,20 - 1,00	0,20 - 0,80	0,15 - 0,90	0,15 - 0,80	0,20 - 1,20	0,20 - 1,00	0,20 - 0,90	0,20 - 0,70	-	0,15 - 0,50	0,15 - 0,50	0,15 - 0,50	0,15 - 0,60	-	-
ER-D41	SP6519	Slotting	0,20 - 0,80	0,20 - 0,75	0,15 - 0,80	0,15 - 0,70	0,20 - 1,00	0,20 - 0,90	0,20 - 0,80	0,20 - 0,70	-	0,10 - 0,40	0,10 - 0,40	0,10 - 0,40	0,10 - 0,45	-	-
ER-D41	SP6519	Plunging	0,04 - 0,25	0,04 - 0,18	0,04 - 0,20	0,04 - 0,14	0,04 - 0,25	0,04 - 0,20	0,04 - 0,18	0,04 - 0,25	-	0,04 - 0,06	0,04 - 0,06	0,04 - 0,06	0,04 - 0,06	-	-
ER-D41	SC6525	Facing	0,20 - 0,95	0,20 - 0,78	-	-	0,20 - 1,20	0,20 - 1,00	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Slotting	0,20 - 0,78	0,20 - 0,72	-	-	0,20 - 1,00	0,20 - 0,90	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Plunging	0,04 - 0,23	0,04 - 0,17	-	-	0,04 - 0,25	0,04 - 0,20	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

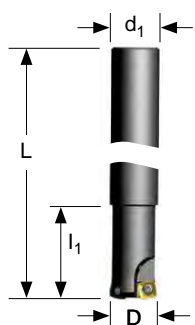
Note: Speed recommendations can be found on page A72.



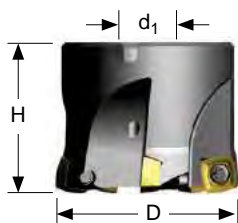
End Mills & Face Mills



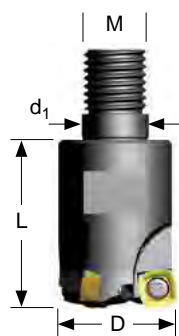
Weldon Shank



Cylindrical Shank



Shell Mill Fixation



Modular Head



Depth of Cut (ap)

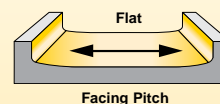
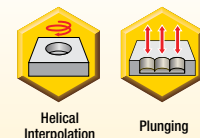
Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7792VXD09 Weldon Shank												
029461	7792VXD09WA025Z2R	25	96	40	25	1,50	2	015269	F3508T	015240	T15	2,10
029462	7792VXD09WA032Z3R	32	100	40	32	1,50	3	015064	F3510T	015240	T15	2,10
7792VXD09 Cylindrical Shank												
031191	7792VXD09CA025Z2R50	25	200	50	25	1,50	2	015064	F3510T	015240	T15	2,10
031192	7792VXD09CA032Z3R70	32	250	70	32	1,50	3	015064	F3510T	015240	T15	2,10
7792VXD09 Shell Mill Fixation - Coarse, Medium and Fine Pitch												
029463	7792VXD09-A040Z3R	40	32	-	16	1,50	3	015064	F3510T	015240	T15	2,10
029464	7792VXD09-A040Z4R	40	32	-	16	1,50	4	015064	F3510T	015240	T15	2,10
030434	7792VXD09-A040Z5R	40	32	-	16	1,50	5	015064	F3510T	015240	T15	2,10
030435	7792VXD09-A050Z5R	50	40	-	22	1,50	5	015064	F3510T	015240	T15	2,10
030436	7792VXD09-A050Z6R	50	40	-	22	1,50	6	015064	F3510T	015240	T15	2,10

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	M	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7792VXD09 Modular Head												
030613	7792VXD09SA025Z2R35	25	35	M12	12,50	1,50	2	015269	F3508T	015240	T15	2,10
030614	7792VXD09SA032Z3R43	32	43	M16	17,00	1,50	3	015064	F3510T	015240	T15	2,10

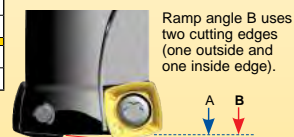
Note: For cylindrical shank extensions in high density alloy with through coolant refer to page A76.

7792VXD09 Technical Information (mm)

Product		Dimensions							
EDP	Item Description	Facing Pitch	Ramping Angle		Helical Hole min. - max.	a _p max Helical / Linear	a _g max Plunging	Max RPM	
			A°	B°					
029461	7792VXD09WA025Z2R	11,75	2,80	6,30	34	48	1,00	6,00	48500
029462	7792VXD09WA032Z3R	18,75	1,50	5,00	48	62	1,00	6,00	40500
031191	7792VXD09CA025Z2R50	11,75	2,80	6,30	34	48	1,00	6,00	48500
031192	7792VXD09CA032Z3R70	18,75	1,50	5,00	48	62	1,00	6,00	40500
029463	7792VXD09-A040Z3R	26,75	0,80	2,70	64	78	1,00	6,00	34500
029464	7792VXD09-A040Z4R	26,75	0,80	2,70	64	78	1,00	6,00	34500
030434	7792VXD09-A040Z5R	26,75	0,80	2,70	64	78	1,00	6,00	34500
030435	7792VXD09-A050Z5R	36,75	0,71	2,31	84	98	1,00	6,00	30000
030436	7792VXD09-A050Z6R	36,75	0,71	2,31	84	98	1,00	6,00	29500
030613	7792VXD09SA025Z2R35	11,75	2,80	6,30	34	48	1,00	6,00	48500
030614	7792VXD09SA032Z3R43	18,75	1,50	5,00	48	62	1,00	6,00	40500

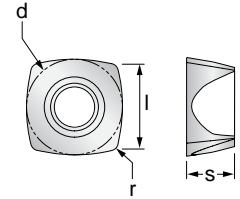


Ramp angle A uses one outside cutting edge only.



A = max ramp angle utilising full face contact

B = max ramp angle utilising full contact + internal corner radius



End Mills & Face Mills

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Facing	Slotting	Plunging	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			ap max. 1,50	ap max. 1,50	ae max. 6,00					
029487	XDLW090408SR-D	X400	◆◆◆	◆◆◆	◆◆◆	9,52	9,52	4,76	0,80	0,10
029485	XDLW090408SR-D	X500	●●●	●●●	●●●	9,52	9,52	4,76	0,80	0,10
029486	XDLW090408SR-D	SC3025	◆	◆	◆	9,52	9,52	4,76	0,80	0,10
029685	XDLT090408ER-D41	X500	◆◆◆	◆◆◆	◆◆◆	9,52	9,52	4,76	0,80	0,05
031535	XDLT090408ER-D41	SP6519	●◆◆◆	●◆◆◆	●◆◆◆	9,52	9,52	4,76	0,80	0,05
033067	XDLT090408ER-D41	SC6525	■◆◆	■◆◆	■◆◆	9,52	9,52	4,76	0,80	0,05
029637	XDLT090408ER-D721	GH2	◆	◆	◆	9,52	9,52	4,76	0,80	0,04
030853	XDLT090412ER-D411	X500	◆◆◆	◆◆◆	◆◆◆	9,52	9,52	4,76	1,20	0,05
030854	XDLT090412ER-D411	SP6519	●◆◆◆	●◆◆◆	●◆◆◆	9,52	9,52	4,76	1,20	0,05



Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

XDLW090408SR-D X500 should be used for Alloyed Steel and Stainless Steel with heavy scale.

XDLT090412ER-D411 is a more positive geometry than the -D-41 with a larger radius which increases performance during smaller radial engagements or where chipping may occur when using the -D-41 geometry.

XDLT090412ER-D411 uses less power than the -D-41 geometry.

7792VXD09 Feeds f_z (mm/tooth)

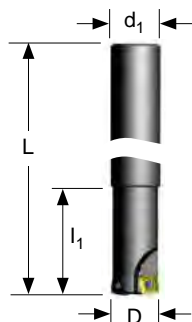
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
SR-D	X400	Facing	0,30 - 2,00	0,30 - 1,90	-	-	-	-	-	-	-	-	-	-	-	0,30 - 1,00	0,30 - 1,00
SR-D	X400	Slotting	0,30 - 1,50	0,30 - 1,45	-	-	-	-	-	-	-	-	-	-	-	0,30 - 0,60	0,30 - 0,80
SR-D	X400	Plunging	0,10 - 0,25	0,10 - 0,23	-	-	-	-	-	-	-	-	-	-	-	0,10 - 0,12	0,10 - 0,12
SR-D	X500	Facing	-	0,30 - 1,90	0,30 - 1,20	0,30 - 1,00	-	-	-	-	-	-	-	-	-	-	-
SR-D	X500	Slotting	-	0,30 - 1,40	0,30 - 0,90	0,30 - 0,80	-	-	-	-	-	-	-	-	-	-	-
SR-D	X500	Plunging	-	0,10 - 0,22	0,10 - 0,20	0,10 - 0,15	-	-	-	-	-	-	-	-	-	-	-
SR-D	SC3025	Facing	-	-	-	-	0,30 - 2,00	0,30 - 1,80	0,30 - 1,50	-	-	-	-	-	-	-	-
SR-D	SC3025	Slotting	-	-	-	-	0,30 - 1,70	0,30 - 1,50	0,30 - 1,30	-	-	-	-	-	-	-	-
SR-D	SC3025	Plunging	-	-	-	-	0,10 - 0,25	0,10 - 0,22	0,10 - 0,20	-	-	-	-	-	-	-	-
ER-D41	X500	Facing	-	-	0,20 - 1,00	0,20 - 0,80	-	-	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D41	X500	Slotting	-	-	0,20 - 0,80	0,15 - 0,70	-	-	-	-	-	0,10 - 0,50	0,10 - 0,50	0,10 - 0,50	0,10 - 0,70	-	-
ER-D41	X500	Plunging	-	-	0,10 - 0,16	0,08 - 0,12	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	-	-
ER-D41	SP6519	Facing	0,30 - 1,50	0,30 - 1,30	0,20 - 1,00	0,20 - 0,60	0,30 - 1,50	0,30 - 1,30	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D41	SP6519	Slotting	0,30 - 1,30	0,30 - 1,00	0,20 - 0,80	0,15 - 0,50	0,30 - 1,30	0,30 - 1,00	-	-	-	0,10 - 0,50	0,10 - 0,50	0,10 - 0,50	0,10 - 0,70	-	-
ER-D41	SP6519	Plunging	0,10 - 0,20	0,10 - 0,16	0,10 - 0,16	0,05 - 0,08	0,10 - 0,20	0,10 - 0,16	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	-	-
ER-D41	SC6525	Facing	0,30 - 1,45	0,30 - 1,30	-	-	0,30 - 1,50	0,30 - 1,30	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Slotting	0,30 - 1,25	0,30 - 1,00	-	-	0,30 - 1,30	0,30 - 1,00	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Plunging	0,10 - 0,18	0,10 - 0,16	-	-	0,10 - 0,20	0,10 - 0,16	-	-	-	-	-	-	-	-	-
ER-D721	GH2	Facing	-	-	-	-	-	-	-	0,30 - 1,50	0,30 - 1,30	-	-	-	-	-	-
ER-D721	GH2	Slotting	-	-	-	-	-	-	-	0,30 - 1,30	0,30 - 1,00	-	-	-	-	-	-
ER-D721	GH2	Plunging	-	-	-	-	-	-	-	0,10 - 0,20	0,10 - 0,16	-	-	-	-	-	-
ER-D411	X500	Facing	-	-	0,20 - 1,00	0,20 - 0,80	-	-	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D411	X500	Slotting	-	-	0,20 - 0,80	0,15 - 0,70	-	-	-	-	-	0,10 - 0,50	0,10 - 0,50	0,10 - 0,50	0,10 - 0,70	-	-
ER-D411	X500	Plunging	-	-	0,10 - 0,16	0,08 - 0,12	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	-	-
ER-D411	SP6519	Facing	0,30 - 1,50	0,30 - 1,30	0,20 - 1,00	0,20 - 0,60	0,30 - 1,50	0,30 - 1,30	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D411	SP6519	Slotting	0,30 - 1,30	0,30 - 1,00	0,20 - 0,80	0,15 - 0,50	0,30 - 1,30	0,30 - 1,00	-	-	-	0,10 - 0,50	0,10 - 0,50	0,10 - 0,50	0,10 - 0,70	-	-
ER-D411	SP6519	Plunging	0,10 - 0,20	0,10 - 0,16	0,10 - 0,16	0,05 - 0,08	0,10 - 0,20	0,10 - 0,16	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	-	-

Note: HTA = High Temperature Alloys

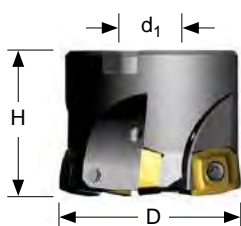
Note: Speed recommendations can be found on page A72.



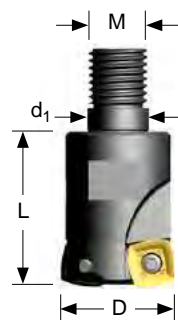
End Mills & Face Mills



Cylindrical Shank



Shell Mill Fixation



Modular Head

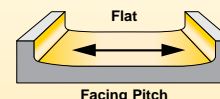
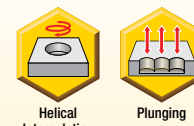
Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7792VXD12 Cylindrical Shank												
031195	7792VXD12CA032Z2R70	32	250	70	32	2,50	2	015262	D4010T	015240	T15	3,10
7792VXD12 Shell Mill Fixation - Coarse, Medium and Fine Pitch												
029467	7792VXD12-A052Z3R	52	40	-	22	2,50	3	015263	D4012T	015240	T15	3,10
029468	7792VXD12-A052Z4R	52	40	-	22	2,50	4	015263	D4012T	015240	T15	3,10
030489	7792VXD12-A052Z5R	52	40	-	22	2,50	5	015262	D4010T	015240	T15	3,10
029469	7792VXD12-A063Z4R	63	40	-	22	2,50	4	015263	D4012T	015240	T15	3,10
029470	7792VXD12-A063Z5R	63	40	-	22	2,50	5	015263	D4012T	015240	T15	3,10
031650	7792VXD12-A066Z4R	66	45	-	27	2,50	4	015263	D4012T	015240	T15	3,10
031651	7792VXD12-A066Z5R	66	45	-	27	2,50	5	015263	D4012T	015240	T15	3,10
029471	7792VXD12-A080Z5R	80	50	-	27	2,50	5	015263	D4012T	015240	T15	3,10
030490	7792VXD12-A080Z8R	80	50	-	27	2,50	8	015263	D4012T	015240	T15	3,10
030443	7792VXD12-A100Z6R	100	50	-	32	2,50	6	015263	D4012T	015240	T15	3,10
030444	7792VXD12-A100Z9R	100	50	-	32	2,50	9	015263	D4012T	015240	T15	3,10
030445	7792VXD12-A125Z8R	125	63	-	40	2,50	8	015263	D4012T	015240	T15	3,10
030446	7792VXD12-A125Z11R	125	63	-	40	2,50	11	015263	D4012T	015240	T15	3,10
033216	7792VXD12-160Z07R	160	63	-	40	2,50	7	015263	D4012T	015240	T15	3,10

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	M	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7792VXD12 Modular Head												
030994	7792VXD12SA032Z2R43	32	43	M16	17,00	2,50	2	015262	D4010T	015240	T15	3,10

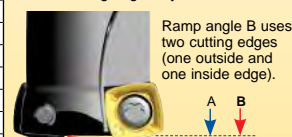
Note: For cylindrical shank extensions in high density alloy with through coolant refer to page A76.

7792VXD12 Technical Information (mm)

Product		Dimensions							
EDP	Item Description	Facing Pitch	Ramping Angle		Helical Hole min. - max.		a _p max Helical / Linear	a _e max Plunging	Max RPM
			A°	B°					
031195	7792VXD12CA032Z2R70	10,60	1.80	2.60	42	62	1,80	9,00	31500
029467	7792VXD12-A052Z3R	33,60	0.80	2.70	82	102	1,80	9,00	22000
029468	7792VXD12-A052Z4R	33,60	0.80	2.70	82	102	1,80	9,00	22000
030489	7792VXD12-A052Z5R	33,60	0.80	2.70	82	102	1,80	9,00	22000
029469	7792VXD12-A063Z4R	44,60	0.60	1.80	104	124	1,80	9,00	19500
029470	7792VXD12-A063Z5R	44,60	0.60	1.80	104	124	1,80	9,00	19500
031650	7792VXD12-A066Z4R	47,60	0.45	1.80	110	130	1,80	9,00	19000
031651	7792VXD12-A066Z5R	47,60	0.45	1.80	110	130	1,80	9,00	19000
029471	7792VXD12-A080Z5R	61,60	0.45	0.90	138	158	1,80	9,00	17000
030490	7792VXD12-A080Z8R	61,60	0.45	0.90	138	158	1,80	9,00	17000
030443	7792VXD12-A100Z6R	81,60	0.32	1.45	178	198	1,80	9,00	15000
030444	7792VXD12-A100Z9R	81,60	0.32	1.45	178	198	1,80	9,00	15000
030445	7792VXD12-A125Z8R	106,60	0.24	1.06	228	248	1,80	9,00	13000
030446	7792VXD12-A125Z11R	106,60	0.24	1.06	228	248	1,80	9,00	13000
033216	7792VXD12-160Z07R	141,60	0.20	0.86	298	318	1,80	9,00	11500
030994	7792VXD12SA032Z2R43	10,60	1.80	2.60	42	62	1,80	9,00	31500



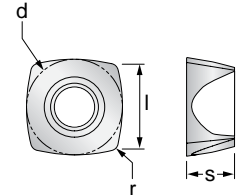
Ramp angle A uses one outside cutting edge only.



A = max ramp angle utilizing full face contact
B = max ramp angle utilizing full contact + internal corner radius



Depth of Cut (a_p)



End Mills & Face Mills

EDP	Product	Grade	Application & Material			Dimensions (mm)				
			Facing	Slotting	Plunging	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max. 2,50	a _p max. 2,00	a _e max. 9,00					
029490	XDLW120508SR-D	X400	◆◆◆	◆◆◆	◆◆◆	12,70	12,70	5,56	0,80	0,10
029488	XDLW120508SR-D	X500	●●●	●●●	●●●	12,70	12,70	5,56	0,80	0,10
029489	XDLW120508SR-D	SC3025	◆	◆	◆	12,70	12,70	5,56	0,80	0,10
029682	XDLT120508ER-D41	X500	◆◆◆	◆◆◆	◆◆◆	12,70	12,70	5,56	0,80	0,05
031534	XDLT120508ER-D41	SP6519	●●●◆◆◆	●●●◆◆◆	●●●◆◆◆	12,70	12,70	5,56	0,80	0,05
033068	XDLT120508ER-D41	SC6525	■◆◆	■◆◆	■◆◆	12,70	12,70	5,56	0,80	0,05
029638	XDLT120508ER-D721	GH2	◆	◆	◆	12,70	12,70	5,56	0,80	0,04
030783	XDLT120512ER-D411	X500	◆◆◆	◆◆◆	◆◆◆	12,70	12,70	5,56	1,20	0,05
030792	XDLT120512ER-D411	SP6519	●●●◆◆◆	●●●◆◆◆	●●●◆◆◆	12,70	12,70	5,56	1,20	0,05



Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

XDLW120508SR-D X500 should be used for Alloyed Steel and Stainless Steel with heavy scale.

XDLT120512ER-D411 is a more positive geometry than the -D41 with a larger radius which increases performance during smaller radial engagements or where chipping may occur when using the -D41 geometry.

XDLT120512ER-D411 uses less power than the -D41 geometry.

7792VXD12 Feeds f_z (mm/tooth)

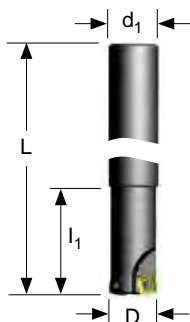
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Grey Iron	Spheroidal Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
SR-D	X400	Facing	0,30 - 2,70	0,30 - 2,50	-	-	-	-	-	-	-	-	-	-	-	0,30 - 1,20	0,30 - 1,50
SR-D	X400	Slotting	0,30 - 2,50	0,30 - 2,40	-	-	-	-	-	-	-	-	-	-	-	0,30 - 0,80	0,30 - 1,00
SR-D	X400	Plunging	0,10 - 0,30	0,10 - 0,25	-	-	-	-	-	-	-	-	-	-	-	0,10 - 0,13	0,10 - 0,15
SR-D	X500	Facing	-	0,30 - 2,50	0,20 - 1,70	0,20 - 1,20	-	-	-	-	-	-	-	-	-	-	-
SR-D	X500	Slotting	-	0,30 - 2,40	0,20 - 1,50	0,20 - 1,00	-	-	-	-	-	-	-	-	-	-	-
SR-D	X500	Plunging	-	0,10 - 0,24	0,10 - 0,25	0,10 - 0,18	-	-	-	-	-	-	-	-	-	-	-
SR-D	SC3025	Facing	-	-	-	-	0,30 - 3,00	0,30 - 2,80	0,30 - 2,50	-	-	-	-	-	-	-	-
SR-D	SC3025	Slotting	-	-	-	-	0,30 - 2,50	0,30 - 2,30	0,30 - 2,10	-	-	-	-	-	-	-	-
SR-D	SC3025	Plunging	-	-	-	-	0,10 - 0,30	0,10 - 0,28	0,10 - 0,25	-	-	-	-	-	-	-	-
ER-D41	X500	Facing	-	-	0,20 - 1,40	0,20 - 0,90	-	-	-	-	-	0,20 - 0,85	0,20 - 0,85	0,20 - 0,85	0,20 - 1,00	-	-
ER-D41	X500	Slotting	-	-	0,20 - 1,10	0,20 - 0,80	-	-	-	-	-	0,10 - 0,70	0,10 - 0,70	0,10 - 0,70	0,10 - 0,80	-	-
ER-D41	X500	Plunging	-	-	0,10 - 0,20	0,08 - 0,14	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,12	-	-
ER-D41	SP6519	Facing	0,30 - 2,50	0,30 - 2,00	0,20 - 1,20	0,20 - 0,75	0,30 - 2,50	0,30 - 2,30	-	-	-	0,20 - 0,85	0,20 - 0,85	0,20 - 0,85	0,20 - 1,00	-	-
ER-D41	SP6519	Slotting	0,30 - 2,00	0,30 - 1,60	0,20 - 1,00	0,15 - 0,60	0,30 - 2,00	0,30 - 1,80	-	-	-	0,10 - 0,70	0,10 - 0,70	0,10 - 0,70	0,10 - 0,80	-	-
ER-D41	SP6519	Plunging	0,10 - 0,22	0,10 - 0,18	0,10 - 0,18	0,05 - 0,10	0,10 - 0,22	0,10 - 0,18	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,12	-	-
ER-D41	SC6525	Facing	0,30 - 2,40	0,30 - 2,00	-	-	0,30 - 2,50	0,30 - 2,30	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Slotting	0,30 - 1,90	0,30 - 1,60	-	-	0,30 - 2,00	0,30 - 1,80	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Plunging	0,10 - 0,20	0,10 - 0,18	-	-	0,10 - 0,22	0,10 - 0,18	-	-	-	-	-	-	-	-	-
ER-D721	GH2	Facing	-	-	-	-	-	-	-	0,30 - 1,50	0,30 - 1,50	-	-	-	-	-	-
ER-D721	GH2	Slotting	-	-	-	-	-	-	-	0,30 - 1,50	0,30 - 1,50	-	-	-	-	-	-
ER-D721	GH2	Plunging	-	-	-	-	-	-	-	0,10 - 0,40	0,10 - 0,40	-	-	-	-	-	-
ER-D411	X500	Facing	-	-	0,20 - 1,40	0,20 - 0,90	-	-	-	-	-	0,20 - 0,85	0,20 - 0,85	0,20 - 0,85	0,20 - 1,00	-	-
ER-D411	X500	Slotting	-	-	0,20 - 1,10	0,20 - 0,80	-	-	-	-	-	0,10 - 0,70	0,10 - 0,70	0,10 - 0,70	0,10 - 0,80	-	-
ER-D411	X500	Plunging	-	-	0,10 - 0,20	0,08 - 0,14	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,12	-	-
ER-D411	SP6519	Facing	0,30 - 2,50	0,30 - 2,30	0,20 - 1,20	0,20 - 0,75	0,30 - 2,50	0,30 - 2,30	-	-	-	0,20 - 0,85	0,20 - 0,85	0,20 - 0,85	0,20 - 1,00	-	-
ER-D411	SP6519	Slotting	0,30 - 2,00	0,30 - 1,80	0,20 - 1,00	0,15 - 0,60	0,30 - 2,00	0,30 - 1,80	-	-	-	0,10 - 0,70	0,10 - 0,70	0,10 - 0,70	0,10 - 0,80	-	-
ER-D411	SP6519	Plunging	0,10 - 0,22	0,10 - 0,18	0,10 - 0,18	0,05 - 0,10	0,10 - 0,22	0,10 - 0,18	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,12	-	-

Note: HTA = High Temperature Alloys

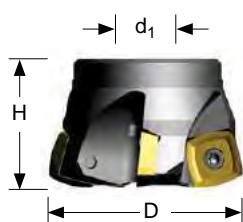
Note: Speed recommendations can be found on page A72.



End Mills & Face Mills



Cylindrical Shank

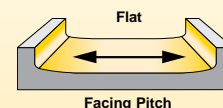
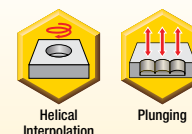


Shell Mill Fixation

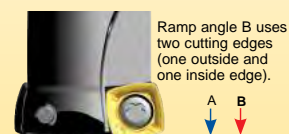
Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7792VXE16 Cylindrical Shank												
034851	7792VXE16CA040Z2R102	40	172	102	40	3,50	2	031225	DP5013T	030819	TP20	6,10
034852	7792VXE16CA050Z3R102	50	172	102	40	3,50	3	031225	DP5013T	030819	TP20	6,10
7792VXE16 Shell Mill Fixation												
031277	7792VXE16-A063Z5R	63	40	-	22	3,50	5	031225	DP5013T	030819	TP20	6,10
031278	7792VXE16-A080Z6R	80	50	-	27	3,50	6	031225	DP5013T	030819	TP20	6,10
031279	7792VXE16-A100Z8R	100	50	-	32	3,50	8	031225	DP5013T	030819	TP20	6,10
031280	7792VXE16-A125Z10R	125	63	-	40	3,50	10	031225	DP5013T	030819	TP20	6,10
031281	7792VXE16-160Z12	160	63	-	40	3,50	12	031225	DP5013T	030819	TP20	6,10

7792VXE16 Technical Information (mm)

Product		Dimensions							
EDP	Item Description	Facing Pitch	Ramping Angle		Helical Hole min. - max.	a _p max Helical / Linear	a _e max Plunging	Max RPM	
			A °	B °					
034851	7792VXE16CA040Z2R102	16.10	2.55	3.35	50	78	2.50	13.00	33000
034852	7792VXE16CA050Z3R102	25.83	1.36	2.85	70	98	2.50	13.00	27500
031277	7792VXE16-A063Z5R	37,45	0.86	1.00	96	124	2.50	13,00	22000
031278	7792VXE16-A080Z6R	54,45	0.58	0.65	130	158	2.50	13,00	19000
031279	7792VXE16-A100Z8R	74,45	0.42	0.51	170	198	2.50	13,00	16500
031280	7792VXE16-A125Z10R	99,45	0.32	0.37	220	248	2.50	13,00	14500
031281	7792VXE16-160Z12	134,50	0.23	0.27	290	318	2.50	13,00	12500



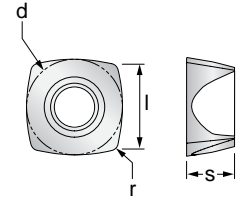
Ramp angle A uses one outside cutting edge only.



A = max ramp angle utilising full face contact
B = max ramp angle utilising full contact + internal corner radius



Depth of Cut (a_p)



End Mills & Face Mills

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Facing	Slotting	Plunging	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max. 3,50	a _p max. 3,00	a _e max. 13,00					
031291	XELW160512SR-D	X400	◆◆◆	◆◆◆	◆◆◆	16,80	16,80	5,56	1,20	0,12
031292	XELW160512SR-D	SC3025	◆	◆	◆	16,80	16,80	5,56	1,20	0,12
031293	XELT160512ER-D41	X500	◆◆◆	◆◆◆	◆◆◆	16,80	16,80	5,56	1,20	0,12
031294	XELT160512ER-D41	SP6519	●●◆◆	●●◆◆	●●◆◆	16,80	16,80	5,56	1,20	0,12
033069	XELT160512ER-D41	SC6525	■◆◆	■◆◆	■◆◆	16,80	16,80	5,56	1,20	0,12

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.



7792VXE16 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
SR-D	X400	Facing	0,30 - 2,00	0,30 - 1,80	-	-	-	-	-	-	-	-	-	-	-	0,30 - 0,80	0,30 - 1,00
SR-D	X400	Slotting	0,30 - 1,70	0,30 - 1,50	-	-	-	-	-	-	-	-	-	-	-	0,30 - 0,50	0,30 - 0,60
SR-D	X400	Plunging	0,10 - 0,27	0,10 - 0,22	-	-	-	-	-	-	-	-	-	-	-	0,10 - 0,10	0,10 - 0,12
SR-D	SC3025	Facing	-	-	-	-	0,30 - 2,00	0,30 - 1,80	0,30 - 1,50	-	-	-	-	-	-	-	-
SR-D	SC3025	Slotting	-	-	-	-	0,30 - 1,50	0,30 - 1,30	0,30 - 1,20	-	-	-	-	-	-	-	-
SR-D	SC3025	Plunging	-	-	-	-	0,10 - 0,20	0,10 - 0,18	0,10 - 0,15	-	-	-	-	-	-	-	-
ER-D41	X500	Facing	-	-	0,20 - 1,00	0,20 - 0,60	-	-	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D41	X500	Slotting	-	-	0,20 - 0,80	0,20 - 0,50	-	-	-	-	-	0,10 - 0,40	0,10 - 0,40	0,10 - 0,40	0,10 - 0,50	-	-
ER-D41	X500	Plunging	-	-	0,12 - 0,16	0,07 - 0,13	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,12	-	-
ER-D41	SP6519	Facing	0,30 - 1,50	0,30 - 1,30	0,20 - 1,00	0,20 - 0,50	0,30 - 1,50	0,30 - 1,20	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D41	SP6519	Slotting	0,30 - 1,30	0,30 - 1,20	0,20 - 0,80	0,20 - 0,45	0,30 - 1,20	0,30 - 1,10	-	-	-	0,10 - 0,40	0,10 - 0,40	0,10 - 0,40	0,10 - 0,50	-	-
ER-D41	SP6519	Plunging	0,10 - 0,23	0,10 - 0,20	0,12 - 0,16	0,07 - 0,12	0,10 - 0,20	0,10 - 0,16	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,12	-	-
ER-D41	SC6525	Facing	0,30 - 1,40	0,30 - 1,20	-	-	0,30 - 1,50	0,30 - 1,20	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Slotting	0,30 - 1,20	0,30 - 1,10	-	-	0,30 - 1,20	0,30 - 1,10	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Plunging	0,10 - 0,20	0,10 - 0,18	-	-	0,10 - 0,20	0,10 - 0,16	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Note: Speed recommendations can be found on page A72.

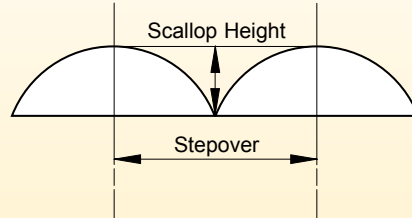
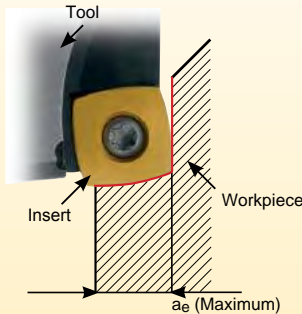


Speed v_c (m/min)												
7792VX Series			Wear Resistance									
			Speed min. - max.									
Coolant Recommendation			PVD X Grade		CVD X Grade		PVD Standard		Uncoated Micrograin		CVD Standard	
ISO	Materials	Rm and Hardness	Recommended	Possible	Recommended	Possible	Recommended	Possible	Recommended	Possible	Recommended	Possible
			☹	☺	☹	☺	☹	☺	☹	☺	☹	☺
P	Unalloyed Steel	<600 N/mm ² <180 HBN	☹	☺								
		120 - 260										
	<950 N/mm ² <280 HBN	☹	☺									
	105 - 230											
Alloyed Steel	700-950 N/mm ² 200-280 HBN	☹	☺									
	950-1200 N/mm ² 280-355 HBN	☹	☺									
	1200-1400 N/mm ² 355-415 HBN	☹	☺									
M	Stainless Steel	Austenitic + Ferritic 300 series			☹	☺						
		115 - 250										
		Martensitic 400 series			☹	☺						
		100 - 220										
	PH Stainless	Refractory P.H.			☹	☺						
		50 - 110										
K	Cast Iron	Grey GG-Ft										
		140 - 295										
		Spheroidal-Ductile GGG-FGS			☹	☺						
		110 - 240										
		Malleable GTS - MN/MP										
		100 - 220										
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN										
		305 - 2130										
		Aluminium + Silicon > 16% Si 92 HBN										
		245 - 1760										
S	High Temperature Alloys	Iron Based										
		23 - 48										
		Cobalt Based										
		21 - 44										
		Nickel Based										
		24 - 51										
		Titanium Based										
		35 - 73										
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	☹	☺								
		45 - 95										
		Chilled Cast Iron >1400 N/mm ² > 400 HBN										
		35 - 80										



End Mills & Face Mills

Plunging



The cutting edge should not be in contact with the material face after machining to maintain the cutting edge quality.

The scallop height is calculated in relation to the step over.



The maximum radial engagement is directly in relation to insert cutting edge length.

For insert type: **XP...06** the a_e , max is 3mm.

For insert type: **XD...09** the a_e , max is 6mm.

For insert type: **XD...12** the a_e , max is 9mm.

For insert type: **XE...16** the a_e , max is 13mm.

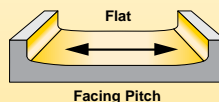
Plunging Information (mm) tool definition-scallop height and step over

	Tool definition (mm)																				
	7792VXP06				7792VXD09				7792VXD12								7792VXE16				
Diameter	16	20	25	32	25	32	40	50	32	52	63	66	80	100	125	160	63	80	100	125	160
Insert size	6	6	6	6	9	9	9	9	12	12	12	12	12	12	12	12	16	16	16	16	16
a_e max	3	3	3	3	6	6	6	6	9	9	9	9	9	9	9	9	13	13	13	13	13
Scallop height	Step over (mm)																				
0,25	3,97	4,44	4,97	5,63	4,97	5,63	6,30	7,05	5,63	7,19	7,92	8,11	8,93	9,99	11,17	12,64	7,92	8,93	9,99	11,17	12,64
0,50	5,57	6,24	7,00	7,94	7,00	7,94	8,89	9,95	7,94	10,15	11,18	11,44	12,61	14,11	15,78	17,86	11,18	12,61	14,11	15,78	17,86
0,75	6,76	7,60	8,53	9,68	8,53	9,68	10,85	12,16	9,68	12,40	13,67	13,99	15,42	17,26	19,31	21,86	13,67	15,42	17,26	19,31	21,86
1,00	7,75	8,72	9,80	11,14	9,80	11,14	12,49	14,00	11,14	14,28	15,75	16,12	17,78	19,90	22,27	25,22	15,75	17,78	19,90	22,27	25,22
2,00	10,58	12,00	13,56	15,49	13,56	15,49	17,44	19,60	15,49	20,00	22,09	22,63	24,98	28,00	31,37	35,55	22,09	24,98	28,00	31,37	35,55
3,00	12,49	14,28	16,25	18,65	16,25	18,65	21,07	23,75	18,65	24,25	26,83	27,49	30,40	34,12	38,26	43,41	26,83	30,40	34,12	38,26	43,41
4,00					18,33	21,17	24,00	27,13	21,17	27,71	30,72	31,50	34,87	39,19	44,00	49,96	30,72	34,87	39,19	44,00	49,96
5,00					20,00	23,24	26,46	30,00	23,24	30,66	34,06	34,93	38,73	43,59	48,99	55,68	34,06	38,73	43,59	48,99	55,68
6,00					21,35	24,98	28,57	32,49	24,98	33,23	36,99	37,95	42,14	47,50	53,44	60,79	36,99	42,14	47,50	53,44	60,79
7,00									26,46	35,50	39,60	40,64	45,21	51,03	57,48	65,45	39,60	45,21	51,03	57,48	65,45
8,00									27,71	37,52	41,95	43,08	48,00	54,26	61,19	69,74	41,95	48,00	54,26	61,19	69,74
9,00									28,77	39,34	44,09	45,30	50,56	57,24	64,62	73,73	44,09	50,56	57,24	64,62	73,73
10,00																	46,04	52,92	60,00	67,82	77,46
11,00																	47,83	55,10	62,58	70,82	80,97
12,00																	49,48	57,13	64,99	73,65	84,29
13,00																	50,99	59,03	67,26	76,32	87,43

Max. flat surface (mm)		
Insert size	Cutter dia.	Pitch
06	16	7,60
	20	11,60
	25	16,60
	32	23,60
09	25	11,75
	32	18,75
	40	26,75
	50	36,75
12	32	10,60
	52	33,60
	63	44,60
	66	47,60
	80	61,60
	100	81,60
16	125	106,60
	160	141,60
	63	37,45
	80	54,45
16	100	74,45
	125	99,45
	160	134,50



Helical Interpolation



Facing Pitch

Helical interpolation capacity for 7792VX (mm)			
Insert Size	Cutter dia.	Hole min.	Hole max.
06	16	22	30
	20	30	38
	25	40	48
	32	54	62
09	25	34	48
	32	48	62
	40	64	78
	50	84	98
12	32	42	62
	52	82	102
	63	104	124
	66	110	130
	80	138	158
	100	178	198
16	125	228	248
	160	298	318
	63	96	124
	80	130	158
16	100	170	198
	125	220	248
	160	290	318

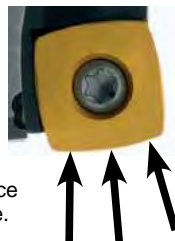


The advantages of face milling and producing cavities with Stellram's high feed face mill are numerous.

The unique design of the insert, approach angle and the cutter body ensure the cutting forces are predominantly directed in the axial direction. The example shown with a round insert tool shows complex forces which result in high levels of vibration and damage to the cutting edge.

7792VX

- Cutting forces predominantly axial
- Relationship between cutting edge and work piece is at its most stable.
- Results in high feed rates and consistent tool life.



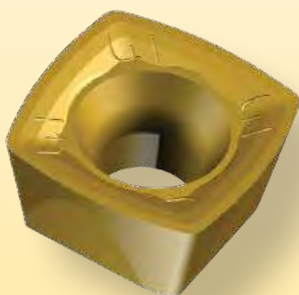
Round Insert Tools

- Tangential forces act around the radius
- Leads to vibration and damage of the cutting edge
- Leads to reduced feed and lower productivity



The 7792VX machines with a constant volume of chip throughout all aspects of producing cavities and produces a side wall that is close to profile.

Round insert tools have increasing chip volume through the process.



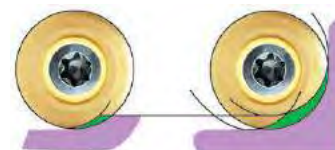
7792VX

- Constant cutting section (chip volume) irrespective of position in cavity.
- Producing a close to profile side wall.
- Near-square side walls possible.



Centre clearance

Side wall



Round insert

- Greater surface contact.
- Increased chip section for side wall machining.
- Vibration in corners.
- Undulating side wall cusps.

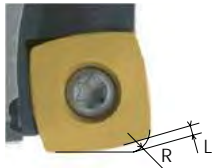


CNC Program - Corner Radius Definition

The use of common CAD / CAM systems requires a round insert dimension to be known for cavity machining. This is available with 7792VX cutters as shown to the right and in the reference table.

For finish pass applications:

Wiper Facet for finishing use max. feed 0,80mm/Revolution



Programming Data (mm)			
Insert size (mm)	Radius	R	L
06	0,80	1,37	0,40
09	0,80	2,01	0,73
	1,20	2,27	0,67
12	0,80	2,50	1,02
	1,20	2,73	0,97
16	1,20	4,18	1,46

Calculation of the average chip thickness in relation with the D.O.C. (Axial)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_p}}$$

h_m = Average chip thickness

a_p = Depth of cut

f_z = Feed per tooth

d = Insert diameter 45mm

Theoretical Diameter for all high feed insert sizes = 45mm

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_p}{d}}$$

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness

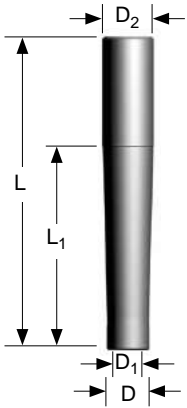
a_e = Radial engagement

f_z = Feed per tooth

d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$



Shank Extension

Product		Dimensions (mm)					
EDP	Item Description	L	L ₁	D ₂	D	D ₁	M
030624	M-13-M8-CA16-090	90	40	16	13	8,50	M8
030625	M-13-M8-CA16-110	110	60	16	13	8,50	M8
030626	M-13-M8-CA16-130	130	80	16	13	8,50	M8
030627	M-13-M8-CA16-170	170	120	16	13	8,50	M8
030628	M-18-M10-CA20-110	110	60	20	18	10,50	M10
030629	M-18-M10-CA20-130	130	80	20	18	10,50	M10
030630	M-18-M10-CA20-170	170	120	20	18	10,50	M10
030631	M-18-M10-CA20-190	190	140	20	18	10,50	M10
030632	M-21-M12-CA25-131	131	75	25	21	12,50	M12
030633	M-21-M12-CA25-156	156	100	25	21	12,50	M12
030634	M-21-M12-CA25-181	181	125	25	21	12,50	M12
030635	M-21-M12-CA25-206	206	150	25	21	12,50	M12
030636	M-21-M12-CA25-231	231	175	25	21	12,50	M12
030637	M-29-M16-CA32-160	160	100	32	29	17,00	M16
030638	M-29-M16-CA32-210	210	150	32	29	17,00	M16
030639	M-29-M16-CA32-260	260	200	32	29	17,00	M16
030640	M-29-M16-CA32-310	310	250	32	29	17,00	M16

Note: Order example with cylindrical shank: M-13-M8-CA16-090

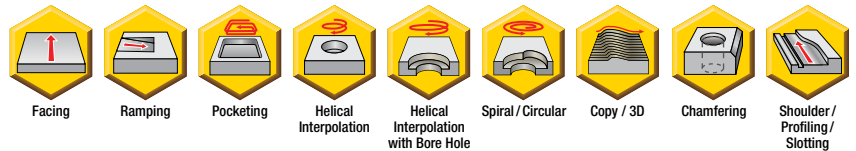


Cylindrical shank extensions can be used with all modular heads found in several product family series within this catalogue.

These extensions have the industry standard of metric threads.

Technical Advice

M	Modular adapter
13	Diameter in front of the modular shank (D)
M8	Metric Thread (M)
CA16	Cylindrical shank diameter 16mm with through coolant
90	Total length of the body



42° LEAD ANGLE - FACE MILLS

7745VOD cutters are designed for machining most materials. Octagonal inserts offer up to eight economical cutting edges.

These cutters are ideal for roughing, semi-finishing and finishing of Steel, Alloyed Steel, Stainless Steel, High Temperature Alloys, Cast Iron and Aluminium Alloys.

7745VOD cutters are also very robust when machining with tool holder extensions.

They are one of the first choice tools for machining component surfaces with scale as well as for machining of irregular stock.

Available in two insert sizes: OD..04 and OD..06. Both sizes are available in cutters with medium and fine tooth pitch, giving maximum efficiency and performance in order to reduce cycle times.

7745VOD

7745VOD04:

Maximum $a_p = 3,50\text{mm}$
($a_{p1} \text{ max} = 8\text{mm}$)
Diameter Range = 25mm to 160mm

Note: Larger diameter Shell Mill Fixation cutters with interchangeable cartridges are available. Please see page A126.

7745VOD06:

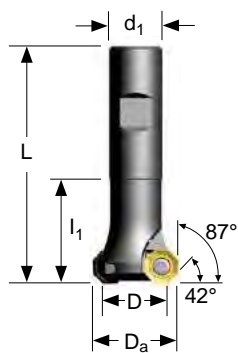
Maximum $a_p = 4,50\text{mm}$
($a_{p1} = 10\text{mm}$)
Diameter Range = 50mm to 160mm

Note: Larger diameter Shell Mill Fixation cutters with interchangeable cartridges are available. Please see page A130.

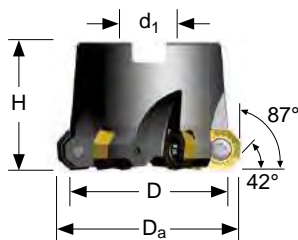




End Mills & Face Mills



Weldon Shank



Shell Mill Fixation

Product		Dimensions (mm)								Spares				
EDP	Item Description	D	Da*	L/H	l ₁	d ₁	a _p	a _{p1} max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7745VOD04 Weldon Shank														
021758	7745VOD04WA025R	25	33	90	40	20	3,50	8,00	2	015270	F4011T	015241	T20	3,10
025379	7745VOD04WA025R095	25	33	145	95	20	3,50	8,00	2	015270	F4011T	015241	T20	3,10
021759	7745VOD04WA032R	32	40	96	40	25	3,50	8,00	3	015270	F4011T	015241	T20	3,10
025380	7745VOD04WA032R095	32	40	151	95	25	3,50	8,00	3	015270	F4011T	015241	T20	3,10
021760	7745VOD04WA040R	40	48	110	50	32	3,50	8,00	4	015270	F4011T	015241	T20	3,10
025381	7745VOD04WA040R095	40	48	165	95	32	3,50	8,00	4	015270	F4011T	015241	T20	3,10
7745VOD04 Shell Mill Fixation - Medium and Fine Pitch														
021754	7745VOD04-A040R	40	48	35	-	16	3,50	8,00	4	015270	F4011T	015241	T20	3,10
021755	7745VOD04-A050R	50	58	40	-	22	3,50	8,00	4	015270	F4011T	015241	T20	3,10
030971	7745VOD04-A050Z5R	50	58	40	-	22	3,50	8,00	5	015270	F4011T	015241	T20	3,10
023058	7745VOD04-A050Z6R	50	58	40	-	22	3,50	8,00	6	015270	F4011T	015241	T20	3,10
021756	7745VOD04-A063R	63	71	40	-	22	3,50	8,00	5	015270	F4011T	015241	T20	3,10
023059	7745VOD04-A063Z7R	63	71	40	-	22	3,50	8,00	7	015270	F4011T	015241	T20	3,10
017907	7745VOD04-A080R	80	88	50	-	27	3,50	8,00	6	015270	F4011T	015241	T20	3,10
023060	7745VOD04-A080Z9R	80	88	50	-	27	3,50	8,00	9	015270	F4011T	015241	T20	3,10
021757	7745VOD04-A100R	100	108	55	-	32	3,50	8,00	7	015270	F4011T	015241	T20	3,10
023061	7745VOD04-A100Z11R	100	108	55	-	32	3,50	8,00	11	015270	F4011T	015241	T20	3,10
023062	7745VOD04-A125R	125	133	63	-	40	3,50	8,00	8	015270	F4011T	015241	T20	3,10
023063	7745VOD04-A125Z12R	125	133	63	-	40	3,50	8,00	12	015270	F4011T	015241	T20	3,10
025382	7745VOD04-160R	160	168	63	-	40	3,50	8,00	10	015270	F4011T	015241	T20	3,10
025383	7745VOD04-160Z15R	160	168	63	-	40	3,50	8,00	15	015270	F4011T	015241	T20	3,10

Da* = Outside Diameter



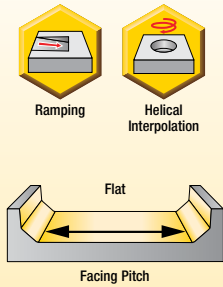
Depth of Cut (a_p)



End Mills & Face Mills

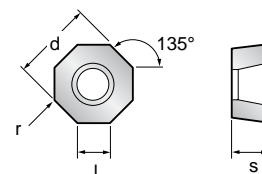
7745VOD04 Technical Information

EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole		ap max Helical / Linear	Max RPM
				min.	max.		
021758	7745VOD04WA025R	25	17.00	46	64	2.00	38500
025379	7745VOD04WA025R095	25	17.00	46	64	2.00	38500
021759	7745VOD04WA032R	32	12.10	60	78	2.00	33200
025380	7745VOD04WA032R095	32	12.10	60	78	2.00	33200
021760	7745VOD04WA040R	40	8.50	76	94	2.00	29200
025381	7745VOD04WA040R095	40	8.50	76	94	2.00	29200
021754	7745VOD04-A040R	40	8.50	76	94	2.00	29200
021755	7745VOD04-A050R	50	6.10	96	114	2.00	25700
030971	7745VOD04-A050Z5R	50	6.10	96	114	2.00	25700
023058	7745VOD04-A050Z6R	50	6.10	96	114	2.00	25700
021756	7745VOD04-A063R	63	4.30	122	140	2.00	22700
023059	7745VOD04-A063Z7R	63	4.30	122	140	2.00	22700
017907	7745VOD04-A080R	80	3.00	156	174	2.00	20000
023060	7745VOD04-A080Z9R	80	3.00	156	174	2.00	20000
021757	7745VOD04-A100R	100	2.40	196	214	2.00	17700
023061	7745VOD04-A100Z11R	100	2.40	196	214	2.00	17700
023062	7745VOD04-A125R	125	2.00	246	264	2.00	15700
023063	7745VOD04-A125Z12R	125	2.00	246	264	2.00	15700
025382	7745VOD04-160R	160	1.40	316	334	2.00	14000
025383	7745VOD04-160Z15R	160	1.40	316	334	2.00	14000





End Mills & Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max. 3,50	a _p min. - max. 1,00 - 2,00	a _p min. - max. 0,20 - 1,00					
024911	ODET0404APFN-441	GH1	◆	◆	◆	12,70	4,00	4,76	Facet	0,02
022198	ODET0404APEN-44	X500	-	-	●●●●●	12,70	4,00	4,76	Facet	0,04
031470	ODET0404APEN-44	SP6519	-	-	●●●●●	12,70	4,00	4,76	Facet	0,04
022199	ODET0404APEN-44	MP91M	-	-	●●●●●	12,70	4,00	4,76	Facet	0,04
022061	ODMT0404APEN-41	X500	-	●●	-	12,70	4,00	4,76	Facet	0,06
031472	ODMT0404APEN-41	SP6519	-	●●●	-	12,70	4,00	4,76	Facet	0,06
017775	ODMT0404APEN-41	MP91M	-	●●●	-	12,70	4,00	4,76	Facet	0,06
030768	ODMT040408EN-412	X500	-	●●●	-	12,70	4,00	4,76	0,80	0,06
030769	ODMT040408EN-412	X700	-	●●●	-	12,70	4,00	4,76	0,80	0,06
031540	ODMT040408EN-412	SP6519	-	●●●	-	12,70	4,00	4,76	0,80	0,06
015143	ODMT040408EN-41	X500	●●●	-	-	12,70	4,00	4,76	0,80	0,06
030330	ODMT040408EN-41	X700	●●●	●●●	-	12,70	4,00	4,76	0,80	0,06
031471	ODMT040408EN-41	SP6519	●●●	-	-	12,70	4,00	4,76	0,80	0,06
017303	ODMT040408EN-41	MP91M	●	-	-	12,70	4,00	4,76	0,80	0,06
027884	ODEW0404APTR-RA	SC3025	-	◆	◆	12,70	4,00	4,76	Wiper Facet	0,19
017672	ODMW040408SN	X500	●●●	-	-	12,70	4,00	4,76	0,80	0,27
031462	ODMW040408SN	SP6519	●●	-	-	12,70	4,00	4,76	0,80	0,27
017304	ODMW040408SN	MP91M	●●	-	-	12,70	4,00	4,76	0,80	0,27
029096	ODMW040408SN	SC3025	◆	-	-	12,70	4,00	4,76	0,80	0,27



-Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

ODMW040408SN X500 should be generally used for heavy duty applications as well as Stainless Steel and High Temperature Alloys with heavy scale.

ODMT040408EN-41 X700 should be used for Stainless Steel and High Temperature Alloys when a stronger cutting edge is required.

Note: Feed recommendations can be found on page A81. Speed recommendations can be found on page A85.



End Mills & Face Mills

7745VOD04 Feeds f_z (mm/tooth)

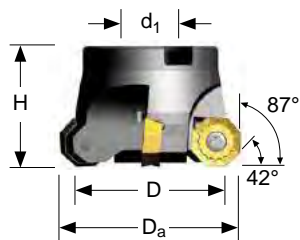
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
FN-441	GH1	Facing	-	-	-	-	-	-	-	0,04 - 0,30	0,04 - 0,25	-	-	-	-	-	-
EN-44	X500	Facing	0,06 - 0,30	0,06 - 0,27	0,06 - 0,25	0,06 - 0,20	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-44	SP6519	Facing	0,06 - 0,30	0,06 - 0,27	0,06 - 0,25	0,06 - 0,20	0,06 - 0,25	0,06 - 0,25	0,06 - 0,23	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-44	MP911M	Facing	0,06 - 0,30	0,06 - 0,27	-	-	0,06 - 0,25	0,06 - 0,25	0,06 - 0,23	-	-	-	-	-	-	-	-
APEN-41	X500	Facing	0,06 - 0,35	0,06 - 0,32	-	-	-	-	-	-	-	-	-	-	-	-	-
APEN-41	SP6519	Facing	0,06 - 0,35	0,06 - 0,32	-	-	0,06 - 0,25	0,06 - 0,25	0,06 - 0,23	-	-	-	-	-	-	-	-
APEN-41	MP911M	Facing	0,06 - 0,35	0,06 - 0,32	-	-	0,06 - 0,25	0,06 - 0,25	0,06 - 0,23	-	-	-	-	-	-	-	-
EN-412	X500	Facing	-	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-412	X700	Facing	-	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-412	SP6519	Facing	-	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-41	X500	Facing	-	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,30	-	-
EN-41	X700	Facing	-	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,30	-	-
EN-41	SP6519	Facing	0,06 - 0,35	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,30	-	-
EN-41	MP911M	Facing	-	-	-	-	0,06 - 0,35	0,06 - 0,35	0,06 - 0,35	-	-	-	-	-	-	-	-
TR-RA	SC3025	Facing	-	-	-	-	0,19 - 0,35	0,19 - 0,35	0,19 - 0,35	-	-	-	-	-	-	-	-
SN	X500	Facing	-	0,32 - 0,50	0,30 - 0,40	-	-	-	-	-	-	0,20 - 0,30	0,20 - 0,30	0,20 - 0,30	0,20 - 0,33	-	-
SN	SP6519	Facing	0,32 - 0,55	0,32 - 0,50	-	-	-	-	-	-	-	-	-	-	-	-	-
SN	MP911M	Facing	0,32 - 0,55	0,32 - 0,50	-	-	0,32 - 0,50	0,32 - 0,50	0,32 - 0,50	-	-	-	-	-	-	-	-
SN	SC3025	Facing	-	-	-	-	0,32 - 0,50	0,32 - 0,50	0,32 - 0,50	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A85.



End Mills & Face Mills



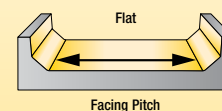
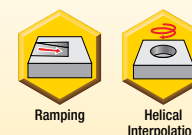
Shell Mill Fixation

Product		Dimensions (mm)								Spares				
EDP	Item Description	D	Da*	L/H	l1	d1	ap	ap 1 max	No. of Teeth	EDP		EDP		Screw Tightening nm
7745VOD06 Shell Mill Fixation - Medium and Fine Pitch														
026581	7745VOD06-A050R	50	60	40	-	22	4,50	10	4	015270	F4011T	015241	T20	3,10
026582	7745VOD06-A063R	63	73	40	-	22	4,50	10	5	015270	F4011T	015241	T20	3,10
026583	7745VOD06-A080R	80	90	50	-	27	4,50	10	6	015270	F4011T	015241	T20	3,10
027911	7745VOD06-A080Z08R	80	90	50	-	27	4,50	10	8	015270	F4011T	015241	T20	3,10
026584	7745VOD06-A100R	100	110	55	-	32	4,50	10	7	015270	F4011T	015241	T20	3,10
027876	7745VOD06-A100Z09R	100	110	55	-	32	4,50	10	9	015270	F4011T	015241	T20	3,10
026585	7745VOD06-A125R	125	135	63	-	40	4,50	10	8	015270	F4011T	015241	T20	3,10
027877	7745VOD06-A125Z11R	125	135	63	-	40	4,50	10	11	015270	F4011T	015241	T20	3,10
026586	7745VOD06-160R	160	170	63	-	40	4,50	10	10	015270	F4011T	015241	T20	3,10
027878	7745VOD06-160Z14R	160	170	63	-	40	4,50	10	14	015270	F4011T	015241	T20	3,10

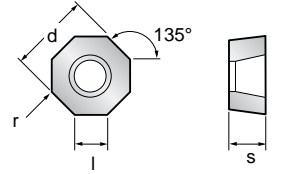
Da* = Outside Diameter

7745VOD06 Technical Information (mm)

Product		Dimensions					Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	
026581	7745VOD06-A050R	50	6.00	94	118	2,60	18000
026582	7745VOD06-A063R	63	4.60	120	144	2,60	15600
026583	7745VOD06-A080R	80	3.30	154	178	2,60	13700
027911	7745VOD06-A080Z08R	80	3.30	154	178	2,60	13700
026584	7745VOD06-A100R	100	2.60	194	218	2,60	12100
027876	7745VOD06-A100Z09R	100	2.60	194	218	2,60	12100
026585	7745VOD06-A125R	125	2.00	244	268	2,60	10700
027877	7745VOD06-A125Z11R	125	2.00	244	268	2,60	10700
026586	7745VOD06-160R	160	1.50	314	338	2,60	9500
027878	7745VOD06-160Z14R	160	1.50	314	338	2,60	9500



Depth of Cut (ap)



End Mills & Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			ap max. 4,50	ap min. - max. 1,00 - 2,00	ap min. - max. 0,20 - 1,00					
026588	ODET0605APFN-441	GH1	◆	◆	◆	16,00	6,00	5,55	Facet	0,02
026592	ODET0605APEN-44	X500	-	-	●●●●●	16,00	6,00	5,55	Facet	0,04
031501	ODET0605APEN-44	SP6519	-	-	■◆●●●	16,00	6,00	5,55	Facet	0,04
034513	ODET0605APEN-44	SP4019	-	-	◆◆◆	16,00	6,00	5,55	Facet	0,04
026591	ODET0605APEN-44	MP91M	-	-	◆■	16,00	6,00	5,55	Facet	0,04
026590	ODMT0605APEN-41	X500	●●◆	●●●●●	-	16,00	6,00	5,55	Facet	0,06
031502	ODMT0605APEN-41	SP6519	■●●	■◆●●●	-	16,00	6,00	5,55	Facet	0,06
034514	ODMT0605APEN-41	SP4019	◆◆	◆◆◆	-	16,00	6,00	5,55	Facet	0,06
026589	ODMT0605APEN-41	MP91M	-	■◆	-	16,00	6,00	5,55	Facet	0,06
027885	ODEW0605APTR-RA	SC3025	-	◆	◆	16,00	6,00	5,55	Facet	0,19
026596	ODMW060512TN	X500	●●●●●	-	-	16,00	6,00	5,55	1,20	0,17
031503	ODMW060512TN	SP6519	■◆	-	-	16,00	6,00	5,55	1,20	0,17
034515	ODMW060512TN	SP4019	●●●	-	◆	16,00	6,00	5,55	1,20	0,17
026595	ODMW060512TN	MP91M	◆■	-	-	16,00	6,00	5,55	1,20	0,17
025838	ODMW060512SN	X500	●●	-	-	16,00	6,00	5,55	1,20	0,27
031483	ODMW060512SN	SP6519	■◆	-	-	16,00	6,00	5,55	1,20	0,27
025836	ODMW060512SN	MP91M	◆■	-	-	16,00	6,00	5,55	1,20	0,27
029097	ODMW060512SN	SC3025	◆	-	-	16,00	6,00	5,55	1,20	0,27

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

ODMW060512SN should be generally used for heavy duty applications.
 ODMW060512TN X500 and SP4019 should be used in Stainless Steel and High Temperature Alloys with heavy scale.
 ODMW060512TN should also be used when the machine tool has less power available.

Note: Feed recommendations can be found on page A84. Speed recommendations can be found on page A85.



7745VOD06 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
FN-441	GH1	Facing	-	-	-	-	-	-	-	0,04 - 0,30	0,04 - 0,25	-	-	-	-	-	-
EN-44	X500	Facing	0,06 - 0,35	0,06 - 0,30	0,06 - 0,27	0,06 - 0,20	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-44	SP6519	Facing	0,06 - 0,35	0,06 - 0,30	0,06 - 0,27	0,06 - 0,20	0,06 - 0,30	0,06 - 0,30	0,06 - 0,30	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-44	SP4019	Facing	-	-	0,06 - 0,27	0,06 - 0,20	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-44	MP91M	Facing	0,06 - 0,35	0,06 - 0,27	-	-	0,06 - 0,30	0,06 - 0,30	0,06 - 0,30	-	-	-	-	-	-	-	-
EN-41	X500	Facing	0,06 - 0,38	0,06 - 0,35	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,30	-	-
EN-41	SP6519	Facing	0,06 - 0,38	0,06 - 0,35	0,06 - 0,35	0,06 - 0,30	0,06 - 0,38	0,06 - 0,38	0,06 - 0,35	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,30	-	-
EN-41	SP4019	Facing	-	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,30	-	-
EN-41	MP91M	Facing	0,06 - 0,38	0,06 - 0,35	-	-	0,06 - 0,38	0,06 - 0,38	0,06 - 0,35	-	-	-	-	-	-	-	-
TR-RA	SC3025	Facing	-	-	-	-	0,19 - 0,40	0,19 - 0,40	0,19 - 0,40	-	-	-	-	-	-	-	-
TN	X500	Facing	0,24 - 0,55	0,24 - 0,50	0,24 - 0,40	0,24 - 0,32	-	-	-	-	-	0,17 - 0,25	0,17 - 0,25	0,17 - 0,25	0,20 - 0,28	-	-
TN	SP6519	Facing	0,24 - 0,55	0,24 - 0,50	-	-	-	-	-	-	-	-	-	-	-	-	-
TN	SP4019	Facing	-	-	0,24 - 0,40	0,24 - 0,32	-	-	-	-	-	0,17 - 0,25	0,17 - 0,25	0,17 - 0,25	0,20 - 0,28	0,05 - 0,10	0,05 - 0,12
TN	MP91M	Facing	0,24 - 0,55	0,24 - 0,50	-	-	0,17 - 0,50	0,17 - 0,50	0,17 - 0,50	-	-	-	-	-	-	-	-
SN	X500	Facing	0,32 - 0,60	0,32 - 0,55	-	-	-	-	-	-	-	-	-	-	-	-	-
SN	SP6519	Facing	0,32 - 0,60	0,32 - 0,55	-	-	-	-	-	-	-	-	-	-	-	-	-
SN	MP91M	Facing	0,32 - 0,55	0,32 - 0,55	-	-	0,32 - 0,55	0,32 - 0,55	0,32 - 0,55	-	-	-	-	-	-	-	-
SN	SC3025	Facing	-	-	-	-	0,32 - 0,55	0,32 - 0,55	0,32 - 0,55	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A85.



End Mills & Face Mills

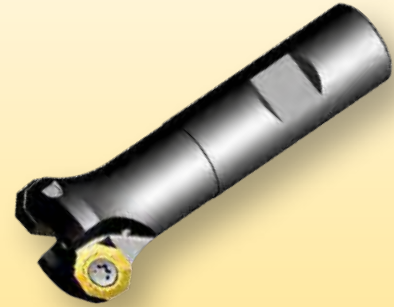
Speed v_c (m/min)																
7745VOD Series			Wear Resistance													
			Speed min. - max.													
Coolant Recommendation																
Recommended ● Possible ○																
ISO	Materials	Rm and Hardness	Water	CVD X Grade	Water	PVD X Grade	Water	PVD Standard	Water	PVD Standard	Water	CVD Standard	Water	CVD Standard	Water	Uncoated Micrograin
			☹	X500	☹	X700	☹	SP6519	☹	SP4019	☹	MP91M	☹	SC3025	☹	GH1
P	Unalloyed Steel	<600 N/mm ² <180 HBN	○	130 - 270			○	130 - 295				●	140 - 345			
		<950 N/mm ² <280 HBN	○	115 - 240			○	115 - 260				●	120 - 205			
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○	100 - 210			○	100 - 230				●	105 - 270			
		950-1200 N/mm ² 280-355 HBN	○	75 - 160			○	75 - 175				●	80 - 205			
		1200-1400 N/mm ² 355-415 HBN		●	50 - 100		●	50 - 110			●	50 - 130				
M	Stainless Steel	Austenitic + Ferritic 300 series	○	115 - 250	○	115 - 260	○	115 - 270	○	●	120 - 280					
		Martensitic 400 series	○	100 - 220	○	105 - 230	○	105 - 235	○	●	110 - 250					
	PH Stainless	Refractory P.H.	●	50 - 110	●	50 - 115	●	50 - 120	●	50 - 130						
K	Cast Iron	Grey GG-Ft														
		Spheroidal-Ductile GGG-FGS					○	●	110 - 240			●	115 - 285	●	120 - 335	
		Malleable GTS - MN/MP							100 - 220				105 - 260		105 - 275	
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN													●	400 - 3050
		Aluminium + Silicon > 16% Si 92 HBN														
S	High Temperature Alloys	Iron Based	●	23 - 48	●	23 - 52	●	23 - 55	●	24 - 63						
		Cobalt Based		21 - 44		22 - 46		22 - 48		23 - 52						
		Nickel Based		24 - 51		25 - 53		25 - 55		26 - 59						
		Titanium Based		35 - 73		36 - 75		36 - 79		37 - 84						
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN								●	50 - 100	●	50 - 105			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN								●	40 - 90	●	40 - 95			



775VOD Technical Information

Feed rate compensation: For 42° cutting, divide the h_m value by the sine of the approach angle (the sine of 42° = 0,669)

i.e.: $\frac{h_m}{0,669}$ or $\frac{0,08mm}{0,669} = 0,12mm$ programmed feed rate



Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

- h_m = Average chip thickness
- a_e = Radial engagement
- f_z = Feed per tooth
- d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$



45° LEAD ANGLE – FACE MILLS

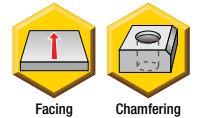
7745VS cutters are designed for machining Tool Steel and Cast Iron. They feature exceptionally thick square inserts and are ideal for tough cutting conditions. The upper edge of the insert does not rest against a pocket allowing for recessing operations.

Ideal for roughing, semi-finishing and finishing. These cutters are a very good choice for machining surfaces with heavy scale and are also ideal for machining surfaces with irregular stock.

This family is available in two different insert sizes: SC..09 and SC..12

7745 cutters using 12mm inserts with 5mm thickness are able to cover irregular surfaces up to 7mm a_p . With its 0° axial and a radial negative rake angle this cutter has an excellent chip evacuation particularly when using the full depth of cut capacity.

The smaller cutter series with 9mm inserts are ideal for facing small areas and chamfering any style component.



7745VS

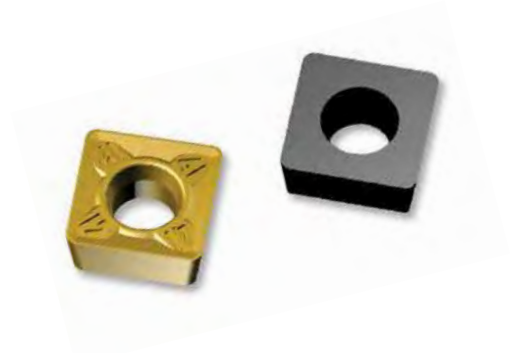
7745VS09:

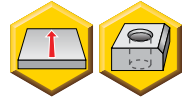
Maximum a_p = 5mm
Diameter Range = 16mm to 25mm

7745VS12:

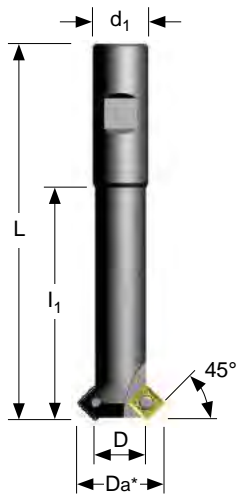
Maximum a_p = 7mm
Diameter Range = 40mm to 125mm

Note: Larger diameter Shell Mill Fixation cutters with interchangeable cartridges are available. Please see page A136.





End Mills & Face Mills



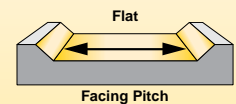
Weldon Shank

Product		Dimensions (mm)							Spares				
EDP	Item Description	D	Da*	L/H	l ₁	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm.
7745VS09 Weldon Shank													
021762	7745VS09WA016R085	16	27	135	85	16	5,00	2	015262	D4010T	015240	T15	3,10
021763	7745VS09WA020R085	20	31	135	85	20	5,00	2	015262	D4010T	015240	T15	3,10
021764	7745VS09WA025R095	25	36	150	95	25	5,00	3	015262	D4010T	015240	T15	3,10

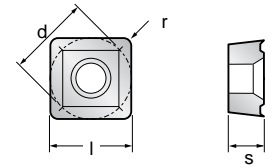
Da* = Outside Diameter

7745VS09 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a _p max Helical / Linear	Max RPM
021762	7745VS09WA016R085	16	-	-	-	-	56500
021763	7745VS09WA020R085	20	-	-	-	-	50500
021764	7745VS09WA025R095	25	-	-	-	-	45200



Depth of Cut (a_p)



End Mills & Face Mills

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
a _p max	a _p min - max	a _p min - max								
018186	SCMT09T308E	GH1	-	●	-	9,52	9,52	3,97	0,80	0,03
015147	SCMT09T308EN-41	X500	-	●●●◆	-	9,52	9,52	3,97	0,80	0,04
031474	SCMT09T308EN-41	SP6519	-	◆◆◆◆◆	-	9,52	9,52	3,97	0,80	0,04
017315	SCMT09T308EN-41	MP91M	-	◆◆◆◆◆	-	9,52	9,52	3,97	0,80	0,04
034550	SCMT09T308T	X400	◆◆	◆	-	9,52	9,52	3,97	0,80	0,15
031568	SCMT09T308T	SP6519	◆◆◆◆◆	-	-	9,52	9,52	3,97	0,80	0,15
034551	SCMT09T308T	SP4019	◆◆◆	◆	-	9,52	9,52	3,97	0,80	0,15

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.



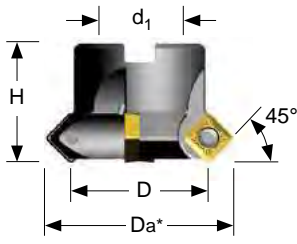
7745VS09 Feeds f _z (mm/tooth)																	
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
E	GH1	Facing / Chamfering	-	-	-	-	0,05 - 0,10	0,05 - 0,10	-	-	-	-	-	-	-	-	-
EN-41	X500	Facing / Chamfering	0,12 - 0,30	0,12 - 0,25	0,12 - 0,26	0,12 - 0,23	-	-	-	-	-	-	-	-	-	-	-
EN-41	SP6519	Facing / Chamfering	0,12 - 0,30	0,12 - 0,25	0,12 - 0,26	0,12 - 0,23	0,12 - 0,30	0,12 - 0,30	0,12 - 0,25	-	-	-	-	-	-	-	-
EN-41	MP91M	Facing / Chamfering	0,12 - 0,30	0,12 - 0,22	-	-	0,12 - 0,30	0,12 - 0,30	0,12 - 0,25	-	-	-	-	-	-	0,05 - 0,08	0,05 - 0,10
T	X400	Facing / Chamfering	0,12 - 0,33	0,12 - 0,30	-	-	-	-	-	-	-	-	-	-	-	0,05 - 0,08	0,05 - 0,10
T	SP6519	Facing / Chamfering	0,12 - 0,30	0,12 - 0,18	0,12 - 0,28	0,12 - 0,25	0,12 - 0,33	0,12 - 0,33	0,12 - 0,30	-	-	-	-	-	-	-	-
T	SP4019	Facing / Chamfering	-	-	0,12 - 0,28	0,12 - 0,25	0,12 - 0,33	0,12 - 0,33	0,12 - 0,30	-	-	-	-	-	-	0,05 - 0,07	0,05 - 0,10

Note: HTA = High Temperature Alloys

Note: Speed recommendations can be found on page A93.



End Mills & Face Mills



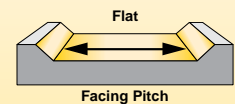
Shell Mill Fixation

Product		Dimensions (mm)							Spares				
EDP	Item Description	D	Da*	L/H	l ₁	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm.
7745VS12 Shell Mill Fixation													
021765	7745VS12-A040R	40	55	32	-	16	7,00	4	015266	D5013T	015241	T20	6,00
021766	7745VS12-A050R	50	65	40	-	22	7,00	4	015266	D5013T	015241	T20	6,00
021767	7745VS12-A063R	63	78	40	-	22	7,00	5	015266	D5013T	015241	T20	6,00
021768	7745VS12-A080R	80	95	50	-	27	7,00	6	015266	D5013T	015241	T20	6,00
021769	7745VS12-A100R	100	115	50	-	32	7,00	7	015266	D5013T	015241	T20	6,00
021770	7745VS12-A125R	125	140	63	-	40	7,00	8	015266	D5013T	015241	T20	6,00

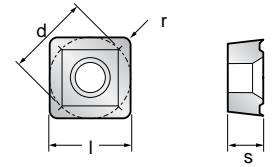
Da* = Outside Diameter

7745VS12 Technical Information (mm)

Product		Dimensions					Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a _p max Helical / Linear	
021765	7745VS12-A040R	40	-	-	-	-	28100
021766	7745VS12-A050R	50	-	-	-	-	25100
021767	7745VS12-A063R	63	-	-	-	-	22300
021768	7745VS12-A080R	80	-	-	-	-	20000
021769	7745VS12-A100R	100	-	-	-	-	17700
021770	7745VS12-A125R	125	-	-	-	-	16000



Depth of Cut (a_p)



End Mills & Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Depth of Cut (mm)			d (IC)	l	s	r	h _m min
			a _p max 7,00	a _p min - max 1,00 - 3,50	a _p min - max 0,20 - 1,00					

Insert selection with facet										
017312	SCCT12M5ACER	MP91M	-	■ ■ ●	◆ ◆ ◆	12,70	12,70	5,00	Facet	0,03
034591	SCCT12M5ACTR	X400	◆ ◆	● ●	◆	12,70	12,70	5,00	Facet	0,15
034552	SCCT12M5ACTR	SP4019	■ ◆	◆ ◆ ■	◆ ◆ ■	12,70	12,70	5,00	Facet	0,15
017695	SCCT12M5ACTR	GH1	-	-	■	12,70	12,70	5,00	Facet	0,15
017698	SCHT12M5ACTN	X500	◆ ■	● ●	● ●	12,70	12,70	5,00	Facet	0,15
031504	SCHT12M5ACTN	SP6519	■ ■ ●	◆ ◆ ◆ ■	■ ■ ■ ■	12,70	12,70	5,00	Facet	0,15
017313	SCHT12M5ACTN	MP91M	■	◆	● ● ● ●	12,70	12,70	5,00	Facet	0,15
015144	SCKT12M5ACSN-41	X500	●	-	-	12,70	12,70	5,00	Facet	0,12
031556	SCKT12M5ACSN-41	SP6519	● ● ●	-	-	12,70	12,70	5,00	Facet	0,12
017314	SCKT12M5ACSN-41	MP91M	◆	-	-	12,70	12,70	5,00	Facet	0,12

Insert selection with corner radius										
015226	SCMT12M512EN-41	X500	-	■ ◆ ●	-	12,70	12,70	5,00	1,20	0,06
031475	SCMT12M512EN-41	SP6519	-	◆ ◆ ◆ ■	-	12,70	12,70	5,00	1,20	0,06
017317	SCMT12M512EN-41	MP91M	-	■ ■ ◆	-	12,70	12,70	5,00	1,20	0,06
034554	SCMT12M512T	X400	◆ ◆	-	-	12,70	12,70	5,00	1,20	0,15
024129	SCMT12M512T	X500	● ◆	-	-	12,70	12,70	5,00	1,20	0,15
034555	SCMT12M512T	SP6519	■ ■ ◆ ●	-	-	12,70	12,70	5,00	1,20	0,15
034553	SCMT12M512T	SP4019	■ ■ ■	-	-	12,70	12,70	5,00	1,20	0,15
017316	SCMT12M512T	MP91M	● ◆	-	-	12,70	12,70	5,00	1,20	0,15

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

SCMT12M512EN-41 and SCMT12M512T with radius are only for semi roughing application where a finished surface is not required.

Note: Feed recommendations can be found on page A92. Speed recommendations can be found on page A93.



7745VS12 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
Insert selection with facet																	
ER	MP91M	Facing	0,05 - 0,25	0,05 - 0,23	-	-	0,05 - 0,25	0,05 - 0,25	0,05 - 0,23	-	-	-	-	-	-	-	-
TR	X400	Facing	0,15 - 0,50	0,12 - 0,45	-	-	-	-	-	-	-	-	-	-	-	0,06 - 0,10	0,08 - 0,10
TR	SP4019	Facing	-	-	0,12 - 0,33	0,12 - 0,22	0,15 - 0,36	0,15 - 0,36	0,15 - 0,36	-	-	-	-	-	-	0,06 - 0,10	0,08 - 0,10
TR	GH1	Facing	-	-	-	-	0,15 - 0,30	0,15 - 0,30	0,15 - 0,25	-	-	-	-	-	-	-	-
TN	X500	Facing	-	-	0,15 - 0,33	0,15 - 0,22	-	-	-	-	-	-	-	-	-	-	-
TN	SP6519	Facing	0,15 - 0,45	0,15 - 0,40	0,15 - 0,33	0,15 - 0,22	0,15 - 0,36	0,15 - 0,36	0,15 - 0,36	-	-	-	-	-	-	-	-
TN	MP91M	Facing	0,15 - 0,40	0,15 - 0,35	-	-	0,12 - 0,40	0,12 - 0,40	0,12 - 0,40	-	-	-	-	-	-	0,06 - 0,10	0,08 - 0,10
SN-41	X500	Facing	-	-	-	0,12 - 0,22	-	-	-	-	-	-	-	-	-	-	-
SN-41	SP6519	Facing	0,12 - 0,40	0,12 - 0,38	0,12 - 0,33	-	-	-	-	-	-	-	-	-	-	-	-
SN-41	MP91M	Facing	-	-	-	-	0,12 - 0,40	0,12 - 0,40	0,12 - 0,40	-	-	-	-	-	-	-	-
Insert selection with corner radius																	
EN-41	X500	Facing	-	-	0,06 - 0,30	0,06 - 0,20	0,06 - 0,30	0,06 - 0,25	-	-	-	-	-	-	-	-	-
EN-41	SP6519	Facing	0,06 - 0,30	0,06 - 0,28	0,06 - 0,30	0,06 - 0,20	0,06 - 0,30	0,06 - 0,25	0,06 - 0,25	-	-	-	-	-	-	-	-
EN-41	MP91M	Facing	0,06 - 0,30	0,06 - 0,28	-	-	0,06 - 0,30	0,12 - 0,25	0,06 - 0,25	-	-	-	-	-	-	-	-
T	X400	Facing	0,15 - 0,38	0,15 - 0,35	-	-	-	-	-	-	-	-	-	-	-	-	-
T	X500	Facing	-	-	0,15 - 0,30	0,15 - 0,20	-	-	-	-	-	-	-	-	-	-	-
T	SP6519	Facing	0,15 - 0,35	0,15 - 0,33	0,15 - 0,30	0,15 - 0,20	0,12 - 0,36	0,12 - 0,36	0,12 - 0,36	-	-	-	-	-	-	-	-
T	SP4019	Facing	-	-	0,12 - 0,30	0,12 - 0,20	0,12 - 0,36	0,12 - 0,36	0,12 - 0,36	-	-	-	-	-	-	-	-
T	MP91M	Facing	0,12 - 0,38	0,12 - 0,32	-	-	0,12 - 0,36	0,12 - 0,36	0,12 - 0,36	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A93.



End Mills & Face Mills

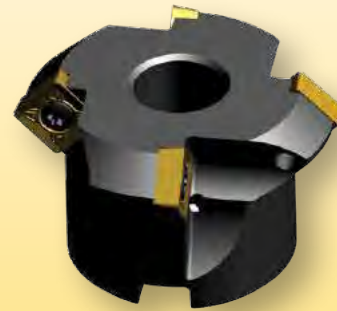
Speed v_c (m/min)													
7745VS Series			Wear Resistance										
			Speed min. - max.										
Coolant Recommendation			PVD X Grade		CVD X Grade		PVD Standard		PVD Standard		CVD Standard		Uncoated Micrograin
ISO	Materials	Rm and Hardness	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
			X400	X500	SP6519	SP4019	MP91M	GH1					
P	Unalloyed Steel	<600 N/mm ² <180 HBN	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
		<950 N/mm ² <280 HBN	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
		950-1200 N/mm ² 280-355 HBN	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
		1200-1400 N/mm ² 355-415 HBN	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
M	Stainless Steel	Austenitic + Ferritic 300 series	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
		Martensitic 400 series	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
	PH Stainless	Refractory P.H.	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
K	Cast Iron	Grey GG-Fl	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
		Spheroidal-Ductile GGG-FGS	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
		Malleable GTS - MN/MMP	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
		Aluminium + Silicon > 16% Si 92 HBN	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
S	High Temperature Alloys	Iron Based	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
		Cobalt Based	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
		Nickel Based	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
		Titanium Based	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕
		Chilled Cast Iron >1400 N/mm ² > 400 HBN	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕



7745VS Technical Information

Feed rate compensation: For 45° cutting, divide the h_m value by the sine of the approach angle (the sine of 45° = 0,707)

i.e.: $\frac{h_m}{0,707}$ or $\frac{0,08}{0,707} = 0,11\text{mm}$ programmed feed rate



End Mills & Face Mills

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness

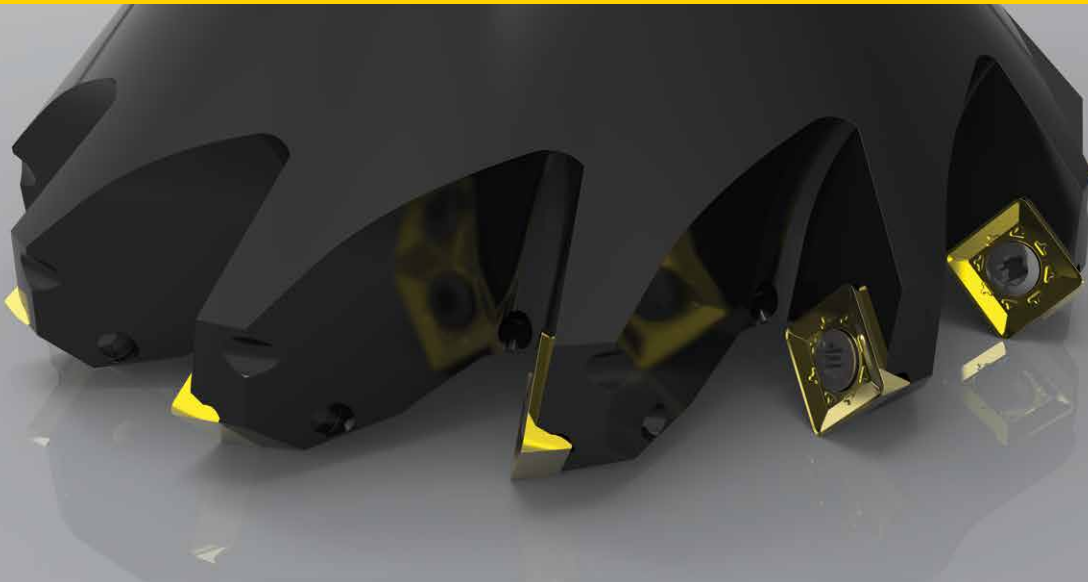
a_e = Radial engagement

f_z = Feed per tooth

d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$



45° LEAD ANGLE - FACE MILLS

7745VSE cutters are designed for Stainless Steels and High Temperature Alloys. Square inserts with a 15 degree clearance are used for reducing edge build-up.

7745VSE series are especially designed for roughing, semi-finishing and finishing of Stainless Steel and High Temperature Alloys. Also suitable for machining Aluminium.

This cutter series has an excellent smooth cutting action and requires low power. They are also perfect for unstable conditions.

Available in two different insert sizes: SD..09 and SD..12.



7745VSE

7745VSE09:

Maximum $a_p = 5,00\text{mm}$
Diameter Range = 16mm to 125mm
Available in medium and fine pitch.

7745VSE12:

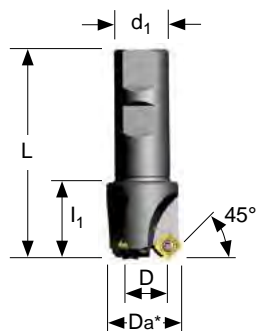
Maximum $a_p = 7,00\text{mm}$
Diameter Range = 50mm to 125mm
Available in medium pitch only.

Note: Larger diameter Shell Mill Fixation cutters with interchangeable cartridges are available. Please see page A142.

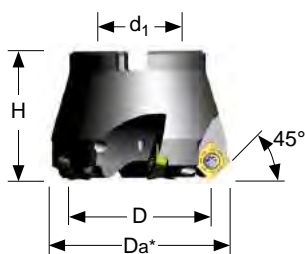




End Mills & Face Mills



Weldon Shank



Shell Mill Fixation

Product		Dimensions (mm)								Spares				
EDP	Item Description	D	Da*	L/H	l1	d1	ap max	Max. plunging depth	No. of Teeth	EDP		EDP		Screw Tightening Nm
7745VSE09 Weldon Shank														
021783	7745VSE09WA016Z2R	16	27	75	22	16	5,00	4,00	2	015269	F3508T	015240	T15	2,10
021784	7745VSE09WA020Z2R	20	31	82	28	20	5,00	4,00	2	015269	F3508T	015240	T15	2,10
021785	7745VSE09WA025Z3R	25	36	96	35	25	5,00	4,00	3	015269	F3508T	015240	T15	2,10
021786	7745VSE09WA032Z3R	32	43	100	35	32	5,00	4,00	3	015269	F3508T	015240	T15	2,10
7745VSE09 Shell Mill Fixation - Medium and Fine Pitch														
021771	7745VSE09-A032Z4R	32	43	30	-	13	5,00	4,00	4	015064	F3510T	015240	T15	2,10
021772	7745VSE09-A040Z5R	40	51	40	-	16	5,00	4,00	5	015064	F3510T	015240	T15	2,10
021773	7745VSE09-A050Z5R	50	61	42	-	22	5,00	4,00	5	015064	F3510T	015240	T15	2,10
021774	7745VSE09-A050Z6R	50	61	42	-	22	5,00	4,00	6	015064	F3510T	015240	T15	2,10
021775	7745VSE09-A063Z5R	63	74	42	-	22	5,00	4,00	5	015064	F3510T	015240	T15	2,10
021776	7745VSE09-A063Z7R	63	74	42	-	22	5,00	4,00	7	015064	F3510T	015240	T15	2,10
021777	7745VSE09-A080Z6R	80	91	52	-	27	5,00	4,00	6	015064	F3510T	015240	T15	2,10
021778	7745VSE09-A080Z9R	80	91	52	-	27	5,00	4,00	9	015064	F3510T	015240	T15	2,10
021779	7745VSE09-A100Z7R	100	111	52	-	32	5,00	4,00	7	015064	F3510T	015240	T15	2,10
021780	7745VSE09-A100Z11R	100	111	52	-	32	5,00	4,00	11	015064	F3510T	015240	T15	2,10
021781	7745VSE09-A125Z8R	125	136	63	-	40	5,00	4,00	8	015064	F3510T	015240	T15	2,10

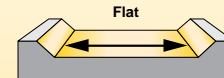
Da* = Outside Diameter

7745VSE09 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	Max RPM
021783	7745VSE09WA016Z2R	16	24.60	-	-	3,00	50700
021784	7745VSE09WA020Z2R	20	17.90	-	-	3,00	41600
021785	7745VSE09WA025Z3R	25	13.00	-	-	3,00	41000
021786	7745VSE09WA032Z3R	32	8.90	-	-	3,00	36400
021771	7745VSE09-A032Z4R	32	8.90	-	-	3,00	36400
021772	7745VSE09-A040Z5R	40	6.75	-	-	3,00	32500
021773	7745VSE09-A050Z5R	50	5.10	-	-	3,00	29200
021774	7745VSE09-A050Z6R	50	5.10	-	-	3,00	29200
021775	7745VSE09-A063Z5R	63	4.00	-	-	3,00	26000
021776	7745VSE09-A063Z7R	63	4.00	-	-	3,00	26000
021777	7745VSE09-A080Z6R	80	3.00	-	-	3,00	23100
021778	7745VSE09-A080Z9R	80	3.00	-	-	3,00	23100
021779	7745VSE09-A100Z7R	100	2.35	-	-	3,00	20600
021780	7745VSE09-A100Z11R	100	2.35	-	-	3,00	20600
021781	7745VSE09-A125Z8R	125	1.85	-	-	3,00	18500



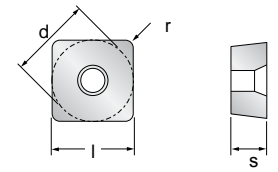
Ramping



Facing Pitch



Depth of Cut (ap)



End Mills & Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _{min}
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			ap max. 5,00	ap min. - max. 1,00 - 2,50	ap min. - max. 0,20 - 1,00					
Insert selection with facet										
015148	SDEX09T3AEFN-701	GH1	◆	◆	◆	9,52	9,52	3,97	Facet	0,02
034519	SDEX09T3AEFN-701	SP4019	●	●	◆ □ ◆	9,52	9,52	3,97	Facet	0,02
017242	SDCT09T3AEFN	GH1	■	■	■	9,52	9,52	3,97	Facet	0,02
031246	SDCT09T3AEEN	SP4019	-	-	◆ ◆ ● ● ●	9,52	9,52	3,97	Facet	0,04
015186	SDHT09T3AEEN-421	X500	-	◆ ◆	● ●	9,52	9,52	3,97	Facet	0,03
031476	SDHT09T3AEEN-421	SP6519	-	◆ ◆	◆ ◆ ● ● ●	9,52	9,52	3,97	Facet	0,03
017320	SDHT09T3AEEN-421	MP91M	-	-	◆ ◆ ◆	9,52	9,52	3,97	Facet	0,03
030766	SDHT09T3AEEN-422	X500	-	◆ ◆ ●	-	9,52	9,52	3,97	Facet	0,05
030890	SDHT09T3AEEN-422	SP6519	-	◆ ◆ ◆ ◆	-	9,52	9,52	3,97	Facet	0,05
026602	SDKT09T3AEEN-45	X500	◆ ◆ ◆	-	-	9,52	9,52	3,97	Facet	0,05
031481	SDKT09T3AEEN-45	SP6519	● ● ◆ ◆ ◆	● ● ●	-	9,52	9,52	3,97	Facet	0,05
026600	SDKT09T3AEEN-45	MP91M	●	◆ ◆ ◆	-	9,52	9,52	3,97	Facet	0,05
015231	SDHW09T3AETN	X500	● ● ●	-	-	9,52	9,52	3,97	Facet	0,10
031575	SDHW09T3AETN	SP6519	◆ ◆ ● ● ●	-	-	9,52	9,52	3,97	Facet	0,10
017323	SDHW09T3AETN	MP91M	◆ ◆ ●	-	■	9,52	9,52	3,97	Facet	0,10

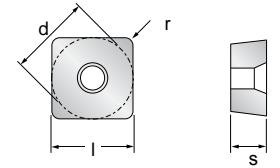
Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

SDHW09T3AETN should be used in Stainless Steel and High Temperature Alloys with heavy scale and generally when the conditions are unstable.

Note: Feed recommendations can be found on page A99. Speed recommendations can be found on page A104.



End Mills & Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			ap max. 5,00	ap min. - max. 1,00 - 2,50	ap min. - max. 0,20 - 1,00					
Insert selection with corner radius										
017725	SDET09T308FN	GH1	◆	◆	◆	9,52	9,52	3,97	0,80	0,02
034520	SDET09T308EN	SP6519	-	-	◆◆◆◆◆	9,52	9,52	3,97	0,80	0,03
031261	SDHT09T308EN-422	X500	◆◆	◆◆	◆◆◆◆	9,52	9,52	3,97	0,80	0,05
033075	SDHT09T308EN-422	SP6519	◆◆	◆◆	-	9,52	9,52	3,97	0,80	0,05
031260	SDHT09T308EN-423	X500	◆◆	◆◆	-	9,52	9,52	3,97	0,80	0,05
033074	SDHT09T308EN-423	SP6519	◆◆	◆◆	-	9,52	9,52	3,97	0,80	0,05
014410	SDMT09T308EN-41	X500	◆◆◆	◆◆◆◆	-	9,52	9,52	3,97	0,80	0,04
031479	SDMT09T308EN-41	SP6519	◆	◆◆	-	9,52	9,52	3,97	0,80	0,04
017325	SDMT09T308EN-41	MP91M	◆◆	◆◆◆	-	9,52	9,52	3,97	0,80	0,04
015232	SDMW09T308TN	X500	◆◆	-	-	9,52	9,52	3,97	0,80	0,15
031482	SDMW09T308TN	SP6519	◆◆	-	-	9,52	9,52	3,97	0,80	0,15
017327	SDMW09T308TN	MP91M	◆◆	-	◆	9,52	9,52	3,97	0,80	0,15



Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

SDHT09T308EN-423 should be used for unstable conditions.

SDMW09T308TN should be used in Stainless Steel and High Temperature Alloys with heavy scale and generally when the conditions are unstable. Inserts with radius are only for semi roughing applications where a finished surface is not required.

Note: Feed recommendations can be found on page A99. Speed recommendations can be found on page A104.



End Mills & Face Mills

7745VSE09 Feeds f_z (mm/tooth)

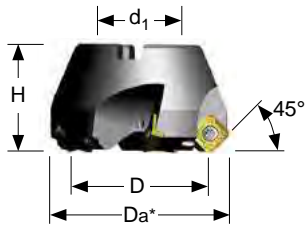
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
Insert selection with facet																	
FN-701	GH1	Facing	-	-	-	-	-	-	-	0,04 - 0,30	0,04 - 0,30	-	-	-	-	-	-
FN-701	SP4019	Facing	-	-	0,04 - 0,20	0,05 - 0,15	-	-	-	0,04 - 0,30	0,04 - 0,30	0,04 - 0,12	0,04 - 0,12	0,04 - 0,12	0,04 - 0,15	-	-
FN	GH1	Facing	-	-	-	-	-	-	-	0,04 - 0,30	0,04 - 0,30	-	-	-	-	-	-
EN	SP4019	Facing	-	-	0,05 - 0,20	0,05 - 0,15	0,05 - 0,20	0,05 - 0,20	0,05 - 0,18	-	-	0,04 - 0,12	0,04 - 0,12	0,04 - 0,12	0,04 - 0,15	0,04 - 0,06	-
EN-421	X500	Facing	0,05 - 0,20	0,05 - 0,18	-	0,05 - 0,15	-	-	-	-	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,15	0,05 - 0,18	-	-
EN-421	SP6519	Facing	0,05 - 0,20	0,05 - 0,18	0,05 - 0,20	0,05 - 0,15	0,05 - 0,20	0,05 - 0,20	0,05 - 0,18	-	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,15	0,05 - 0,18	-	-
EN-421	MP91M	Facing	0,05 - 0,20	0,05 - 0,18	-	-	0,05 - 0,20	0,05 - 0,20	0,05 - 0,18	-	-	-	-	-	-	0,04 - 0,06	-
EN-422	X500	Facing	-	-	0,05 - 0,20	0,05 - 0,20	-	-	-	-	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,15	0,05 - 0,18	-	-
EN-422	SP6519	Facing	0,05 - 0,20	0,05 - 0,18	0,05 - 0,18	0,05 - 0,16	0,05 - 0,20	0,05 - 0,20	0,05 - 0,18	-	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,15	0,05 - 0,18	-	-
EN-45	X500	Facing	-	-	0,07 - 0,22	0,07 - 0,20	-	-	-	-	-	0,07 - 0,18	0,07 - 0,18	0,07 - 0,18	0,07 - 0,20	-	-
EN-45	SP6519	Facing	0,07 - 0,30	0,07 - 0,25	0,07 - 0,22	0,07 - 0,20	0,07 - 0,25	0,07 - 0,25	0,07 - 0,25	-	-	0,07 - 0,18	0,07 - 0,18	0,07 - 0,18	0,07 - 0,20	-	-
EN-45	MP91M	Facing	0,07 - 0,25	0,07 - 0,20	-	-	0,07 - 0,25	0,07 - 0,25	0,07 - 0,25	-	-	-	-	-	-	-	-
TN*	X500	Facing	-	-	0,15 - 0,25	0,15 - 0,23	-	-	-	-	-	0,15 - 0,18	0,15 - 0,18	0,15 - 0,18	0,15 - 0,20	-	-
TN	SP6519	Facing	0,15 - 0,33	0,15 - 0,28	0,15 - 0,25	0,15 - 0,23	0,07 - 0,25	0,07 - 0,25	0,07 - 0,25	-	-	-	-	-	-	-	-
TN	MP91M	Facing	0,15 - 0,33	0,15 - 0,28	-	-	0,15 - 0,28	0,15 - 0,28	0,15 - 0,28	-	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08
Insert selection with corner radius																	
FN*	GH1	Facing	-	-	-	-	-	-	-	0,04 - 0,30	0,04 - 0,30	-	-	-	-	-	-
EN	SP6519	Facing	0,05 - 0,20	0,05 - 0,18	0,05 - 0,20	0,05 - 0,15	0,05 - 0,25	0,05 - 0,25	0,05 - 0,20	-	-	0,04 - 0,12	0,04 - 0,12	0,04 - 0,12	0,04 - 0,15	-	-
EN-422	X500	Facing	0,05 - 0,30	0,05 - 0,25	0,05 - 0,20	0,05 - 0,15	-	-	-	-	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,15	0,05 - 0,16	-	-
EN-422	SP6519	Facing	-	-	0,05 - 0,20	0,05 - 0,15	-	-	-	-	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,15	0,05 - 0,16	-	-
EN-423	X500	Facing	-	-	0,05 - 0,20	0,05 - 0,15	-	-	-	-	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,15	0,05 - 0,16	-	-
EN-423	SP6519	Facing	-	-	0,05 - 0,20	0,05 - 0,15	-	-	-	-	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,15	0,05 - 0,16	-	-
EN-41	X500	Facing	0,05 - 0,30	0,05 - 0,25	0,05 - 0,22	0,05 - 0,20	0,05 - 0,25	0,05 - 0,25	0,05 - 0,25	-	-	0,05 - 0,18	0,05 - 0,18	0,05 - 0,18	0,05 - 0,20	-	-
EN-41	SP6519	Facing	0,05 - 0,30	0,05 - 0,25	-	-	0,05 - 0,25	0,05 - 0,25	0,05 - 0,25	-	-	-	-	-	-	-	-
EN-41	MP91M	Facing	0,05 - 0,30	0,05 - 0,25	-	-	0,05 - 0,25	0,05 - 0,25	0,05 - 0,25	-	-	-	-	-	-	-	-
TN	X500	Facing	-	-	-	0,15 - 0,23	-	-	-	-	-	0,15 - 0,18	0,15 - 0,18	0,15 - 0,18	0,15 - 0,20	-	-
TN	SP6519	Facing	0,15 - 0,33	0,15 - 0,28	-	-	0,15 - 0,28	0,15 - 0,28	0,15 - 0,28	-	-	-	-	-	-	-	-
TN	MP91M	Facing	0,15 - 0,33	0,15 - 0,28	-	-	0,15 - 0,28	0,15 - 0,28	0,15 - 0,28	-	-	-	-	-	-	0,06 - 0,10	0,06 - 0,10

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A104.



End Mills & Face Mills



Shell Mill Fixation

Product		Dimensions (mm)								Spares				
EDP	Item Description	D	Da*	H	l ₁	d ₁	a _p max	Max. plunging depth	No. of Teeth	EDP		EDP		Screw Tightening Nm.
7745VSE12 Shell Mill Fixation														
021788	7745VSE12-A050Z4R	50	65	45	-	22	7,00	6,00	4	015270	F4011T	015241	T20	3,10
021789	7745VSE12-A063Z5R	63	78	45	-	22	7,00	6,00	5	015270	F4011T	015241	T20	3,10
021790	7745VSE12-A080Z6R	80	95	50	-	27	7,00	6,00	6	015270	F4011T	015241	T20	3,10
021791	7745VSE12-A100Z7R	100	115	55	-	32	7,00	6,00	7	015270	F4011T	015241	T20	3,10
021792	7745VSE12-A125Z8R	125	140	63	-	40	7,00	6,00	8	015270	F4011T	015241	T20	3,10

Da* = Outside Diameter

7745VSE12 Technical Information (mm)

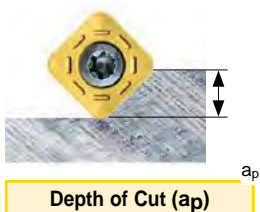
Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a _p max Helical / Linear	Max RPM
021788	7745VSE12-A050Z4R	50	7.60	-	-	4,00	21500
021789	7745VSE12-A063Z5R	63	5.80	-	-	4,00	19100
021790	7745VSE12-A080Z6R	80	4.40	-	-	4,00	17000
021791	7745VSE12-A100Z7R	100	3.50	-	-	4,00	15100
021792	7745VSE12-A125Z8R	125	2.70	-	-	4,00	13500



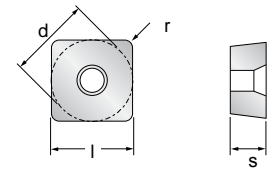
Ramping



Facing Pitch



Depth of Cut (a_p)



End Mills & Face Mills

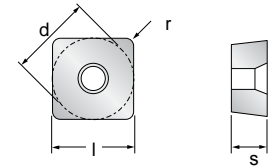


Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			a _p max. 7,00	a _p min. - max. 1,00 - 3,00	a _p min. - max. 0,20 - 1,00					
Insert selection with facet										
034522	SDEX1204AEFN-701	SP4019	-	-	◆◆◆	12,70	12,70	4,76	Facet	0,02
015149	SDEX1204AEFN-701	GH1	◆	◆	◆	12,70	12,70	4,76	Facet	0,02
017243	SDCT1204AEFN	GH1	■	■	■	12,70	12,70	4,76	Facet	0,02
015187	SDHT1204AEEN-421	X500	-	-	●●●	12,70	12,70	4,76	Facet	0,04
031477	SDHT1204AEEN-421	SP6519	-	-	●●●●●	12,70	12,70	4,76	Facet	0,04
017321	SDHT1204AEEN-421	MP91M	-	-	●●◆	12,70	12,70	4,76	Facet	0,04
029457	SDKT1204AEEN-45	X500	-	●●●	-	12,70	12,70	4,76	Facet	0,05
031532	SDKT1204AEEN-45	SP6519	-	●●	-	12,70	12,70	4,76	Facet	0,05
029456	SDKT1204AEEN-45	MP91M	-	●	-	12,70	12,70	4,76	Facet	0,05
017729	SDHT1204AETN-42	X500	◆◆	◆◆	-	12,70	12,70	4,76	Facet	0,15
031478	SDHT1204AETN-42	SP6519	●●◆◆	●●◆◆	-	12,70	12,70	4,76	Facet	0,15
017322	SDHT1204AETN-42	MP91M	●	●◆	●●	12,70	12,70	4,76	Facet	0,15
034517	SDCW1204AETN	X400	◆◆	-	◆	12,70	12,70	4,76	Facet	0,15
034516	SDCW1204AETN	SP4019	●●◆	-	■	12,70	12,70	4,76	Facet	0,10
031404	SDCW1204AETN	SA9808	-	-	◆◆	12,70	12,70	4,76	Facet	0,17
017730	SDHW1204AETN	X500	●●	-	-	12,70	12,70	4,76	Facet	0,15
017324	SDHW1204AETN	MP91M	●◆	-	-	12,70	12,70	4,76	Facet	0,15

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

SDHW1204AETN X500 should be used in Stainless Steel and High Temperature Alloys with heavy scale and generally when the conditions are unstable.

Note: Feed recommendations can be found on page A103. Speed recommendations can be found on page A104.



End Mills & Face Mills

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	hm min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			ap max. 7,00	ap min. - max. 1,00 - 3,00	ap min. - max. 0,20 - 1,00					

Insert selection with corner radius										
030717	SDHT120412EN-422	X500	■◆◆	■◆◆	-	12,70	12,70	4,76	1,20	0,05
030728	SDHT120412EN-422	SP6519	◆■◆	◆■◆	-	12,70	12,70	4,76	1,20	0,05
031218	SDHT120412EN-423	X500	■◆◆	■◆◆	-	12,70	12,70	4,76	1,20	0,06
031321	SDHT120412EN-423	SP6519	◆■◆	◆■◆	-	12,70	12,70	4,76	1,20	0,06
014411	SDMT120412EN-41	X500	●●●	●●●■◆	-	12,70	12,70	4,76	1,20	0,05
031480	SDMT120412EN-41	SP6519	■◆◆	■◆◆	-	12,70	12,70	4,76	1,20	0,05
017326	SDMT120412EN-41	MP91M	●●■	●●■◆	-	12,70	12,70	4,76	1,20	0,05
015233	SDMW120412TN	X500	●●	-	-	12,70	12,70	4,76	1,20	0,15
034518	SDMW120412TN	SP6519	◆■◆	-	-	12,70	12,70	4,76	1,20	0,15

Machining Choice: ◆1st Choice ■2nd Choice ●3rd Choice | Material Guide Key descriptions found on page A5.

SDHT120412EN-423 should be used for unstable conditions.

SDMW120412TN X500 should be used in Stainless Steel and High Temperature Alloys with heavy scale and generally when the conditions are unstable. Inserts with radius are only for semi roughing applications where a finished surface is not required.

Note: Feed recommendations can be found on page A103. Speed recommendations can be found on page A104.





End Mills & Face Mills

7745VSE12 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
Insert selection with facet																	
FN-701	SP4019	Facing	-	-	0,05 - 0,25	0,05 - 0,20	-	-	-	0,04 - 0,25	0,04 - 0,25	0,04 - 0,20	0,04 - 0,20	0,04 - 0,20	0,04 - 0,20	-	-
FN-701	GH1	Facing	-	-	-	-	-	-	-	0,04 - 0,30	0,04 - 0,30	-	-	-	-	-	-
FN	GH1	Facing	-	-	-	-	-	-	-	0,04 - 0,30	0,04 - 0,30	-	-	-	-	-	-
EN-421	X500	Facing	-	-	0,05 - 0,22	0,05 - 0,20	-	-	-	-	-	0,05 - 0,20	0,05 - 0,20	0,05 - 0,20	0,05 - 0,22	-	-
EN-421	SP6519	Facing	0,05 - 0,30	0,05 - 0,25	0,05 - 0,22	0,05 - 0,20	0,05 - 0,28	0,05 - 0,28	0,05 - 0,28	-	-	0,05 - 0,20	0,05 - 0,20	0,05 - 0,20	0,05 - 0,22	-	-
EN-421	MP91M	Facing	0,05 - 0,30	0,05 - 0,25	-	-	0,05 - 0,28	0,05 - 0,28	0,05 - 0,28	-	-	-	-	-	-	-	-
EN-45	X500	Facing	-	-	0,07 - 0,25	0,07 - 0,22	-	-	-	-	-	0,07 - 0,18	0,07 - 0,18	0,07 - 0,18	0,07 - 0,20	-	-
EN-45	SP6519	Facing	0,07 - 0,35	0,07 - 0,30	-	-	-	-	-	-	-	-	-	-	-	-	-
EN-45	MP91M	Facing	-	-	-	-	0,07 - 0,30	0,07 - 0,30	0,07 - 0,30	-	-	-	-	-	-	-	-
TN-42	X500	Facing	-	-	0,15 - 0,27	0,15 - 0,25	-	-	-	-	-	0,15 - 0,22	0,15 - 0,22	0,15 - 0,22	0,15 - 0,25	-	-
TN-42	SP6519	Facing	0,15 - 0,35	0,15 - 0,30	0,15 - 0,27	0,15 - 0,25	0,15 - 0,30	0,15 - 0,30	0,15 - 0,30	-	-	0,15 - 0,22	0,15 - 0,22	0,15 - 0,22	0,15 - 0,25	-	-
TN-42	MP91M	Facing	0,15 - 0,35	0,15 - 0,30	-	-	0,18 - 0,30	0,18 - 0,30	0,18 - 0,30	-	-	-	-	-	-	0,08 - 0,12	0,08 - 0,12
TN	X400	Facing	0,15 - 0,38	0,15 - 0,33	-	-	-	-	-	-	-	-	-	-	-	0,08 - 0,12	0,08 - 0,12
TN	X500	Facing	-	-	-	0,15 - 0,27	-	-	-	-	-	0,15 - 0,20	0,15 - 0,20	0,15 - 0,20	0,15 - 0,25	-	-
TN	SP4019	Facing	-	-	0,15 - 0,30	0,15 - 0,27	0,15 - 0,30	0,15 - 0,30	0,15 - 0,30	-	-	-	-	-	-	0,08 - 0,12	0,08 - 0,12
TN	MP91M	Facing	0,15 - 0,38	0,15 - 0,33	-	-	0,15 - 0,30	0,15 - 0,30	0,15 - 0,30	-	-	-	-	-	-	-	-
TN	SA9808	Facing	0,17 - 0,25	0,17 - 0,23	-	-	-	-	-	-	-	-	-	-	-	-	-
Insert selection with corner radius																	
EN-422	X500	Facing	-	-	0,05 - 0,25	0,05 - 0,22	-	-	-	-	-	0,05 - 0,18	0,05 - 0,18	0,05 - 0,18	0,05 - 0,20	-	-
EN-422	SP6519	Facing	-	-	0,05 - 0,25	0,05 - 0,22	-	-	-	-	-	0,05 - 0,18	0,05 - 0,18	0,05 - 0,18	0,05 - 0,20	-	-
EN-423	X500	Facing	-	-	0,05 - 0,25	0,05 - 0,22	-	-	-	-	-	0,05 - 0,18	0,05 - 0,18	0,05 - 0,18	0,05 - 0,20	-	-
EN-423	SP6519	Facing	-	-	0,05 - 0,25	0,05 - 0,22	-	-	-	-	-	0,05 - 0,18	0,05 - 0,18	0,05 - 0,18	0,05 - 0,20	-	-
EN-41	X500	Facing	0,05 - 0,35	0,05 - 0,30	0,05 - 0,25	0,05 - 0,22	0,05 - 0,30	0,05 - 0,30	0,05 - 0,30	-	-	0,05 - 0,18	0,05 - 0,18	0,05 - 0,18	0,05 - 0,20	-	-
EN-41	SP6519	Facing	0,05 - 0,35	0,05 - 0,30	-	-	0,05 - 0,30	0,05 - 0,30	0,05 - 0,30	-	-	-	-	-	-	-	-
EN-41	MP91M	Facing	0,05 - 0,35	0,05 - 0,30	-	-	0,05 - 0,30	0,05 - 0,30	0,05 - 0,30	-	-	-	-	-	-	-	-
TN	X500	Facing	-	-	-	0,15 - 0,27	-	-	-	-	-	0,15 - 0,18	0,15 - 0,18	0,15 - 0,18	0,15 - 0,20	-	-
TN	SP6519	Facing	0,15 - 0,38	0,15 - 0,33	-	-	0,15 - 0,30	0,15 - 0,30	0,15 - 0,30	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A104.



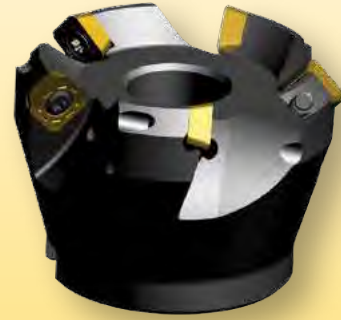
Speed v_c (m/min)																
7745VSE Series			Wear Resistance													
			Speed min. - max.													
Coolant Recommendation			PVD X Grade		CVD X Grade		PVD Standard		PVD Standard		CVD Standard		Uncoated Micrograin		Uncoated Cermets	
ISO	Materials	Rm and Hardness	Water	No Coolant	Water	No Coolant	Water	No Coolant	Water	No Coolant	Water	No Coolant	Water	No Coolant	Water	No Coolant
			●	○	●	○	●	○	●	○	●	○	●	○	●	○
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	○	●	○	●	○			●	○			●	○
		<950 N/mm ² <280 HBN	○	●	○	●	○	●			○	●			○	●
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○	●	○	●	○	●			○	●			○	●
		950-1200 N/mm ² 280-355 HBN	○	●	○	●	○	●			○	●			○	●
		1200-1400 N/mm ² 355-415 HBN	○	●	○	●	○	●			○	●			○	●
M	Stainless Steel	Austenitic + Ferritic 300 series			○	●	○	●	○	●						
		Martensitic 400 series			○	●	○	●	○	●						
	PH Stainless	Refractory P.H.			○	●	○	●	○	●						
K	Cast Iron	Grey GG-Ft			○	●	○	●	○	●						
		Spheroidal-Ductile GGG-FGS			○	●	○	●	○	●						
		Malleable GTS - MN/MP														
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN							○	●			○	●		
		Aluminium + Silicon > 16% Si 92 HBN													○	●
S	High Temperature Alloys	Iron Based														
		Cobalt Based			○	●	○	●	○	●						
		Nickel Based														
		Titanium Based														
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	○	●							○	●				
		Chilled Cast Iron >1400 N/mm ² > 400 HBN	○	●								○	●			



775VSE Technical Information

Feed rate compensation: For 45° cutting, divide the h_m value by the sine of the approach angle (the sine of 45° = 0,707)

i.e.: $\frac{h_m}{0,707}$ or $\frac{0,08mm}{0,707} = 0,11mm$ programmed feed rate



Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness

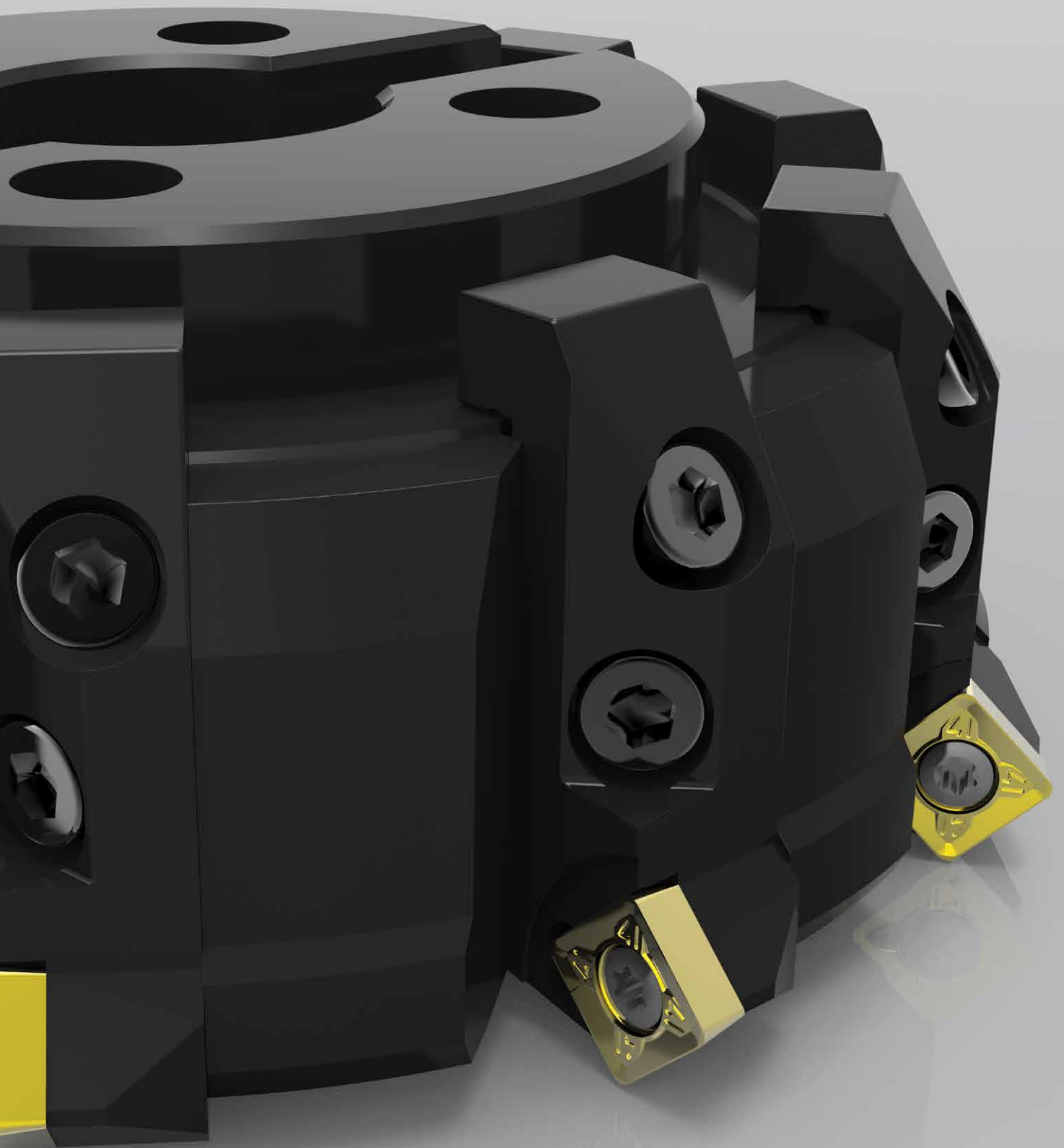
a_e = Radial engagement

f_z = Feed per tooth

d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$





VERSATILE CARTRIDGE MILLING CUTTERS

The 8000V-8010V cutter series provides the opportunity to assemble the bodies with different cartridges for a wide range of applications.

This clamping design allows the adjusting screws to work in opposition to each other, to allow setting of each insert within 2-5 µm.

All Stellram cartridge face mills feature a unique design that maintains the accuracy of the cartridge location even after a collision.





Cartridge Face Mills



8000V Cutter

8000V CUTTERS WITH UNEQUAL PITCH

The cutters in the 8000V series (\varnothing 100 – 400mm) with interchangeable cartridges have a medium pitch and an unequal division of teeth. This design has been developed through extensive studies of their vibration phenomena. They are especially recommended for surfacing cast structures and all other parts with drilled holes or thin walled sections, as well as for square shoulder face milling. For a given table feed, the medium pitch allows a lower feed rate per tooth which avoids the risks of damage to sides or recesses of the machined parts.

These are quick-change cartridges thanks to a heel which comes up against a setting track. The runout achieved is in the order of 0,05mm. If a greater degree of precision is required, they can easily be adjusted individually with a runout of 2-5 μ m. In case of accidental shocks, the heel disengages automatically from the track and the tool body remains intact.



8010V Cutter

8010V CUTTERS WITH EQUAL PITCH

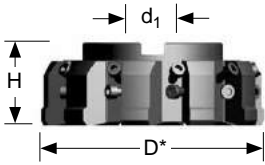
For machining High Temperature Alloys, we have modified our milling cutters with cartridges. Available in \varnothing 100 – 200mm, the bodies of the 8010V milling cutters have the same characteristics as the 8000V body but the distribution of the teeth is regular. The number of teeth is equal to that of the 8000V series.

The 8010V is best used for rough milling, semi-finishing and finishing of Titanium and High Temperature Alloys.

Precautions

At speeds above 80 m/min., the differential pitch of the 8000V becomes essential to reduce the possibility of vibration.

The capability of the 8000V-8010V series is dependent on the different assembly options.



Cutter Body

Product		Dimensions (mm)				Cartridge Spares		
EDP	Item Description	D*	H	d1	No. of Teeth	EDP	Cartridge Screw	Weight incl. Cartridges kg
8000V Bodies with Unequal Pitch								
021921	8000V100RBODY	100	68	32	6	022646	7065	2,29
021922	8000V125RBODY	125	63	40	8	022646	7065	3,04
021923	8000V160RBODY	160	63	40	10	022646	7065	5,43
021924	8000V200RBODY	200	63	60	12	022646	7065	8,77
021925	8000V250RBODY	250	63	60	16	022646	7065	15,48
021926	8000V315RBODY**	315	80	60	20	022646	7065	29,85
021927	8000V400RBODY**	400	80	60	24	022646	7065	57,60
8010V Bodies with Equal Pitch								
023071	8010V100RBODY**	100	68	32	6	022646	7065	2,29
021973	8010V125RBODY**	125	63	40	8	022646	7065	3,04
021974	8010V160RBODY**	160	63	40	10	022646	7065	5,43
021975	8010V200RBODY**	200	63	60	12	022646	7065	8,77

** Denotes non stock items.

Note: Mounting instructions refer to pages A161 - A164.

Note: D* is nominal diameter for most cutter assemblies except for 90 degree A-Style, 16mm & 20mm button and 12mm & 16mm High Feed assemblies.

For these mentioned assemblies the cutter diameter will change, please see assembly pages for diameter detail.

Cartridge Face Mills



81 FS 00 Cartridge

Product		Spares							
EDP	Item Description	X* Adjustment Range (mm)	Insert Screw EDP	Insert	EDP	Adjustment Screw EDP	Adjustment Screw	Insert Style	
Finishing Cartridge & Spares									
014953	81FS00R-12	0,03-0,05	015266	D5013T	105241	T20	016858	72.602	SPHX12....

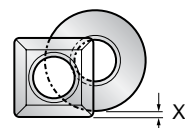
These cartridges, have a fine adjusting set screw and are set according to the dimension (axial shift) "X".

X = 0,03 - 0,05 mm

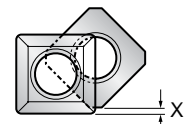
(X = 0,02 mm with a pressed insert with a nose radius).

The following series assemblies with a wiper insert are possible:

Cutter	Inserts
8000VR00...	RP.. 16 + Wiper
8000VOD45...	OD..04 + Wiper
8000VOD45...	OD..06 + Wiper
8000VS45...	SC..12 + Wiper
8000VSE45...	SD..12 + Wiper



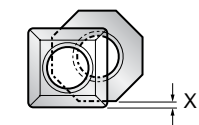
8000VR 00



8000VS / VSE 45

The following series assemblies with a wiper inserts are not possible:

Cutter	Inserts
8000VXD92...	Wiper not possible
8000VXE92...	Wiper not possible
8000VA90...	Wiper not possible

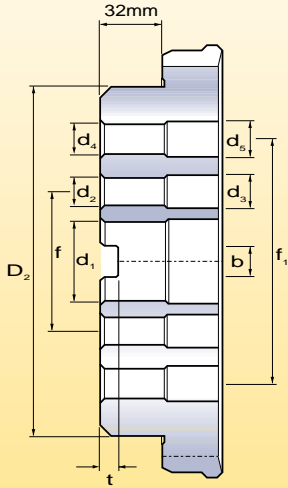


8000VOD 45

Also, all 8010V cutter series are not possible to assemble with a wiper insert.

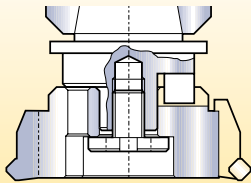


Cartridge Face Mills



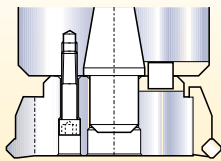
80.0V Cutters Mounting & Attachment Dimensions (mm)

Ø Cutter D	Fixation Bore / Pilot	d1 H7	D2	f	f1	d2	d3	d4	d5	b1	t
Ø 100	Ø 32 mm	32	53	-	-	-	-	-	-	14,40	8
Ø 125	Ø 40 mm	40	77	-	-	-	-	-	-	16,40	9
Ø 160	Ø 40 mm	40	100	66,70	-	14	20	-	-	16,40	9
Ø 200	Ø 60 mm	60	136	101,60	-	18	26	-	-	25,70	14
Ø 250	Ø 60 mm	60	180	101,60	-	18	26	-	-	25,70	14
Ø 315	Ø 60 mm	60	240	101,60	177,8	18	26	22	32	25,70	14
Ø 400	Ø 60 mm	60	320	101,60	177,8	18	26	22	32	25,70	14



Locate Directly to Milling Arbor

For cutter Ø 100, 125 & 160mm.

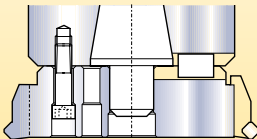


Locate Directly to Spindle Nose 7/24 with Centreing Arbor

Spindle 7/24 No. 40 for cutter Ø 160mm.

Spindle 7/24 No. 50 for cutter Ø 200mm to 400mm.

Spindle 7/24 No. 60 for cutter Ø 315mm to 400mm.





90° CARTRIDGE SHOULDER MILLING ASSEMBLIES

Applications:

80.0VA90 cutters series are assembled with cartridges for AP..16 milling inserts for face and shoulder milling applications.

This cutter series is available in two different versions, both with medium pitch.

The cutters series **8000VA90** has an **unequal** medium pitch for reducing vibration and is suitable for roughing, semi-finishing and finishing of Steel, Steel Alloys, Stainless Steel, Cast Iron and Aluminium Alloys.

The **8010VA90** series has an **equal** medium pitch and is especially recommended for roughing, semi-finishing and finishing of High Temperature Alloys such as Iron Based Alloys, Cobalt Based Alloys, Nickel Based Alloys and Titaniums.

Note: The 80.0VA90 series when mounted with cartridge 80VA90R-16 using AP..1604.. A-Style inserts cannot utilise the wiper cartridge for finishing when a fine finished surface is required.

Note: When using inserts with a radius larger than 2,00mm the cartridges need to be modified for additional clearance by the end user.

80.0VA90- _R-16

8000VA90- _R-16:

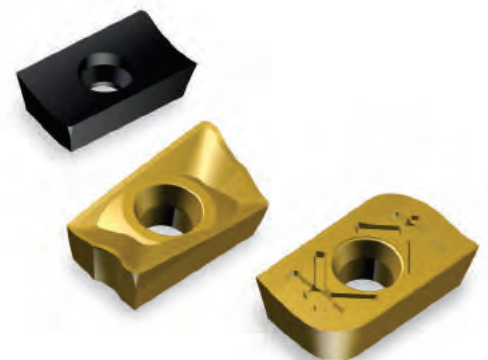
Maximum $a_p = 16\text{mm}$
Effective Cutting Diameter
Range = 106mm to 406mm

* Denotes non stock items diameter
321mm - 406mm

8010VA90- _R-16:

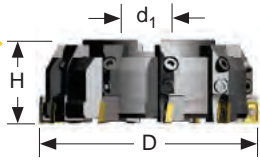
Maximum $a_p = 16\text{mm}$
Effective Cutting Diameter
Range = 106*mm to 206*mm

* Denotes non stock items.





Cartridge Face Mills



Cutter Body & Cartridges



80VA90R-16

Product		Dimensions (mm)					Spares					
EDP	Item Description	D Effective Cutting Diameter	H	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm	
8000VA90- R-16 Bodies with Unequal Medium Pitch & Cartridges												
021817	8000VA90-100R-16	106	68	32	16	6	015262		D4010T	015240	T15	3,10
021819	8000VA90-125R-16	131	63	40	16	8						
021821	8000VA90-160R-16	166	63	40	16	10						
021823	8000VA90-200R-16	206	63	60	16	12						
021825	8000VA90-250R-16	256	63	60	16	16						
021827	8000VA90-315R-16*	321	80	60	16	20						
021829	8000VA90-400R-16*	406	80	60	16	24						
8010VA90- R-16 Bodies with Equal Medium Pitch & Cartridges												
021929	8010VA90-100R-16*	106	68	32	16	6	015262		D4010T	015240	T15	3,10
021931	8010VA90-125R-16*	131	63	40	16	8						
021933	8010VA90-160R-16*	166	63	40	16	10						
021935	8010VA90-200R-16*	206	63	60	16	12						

* Denotes non stock items.

Product		Spares								
EDP	Item Description	EDP		EDP		Screw Tightening Nm	Cartridge Screw EDP		Adjustment Screw EDP	
Cartridge & Spares										
015390	80VA90R-16	015262	D4010T	015240	T15	3,10	022646	7065	-	-

Note: AP..1604.. A-Syle cutter assemblies cannot utilise the wiper cartridges.

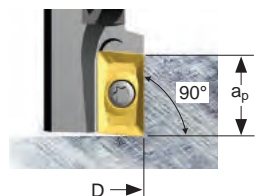
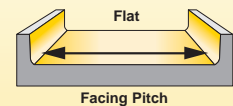
Note: When using inserts with a radius larger than 2,0mm the cartridges need to be modified for additional clearance by the end user.

Note: Mounting instructions refer to pages A161 - A164.

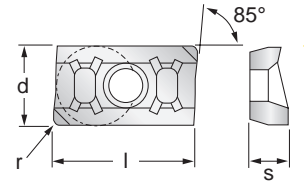
80.VA90- R-16 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a _p max Helical / Linear	Max RPM
021817	8000VA90-100R-16	106	-	-	-	-	10800
021819	8000VA90-125R-16	131	-	-	-	-	9200
021821	8000VA90-160R-16	166	-	-	-	-	7800
021823	8000VA90-200R-16	206	-	-	-	-	6200
021825	8000VA90-250R-16	256	-	-	-	-	5900
021827	8000VA90-315R-16*	321	-	-	-	-	5200
021829	8000VA90-400R-16*	406	-	-	-	-	4500
021929	8010VA90-100R-16*	106	-	-	-	-	10800
021931	8010VA90-125R-16*	131	-	-	-	-	9200
021933	8010VA90-160R-16*	166	-	-	-	-	7800
021935	8010VA90-200R-16*	206	-	-	-	-	6200

* Denotes non stock items.



Depth of Cut (a_p)



Cartridge Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			ap max. 16,00	ap min. - max. 1,50 - 5,00	ap min. - max. 0,10 - 1,50					
033179	APET160402TR-42	SP6519	●●●●	■●●●	■	9,52	16,66	4,76	0,20	0,10
033180	APET160408TR-42	SP6519	●●●●	■●●●	■	9,52	16,66	4,76	0,80	0,10
033181	APET160410TR-42	SP6519	●●●●	■●●●	■	9,52	16,66	4,76	1,00	0,10
033182	APET160415TR-42	SP6519	●●●●	■●●●	■	9,52	16,66	4,76	1,50	0,10
033183	APET160420TR-42	SP6519	●●●●	■●●●	■	9,52	16,66	4,76	2,00	0,10
033184	APET160425TR-42	SP6519	●●●●	■●●●	■	9,52	16,66	4,76	2,50	0,10
033185	APET160430TR-42	SP6519	●●●●	■●●●	■	9,52	16,66	4,76	3,00	0,10
033186	APET160440TR-42	SP6519	●●●●	■●●●	■	9,52	16,66	4,76	4,00	0,10
033187	APET160460TR-42	SP6519	●●●●	■●●●	■	9,52	16,66	4,76	6,00	0,10
015155	APHT1604PDTR-42	X500	●●	-	-	9,52	16,66	4,76	Facet	0,10
031466	APHT1604PDTR-42	SP6519	●●●●	■●●●	■	9,52	16,66	4,76	Facet	0,10
017293	APHT1604PDTR-42	MP91M	-	■●	■●	9,52	16,66	4,76	Facet	0,10
033188	APEX1604PDER-701	SP6519	-	-	●	9,52	16,66	4,76	Facet	0,02
033189	APEX1604PDFR-701	SP4019	●	●	●	9,52	16,66	4,76	Facet	0,02
014066	APEX1604PDFR-701	GH1	◆	◆	◆	9,52	16,66	4,76	Facet	0,02
033190	APFW1604PDTR	X400	●	◆	●	9,52	16,66	4,76	Facet	0,10
033191	APFW1604PDTR	SP4019	●	■	◆	9,52	16,66	4,76	Facet	0,10
027883	APFW1604PDTR	SC3025	■	◆	◆	9,52	16,66	4,76	Facet	0,10
017628	APFW1604PDTR	GH1	-	●	●	9,52	16,66	4,76	Facet	0,10
033192	APHT1604PDER	SP4019	-	-	●	9,52	16,66	4,76	Facet	0,05
015154	APHT1604PDFR	GH1	■	■	■	9,52	16,66	4,76	Facet	0,02

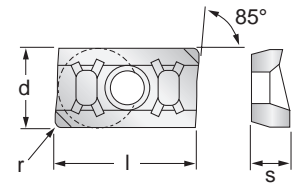
 Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: APHT1604PDTR-42 X500 should be used for Stainless Steel with heavy scale.

Note: APFW1604PDTR X400 should be used for Alloyed Steel with heavy scale.

Note: APFW1604PDTR SP4019 should be used for High Temperature Alloys with heavy scale.

Note: Feed recommendations can be found on page A115. Speed recommendations can be found on page A116



Cartridge Face Mills

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max 16,00	a _p min - max 1,50 - 5,00	a _p min - max 0,10 - 1,50					
027869	APHT160408ER-46	X500	■ ◆	◆	○	9,52	16,66	4,76	0,80	0,05
031495	APHT160408ER-46	SP6519	◆	◆	◆ ◆ ◆	9,52	16,66	4,76	0,80	0,05
027870	APHT160416ER-46	X500	■ ◆	◆	○	9,52	16,66	4,76	1,60	0,05
031496	APHT160416ER-46	SP6519	◆	◆	◆ ◆ ◆	9,52	16,66	4,76	1,60	0,05
027871	APHT160424ER-46	X500	■ ◆	◆	○	9,52	16,66	4,76	2,40	0,05
031497	APHT160424ER-46	SP6519	◆	◆	◆ ◆ ◆	9,52	16,66	4,76	2,40	0,05
027872	APHT160432ER-46	X500	■ ◆	◆	○	9,52	16,66	4,76	3,20	0,05
031397	APHT160432ER-46	SP6519	◆	◆	◆ ◆ ◆	9,52	16,66	4,76	3,20	0,05
027873	APHT160440ER-46	X500	■ ◆	◆	○	9,52	16,66	4,76	4,00	0,05
031542	APHT160440ER-46	SP6519	◆	◆	◆ ◆ ◆	9,52	16,66	4,76	4,00	0,05
027874	APHT160450ER-46	X500	■ ◆	◆	○	9,52	16,66	4,76	5,00	0,05
031498	APHT160450ER-46	SP6519	◆	◆	◆ ◆ ◆	9,52	16,66	4,76	5,00	0,05
027875	APHT160464ER-46	X500	■ ◆	◆	○	9,52	16,66	4,76	6,40	0,05
031541	APHT160464ER-46	SP6519	◆	◆	◆ ◆ ◆	9,52	16,66	4,76	6,40	0,05
030811	APET1604PDER-48	X500	◆	◆	■	9,52	16,66	4,76	Facet	0,04
030773	APET1604PDER-48	SP6519	●	●	● ● ◆ ◆	9,52	16,66	4,76	Facet	0,04
030860	APET160408ER-48	X500	◆	◆	■	9,52	16,66	4,76	0,80	0,04
030861	APET160408ER-48	SP6519	●	●	● ● ◆ ◆	9,52	16,66	4,76	0,80	0,04
015156	APKT1604PDER-43	X500	●	-	-	9,52	16,66	4,76	Facet	0,08
031468	APKT1604PDER-43	SP6519	◆ ◆	-	-	9,52	16,66	4,76	Facet	0,08
017294	APKT1604PDER-43	MP91M	■ ●	-	-	9,52	16,66	4,76	Facet	0,08
027887	APKT1604PDER-43	SC3025	◆	-	-	9,52	16,66	4,76	Facet	0,08
023115	APKT1604PDER-45	X500	-	●	-	9,52	16,66	4,76	Facet	0,08
031469	APKT1604PDER-45	SP6519	-	◆ ◆	-	9,52	16,66	4,76	Facet	0,08
023114	APKT1604PDER-45	MP91M	-	●	-	9,52	16,66	4,76	Facet	0,08



Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: APKT1604PDER-43 X500 should be used for Steel with heavy scale.

Note: Feed recommendations can be found on page A115. Speed recommendations can be found on page A116.



Cartridge Face Mills

80.0VA90- R-16 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
TR-42	X500	Facing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TR-42	SP6519	Facing	0,10 - 0,28	0,10 - 0,23	0,10 - 0,22	0,10 - 0,20	-	-	-	-	-	-	-	-	-	-	-
TR-42	MP91M	Facing	-	-	-	-	0,08 - 0,25	0,08 - 0,20	0,08 - 0,20	-	-	-	-	-	-	0,03 - 0,06	0,05 - 0,08
ER-701	SP6519	Facing	-	-	-	-	-	-	-	-	-	0,02 - 0,05	0,02 - 0,05	0,02 - 0,05	0,02 - 0,05	-	-
FR-701	SP4019	Facing	-	-	-	-	-	-	-	0,03 - 0,20	0,03 - 0,18	-	-	-	-	-	-
FR-701	GH1	Facing	-	-	-	-	-	-	-	0,03 - 0,20	0,03 - 0,18	-	-	-	-	-	-
TR	X400	Facing	-	0,10 - 0,25	-	-	-	-	-	-	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10
TR	SP4019	Facing	-	-	-	-	-	-	-	-	-	0,08 - 0,10	0,08 - 0,10	0,08 - 0,10	0,08 - 0,12	0,05 - 0,10	0,05 - 0,10
TR	SC3025	Facing	-	-	-	-	0,10 - 0,22	0,10 - 0,22	0,10 - 0,22	-	-	-	-	-	-	-	-
TR	GH1	Facing	-	-	-	-	0,10 - 0,22	0,10 - 0,22	0,10 - 0,22	-	-	-	-	-	-	-	-
ER	SP4019	Facing	-	-	0,05 - 0,18	-	-	-	-	-	-	-	-	-	-	-	-
FR	GH1	Facing	-	-	-	-	-	-	-	0,03 - 0,20	0,03 - 0,18	-	-	-	-	-	-
ER-46	X500	Facing	-	-	0,04 - 0,25	0,04 - 0,22	-	-	-	-	-	0,04 - 0,10	0,04 - 0,10	0,04 - 0,10	0,04 - 0,14	-	-
ER-46	SP6519	Facing	0,04 - 0,25	0,04 - 0,20	0,04 - 0,24	0,04 - 0,20	-	-	-	-	-	-	-	-	-	-	-
ER-48	X500	Facing	-	-	-	-	-	-	-	-	-	0,04 - 0,10	0,04 - 0,10	0,04 - 0,10	0,04 - 0,14	-	-
ER-48	SP6519	Facing	0,05 - 0,20	0,05 - 0,18	0,04 - 0,16	0,04 - 0,12	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08	0,04 - 0,08	0,04 - 0,12	-	-
ER-43	X500	Facing	0,08 - 0,30	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ER-43	SP6519	Facing	0,05 - 0,28	0,05 - 0,23	-	-	-	-	-	-	-	-	-	-	-	-	-
ER-43	MP91M	Facing	0,06 - 0,27	0,06 - 0,22	-	-	0,06 - 0,25	0,06 - 0,25	0,06 - 0,20	-	-	-	-	-	-	-	-
ER-43	SC3025	Facing	-	-	-	-	0,06 - 0,25	0,06 - 0,25	0,06 - 0,20	-	-	-	-	-	-	-	-
ER-45	X500	Facing	-	0,08 - 0,22	-	-	-	-	-	-	-	-	-	-	-	-	-
ER-45	SP6519	Facing	0,06 - 0,25	0,06 - 0,20	-	-	-	-	-	-	-	-	-	-	-	-	-
ER-45	MP91M	Facing	0,08 - 0,25	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A116.



Cartridge Face Mills

Speed v_c (m/min)															
80.0VA90- R-16 Series		Wear Resistance													
		Speed min. - max.													
Coolant Recommendation															
Recommended ● Possible ○															
ISO	Materials	Rm and Hardness	PVD X Grade		CVD X Grade		PVD Standard		PVD Standard		CVD Standard		CVD Standard		Uncoated Micrograin
			Water	No Water	Water	No Water	Water	No Water	Water	No Water	Water	No Water	Water	No Water	
P	Unalloyed Steel	<600 N/mm ² <180 HBN													
		<950 N/mm ² <280 HBN		○	●	○	●				●				
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○	●	○	●	○	●			●				
		950-1200 N/mm ² 280-355 HBN													
		1200-1400 N/mm ² 355-415 HBN	●		●		●		●		●				
M	Stainless Steel	Austenitic + Ferritic 300 series			○	●	○	●	○	●					
		Martensitic 400 series			○	●	○	●	○	●					
	PH Stainless	Refractory P.H.			●		●								
K	Cast Iron	Grey GG-Ft													
		Spheroidal-Ductile GGG-FGS									●		●	○	●
		Malleable GTS- MNMP													
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN							●						●
		Aluminium + Silicon > 16% Si 92 HBN													
S	High Temperature Alloys	Iron Based													
		Cobalt Based			●		●		●						
		Nickel Based													
		Titanium Based													
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	●							●		●			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN								●		●			

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness

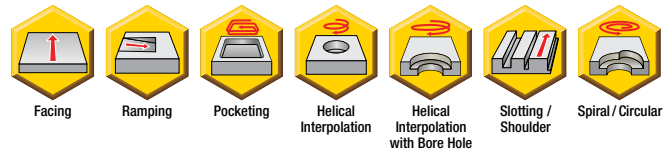
a_e = Radial engagement

f_z = Feed per tooth

d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$



CARTRIDGE HIGH FEED MILLING ASSEMBLIES

80.0VX.92 high feed milling cutters are capable of high metal removal in facing applications. The patented insert design offers better performance than round insert cutters.

The 80.0VX.92 high feed cutters are the best solution when specifically focusing on reducing cycle time or removing a maximum volume of material in the shortest time.

Our high feed cutter has the capacity to achieve 5 times higher feed rate than other existing cutters in the market. This is due to its unique design and insert positioning. 80.0VX.92 cutters also have a tremendous advantage, when used in a long (extended) toolholder.

These cutters absorb vibration and generally reduces the instability and deflection of the tool.

Applications:

The 80.0VX.92 cutters are assembled with cartridges for XD...or XE... high feed milling inserts and are ideal for a wide range of applications. Facing, slotting pocketing, ramping and helical interpolation. Available with medium pitch.

The cutter series **8000VX.92** has an unequal medium pitch for reducing vibration and is suitable for roughing and semi-finishing of Steel, Steel Alloys, Stainless Steel, Cast Iron and Aluminium Alloys.

The cutters series **8010VX.92** has an equal medium pitch and is especially recommended for roughing and semi-finishing of High Temperature Alloys, such as Iron Based alloys, Cobalt Based Alloys, Nickel Based Alloys and Titanium.

NOTE: The 80.0VX.92 series when mounted with high feed cartridges 80VX.92R-12 or 80VX.92R-16 using XD... or XE... inserts cannot utilise the wiper cartridge for finishing when a fine finished surface is required.

80_0VX_92- R-12 & -16

8000VXD92- R-12:

Maximum $a_p = 2,50\text{mm}$
Diameter Range =
106mm to 256mm

8010VXD92- R-12:

Maximum $a_p = 2,50\text{mm}$
**Diameter Range =
106mm to 206mm

8000VXE92- R-16:

Maximum $a_p = 3,50\text{mm}$
Diameter Range =
106mm to 256mm

8010VXE92- R-16:

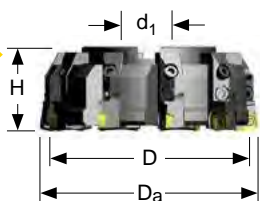
Maximum $a_p = 3,50\text{mm}$
**Diameter Range =
106mm to 206mm

**Denotes non stock





Cartridge Face Mills



Cutter Body & Cartridges



80VX92-R12

Product		Dimensions (mm)						Spares					
EDP	Item Description	D Effective Cutting Diameter	Da*	H	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm	
8000VXD92- R-12 Bodies with Unequal Medium Pitch & Cartridges													
033161	8000VXD92-100R-12	87,95	106	68	32	2,5	6	015263		D4012T	015240	T15	3,10
033162	8000VXD92-125R-12	112,95	131	63	40	2,5	8						
033163	8000VXD92-160R-12	147,95	166	63	40	2,5	10						
033164	8000VXD92-200R-12	187,95	206	63	60	2,5	12						
033165	8000VXD92-250R-12	237,95	256	63	60	2,5	16						
8010VXD92- R-12 Bodies with Equal Medium Pitch & Cartridges													
033166	8010VXD92-100R-12**	87,95	106	68	32	2,5	6	015263		D4012T	015240	T15	3,10
033167	8010VXD92-125R-12**	112,95	131	63	40	2,5	8						
033168	8010VXD92-160R-12**	147,95	166	63	40	2,5	10						
033169	8010VXD92-200R-12**	187,95	206	63	60	2,5	12						

** Denotes non stock items.

Da* = Outside Diameter

Product		Spares							
EDP	Item Description	EDP		EDP		Screw Tightening Nm	Cartridge Screw EDP		Adjustment Screw EDP
Cartridge & Spares									
030378	80VX92R-12	015263	D4012T	015240	T15	3,10	022646	7065	-

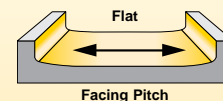
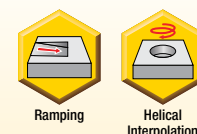
Note: Mounting instructions refer to pages A161 - A164.

Note: XD..1205.., X-Style cutter assemblies cannot utilise the finishing wiper cartridges.

80.0VXD92- R-12 Technical Information (mm)

Product		Dimensions						Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle		Helical Hole min. - max.		ap max Helical / Linear	
			A °	B °				
033161	8000VXD92-100R-12	87,95	0,31	0,47	192	210	1,80	10800
033162	8000VXD92-125R-12	112,95	0,24	0,36	242	260	1,80	9200
033163	8000VXD92-160R-12	147,95	0,18	0,28	312	330	1,80	7800
033164	8000VXD92-200R-12	187,95	0,14	0,21	392	410	1,80	6800
033165	8000VXD92-250R-12	237,95	0,11	0,17	492	510	1,80	5900
033166	8010VXD92-100R-12**	87,95	0,31	0,47	192	210	1,80	10800
033167	8010VXD92-125R-12**	112,95	0,24	0,36	242	260	1,80	9200
033168	8010VXD92-160R-12**	147,95	0,18	0,28	312	330	1,80	7800
033169	8010VXD92-200R-12**	187,95	0,14	0,21	392	410	1,80	6800

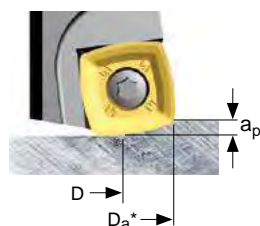
** Denotes non stock items.



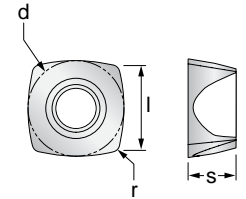
Ramp angle A uses one outside cutting edge only.



A = max ramp angle utilizing full face contact
B = max ramp angle utilizing full contact + internal corner radius



Depth of Cut (ap)



Cartridge Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Facing	Slotting	Plunging	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max. 2,50	a _p max. 2,00	a _e max. 9,00					
029490	XDLW120508SR-D	X400	◆◆◆	◆◆◆	◆◆◆	12,70	12,70	5,56	0,80	0,10
029488	XDLW120508SR-D	X500	●●●	●●●	●●●	12,70	12,70	5,56	0,80	0,10
029489	XDLW120508SR-D	SC3025	◆	◆	◆	12,70	12,70	5,56	0,80	0,10
029682	XDLT120508ER-D41	X500	◆◆◆	◆◆◆	◆◆◆	12,70	12,70	5,56	0,80	0,05
031534	XDLT120508ER-D41	SP6519	●◆◆◆	●◆◆◆	●◆◆◆	12,70	12,70	5,56	0,80	0,05
033068	XDLT120508ER-D41	SC6525	◆◆◆	◆◆◆	◆◆◆	12,70	12,70	5,56	0,80	0,05
029638	XDLT120508ER-D721	GH2	◆	◆	◆	12,70	12,70	5,56	0,80	0,04
030783	XDLT120512ER-D411	X500	◆◆◆	◆◆◆	◆◆◆	12,70	12,70	5,56	1,20	0,05
030792	XDLT120512ER-D411	SP6519	●◆◆◆	●◆◆◆	●◆◆◆	12,70	12,70	5,56	1,20	0,05

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

XDLW120508SR-D X500 should be used for Alloyed Steel and Stainless Steel with heavy scale.

XDLT120512ER-D411 is a more positive geometry than the -D41 with a larger radius which increases performance during smaller radial engagements or where chipping may occur when using the -D41 geometry.

XDLT120512ER-D411 uses less power than -D41.

80.0VXD92_ R12 Feeds f_z (mm/tooth)

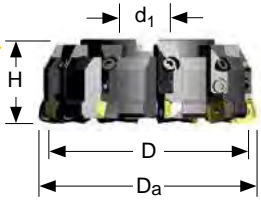
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ²
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
SR-D	X400	Facing	0,30 - 2,70	0,30 - 2,50	-	-	-	-	-	-	-	-	-	-	-	0,30 - 1,20	0,30 - 1,50
SR-D	X400	Slotting	0,30 - 2,50	0,30 - 2,40	-	-	-	-	-	-	-	-	-	-	-	0,30 - 0,80	0,30 - 1,00
SR-D	X500	Facing	-	0,30 - 2,50	0,20 - 1,70	0,20 - 1,20	-	-	-	-	-	-	-	-	-	-	-
SR-D	X500	Slotting	-	0,30 - 2,40	0,20 - 1,50	0,20 - 1,00	-	-	-	-	-	-	-	-	-	-	-
SR-D	SC3025	Facing	-	-	-	-	0,30 - 3,00	0,30 - 2,80	0,30 - 2,50	-	-	-	-	-	-	-	-
SR-D	SC3025	Slotting	-	-	-	-	0,30 - 2,50	0,30 - 2,30	0,30 - 2,10	-	-	-	-	-	-	-	-
ER-D41	X500	Facing	-	-	0,20 - 1,40	0,20 - 0,90	-	-	-	-	-	0,20 - 0,85	0,20 - 0,85	0,20 - 0,85	0,20 - 1,00	-	-
ER-D41	X500	Slotting	-	-	0,20 - 1,10	0,20 - 0,80	-	-	-	-	-	0,10 - 0,70	0,10 - 0,70	0,10 - 0,70	0,10 - 0,80	-	-
ER-D41	SP6519	Facing	0,30 - 2,50	0,30 - 2,30	0,20 - 1,20	0,20 - 0,75	0,30 - 2,50	0,30 - 2,30	-	-	-	0,20 - 0,85	0,20 - 0,85	0,20 - 0,85	0,20 - 1,00	-	-
ER-D41	SP6519	Slotting	0,30 - 2,00	0,30 - 1,80	0,20 - 1,00	0,15 - 0,60	0,30 - 2,00	0,30 - 1,80	-	-	-	0,10 - 0,70	0,10 - 0,70	0,10 - 0,70	0,10 - 0,80	-	-
ER-D41	SC6525	Facing	0,20 - 2,00	0,20 - 1,65	-	-	0,30 - 2,50	0,30 - 2,30	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Slotting	0,20 - 1,75	0,20 - 1,55	-	-	0,30 - 2,00	0,30 - 1,80	-	-	-	-	-	-	-	-	-
ER-D721	GH2	Facing	-	-	-	-	-	-	-	0,30 - 1,50	0,30 - 1,50	-	-	-	-	-	-
ER-D721	GH2	Slotting	-	-	-	-	-	-	-	0,30 - 1,50	0,30 - 1,50	-	-	-	-	-	-
ER-D411	X500	Facing	-	-	0,20 - 1,40	0,20 - 0,90	-	-	-	-	-	0,20 - 0,85	0,20 - 0,85	0,20 - 0,85	0,20 - 1,00	-	-
ER-D411	X500	Slotting	-	-	0,20 - 1,10	0,20 - 0,80	-	-	-	-	-	0,10 - 0,70	0,10 - 0,70	0,10 - 0,70	0,10 - 0,80	-	-
ER-D411	SP6519	Facing	0,30 - 2,50	0,30 - 2,30	0,20 - 1,20	0,20 - 0,75	0,30 - 2,50	0,30 - 2,30	-	-	-	0,20 - 0,85	0,20 - 0,85	0,20 - 0,85	0,20 - 1,00	-	-
ER-D411	SP6519	Slotting	0,30 - 2,00	0,30 - 1,80	0,20 - 1,00	0,15 - 0,60	0,30 - 2,00	0,30 - 1,80	-	-	-	0,10 - 0,70	0,10 - 0,70	0,10 - 0,70	0,10 - 0,80	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A122.



Cartridge Face Mills



Cutter Body & Cartridges



80VX92R-16

Product		Dimensions (mm)						Spares				
EDP	Item Description	D Effective Cutting Diameter	Da*	H	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm
8000VXE92- R-16 Bodies with Unequal Medium Pitch & Cartridges												
033207	8000VXE92-100R-16	82,15	106	68	32	3,5	6	031225		030819	TP20	6,10
033208	8000VXE92-125R-16	107,15	131	63	40	3,5	8					
033209	8000VXE92-160R-16	142,15	166	63	40	3,5	10					
033210	8000VXE92-200R-16	182,15	206	63	60	3,5	12					
033211	8000VXE92-250R-16	232,15	256	63	60	3,5	16					
8010VXE92- R-16 Bodies with Equal Medium Pitch & Cartridges												
033212	8010VXE92-100R-16**	82,15	106	68	32	3,5	6	031225		030819	TP20	6,10
033213	8010VXE92-125R-16**	107,15	131	63	40	3,5	8					
033214	8010VXE92-160R-16**	142,15	166	63	40	3,5	10					
033215	8010VXE92-200R-16**	182,15	206	63	60	3,5	12					

** Denotes non stock items.

Da* = Outside Diameter

Product		Spares							
EDP	Item Description	EDP		EDP		Screw Tightening Nm	Cartridge Screw EDP		Adjustment Screw EDP
Cartridge & Spares									
031308	80VX92R-16	031225	DP5013T	030819	TP20	6,10	022646	7065	-

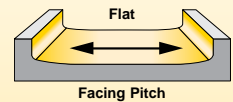
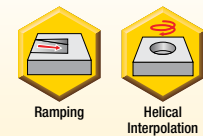
Note: Mounting instructions refer to pages A161 - A164.

Note: XE..1605.., X-Style cutter assemblies cannot utilise the finishing wiper cartridges.

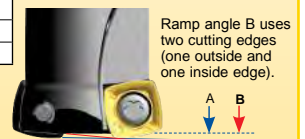
80.0VXE92- R-16 Technical Information (mm)

Product		Dimensions						Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle		Helical Hole min. - max.		ap max Helical / Linear	
			A °	B °				
033207	8000VXE92-100R-16	82,15	0.39	0.47	186	210	2,50	10800
033208	8000VXE92-125R-16	107,15	0.29	0.36	236	260	2,50	9200
033209	8000VXE92-160R-16	142,15	0.22	0.27	306	330	2,50	7800
033210	8000VXE92-200R-16	182,15	0.17	0.20	386	410	2,50	6800
033211	8000VXE92-250R-16	232,15	0.13	0.16	486	510	2,50	5900
033212	8010VXE92-100R-16**	82,15	0.39	0.47	186	210	2,50	10800
033213	8010VXE92-125R-16**	107,15	0.29	0.36	236	260	2,50	9200
033214	8010VXE92-160R-16**	142,15	0.22	0.27	306	330	2,50	7800
033215	8010VXE92-200R-16**	182,15	0.17	0.20	386	410	2,50	6800

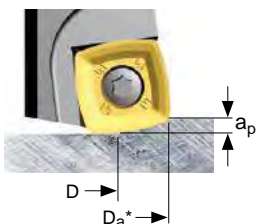
** Denotes non stock items.



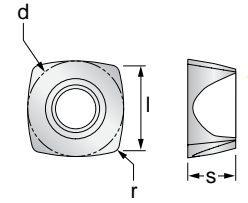
Ramp angle A uses one outside cutting edge only.



A = max ramp angle utilizing full face contact
B = max ramp angle utilizing full contact + internal corner radius



Depth of Cut (ap)



Cartridge Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Facing	Slotting	Plunging	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max. 3,50	a _p max. 3,00	a _e max. -					
031291	XELW160512SR-D	X400	◆◆◆	◆◆◆	-	16,80	16,80	5,56	1,20	0,12
031292	XELW160512SR-D	SC3025	◆	◆	-	16,80	16,80	5,56	1,20	0,12
031293	XELT160512ER-D41	X500	●◆◆	●◆◆	-	16,80	16,80	5,56	1,20	0,12
031294	XELT160512ER-D41	SP6519	●◆◆	●◆◆	-	16,80	16,80	5,56	1,20	0,12
033069	XELT160512ER-D41	SC6525	■●●	■●●	-	16,80	16,80	5,56	1,20	0,12

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

80.0VXE92- R-16 Feeds f _z (mm/tooth)																	
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si	Aluminum & Alloys >16% Si	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >44 HRC	Chilled Cast Iron >1400 N/mm ²
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
Facing																	
SR-D	X400	Slotting	0,30 - 1,70	0,30 - 1,50	-	-	-	-	-	-	-	-	-	-	-	0,30 - 0,50	0,30 - 0,60
SR-D	SC3025	Facing	-	-	-	-	0,30 - 2,00	0,30 - 1,80	0,30 - 1,50	-	-	-	-	-	-	-	-
SR-D	SC3025	Slotting	-	-	-	-	0,30 - 1,50	0,30 - 1,30	0,30 - 1,20	-	-	-	-	-	-	-	-
ER-D41	X500	Facing	-	0,30 - 1,40	0,20 - 1,00	0,20 - 0,60	-	-	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D41	X500	Slotting	-	0,30 - 1,00	0,20 - 0,80	0,20 - 0,50	-	-	-	-	-	0,10 - 0,40	0,10 - 0,40	0,10 - 0,40	0,10 - 0,50	-	-
ER-D41	SP6519	Facing	0,30 - 1,50	0,30 - 1,20	0,20 - 1,00	0,20 - 0,50	0,30 - 1,50	0,30 - 1,20	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D41	SP6519	Slotting	0,30 - 1,20	0,30 - 1,10	0,20 - 0,80	0,20 - 0,45	0,30 - 1,20	0,30 - 1,10	-	-	-	0,10 - 0,40	0,10 - 0,40	0,10 - 0,40	0,10 - 0,50	-	-
ER-D41	SC6525	Facing	0,20 - 1,20	0,20 - 1,00	-	-	0,30 - 1,50	0,30 - 1,20	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Slotting	0,20 - 1,15	0,20 - 0,90	-	-	0,30 - 1,20	0,30 - 1,10	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A122.



Cartridge Face Mills

Speed v_c (m/min)														
80.0VX.92 Series			Wear Resistance											
			Speed min. - max.											
Coolant Recommendation			PVD X Grade		CVD X Grade		PVD Standard		Uncoated Micrograin		CVD Standard			
ISO	Materials	Rm and Hardness	●	○	●	○	●	○	●	○	●	○		
			X400	X500	SP6519	GH2	SC6525	SC3025						
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	○	120 - 260			○	●			○	●	
		<950 N/mm ² <280 HBN	○	●	105 - 230			●	○			●	○	
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○	●	95 - 200	○	●	100 - 210	○	●			○	●
		950-1200 N/mm ² 280-355 HBN	○	●	70 - 150	○	●	75 - 160	○	●			○	●
		1200-1400 N/mm ² 355-415 HBN	●	○	45 - 95	●	○	50 - 100	●	○	50 - 110	●	○	
M	Stainless Steel	Austenitic + Ferritic 300 series				○	●	115 - 250	○	●	115 - 270			
		Martensitic 400 series				○	●	100 - 220	○	●	105 - 235			
	PH Stainless	Refractory P.H.			●	○	50 - 110	●	○	50 - 120				
K	Cast Iron	Grey GG-Ft										145 - 390	150 - 395	
		Spheroidal-Ductile GGG-FGS				○	●	110 - 240			●	115 - 305	●	120 - 335
		Malleable GTS - MN/MP						100 - 220						105 - 275
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN							●	400 - 2745				
		Aluminium + Silicon > 16% Si 92 HBN								●	295 - 2135			
S	High Temperature Alloys	Iron Based												
		Cobalt Based				●	○	23 - 48	○	●	23 - 55			
		Nickel Based						21 - 44			22 - 48			
		Titanium Based						24 - 51			25 - 55			
								35 - 73			36 - 79			
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	●	○	45 - 95									
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			35 - 80									



The advantages of face milling and producing cavities with Stellram's high feed face milling are numerous.

The unique design of the insert, approach angle and the cutter body ensure the cutting forces are predominantly directed in the axial direction. The example shown with a round insert tool shows complex forces which result in high levels of vibration and damage to the cutting edge.

80.0VX.92

- Cutting forces predominantly axial.
- Relationship between cutting edge and work piece is at its most stable.
- Results in high feed rates and consistent tool life.



Round Insert Tools

- Tangential forces act around the radius.
- Leads to vibration and damage of the cutting edge.
- Leads to reduced feed and lower productivity.



The 80.0VX.92 (12mm & 16mm) high feed face mill machines with a constant volume of chip throughout all aspects of producing cavities and produces a side wall that is close to profile.

Round insert tools have increasing chip volume through the process.

80.0VX.92

- Constant cutting section (chip volume) irrespective of position in cavity.
- Producing a close to profile side wall.
- Near-square side walls possible.



Centre clearance

Side wall



Round insert

- Greater surface contact.
- Increased chip section for side wall machining.
- Vibration in corners.
- Undulating side wall cusps.

CNC Programme - Corner Radius Definition 80.0VX.92

The use of common CAD / CAM systems requires a round insert dimension to be known for cavity machining. This is available with 80.0VX92 cutters as shown to the right and in the reference table.



Programming Data (mm)			
Insert size (mm)	Radius	R	L
12	0,8	2,50	1,02
	1,2	2,73	0,97
16	1,2	4,18	1,46

For finish pass applications:

Wiper Facet for finishing use max. feed 0,8 mm/revolution



Calculation of the average chip thickness in relation with the D.O.C. (Axial)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_p}}$$

h_m = Average chip thickness
 a_p = Depth of cut
 f_z = Feed per tooth
 d = Insert diameter (45mm)
 Theoretical Diameter for all high feed insert sizes = 45mm

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_p}{d}}$$

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
 a_e = Radial engagement
 f_z = Feed per tooth
 d = Cutter diameter

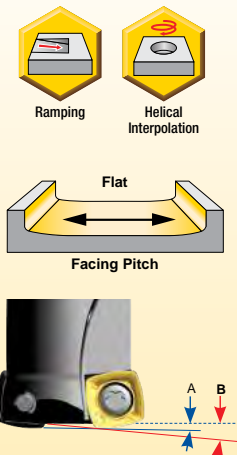
Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

Facing Pitch, Ramp Angle, Helical Interpolation and Max RPM Capacity for 80.0VX.92 Series (mm)

Product				Dimensions						
Insert Size	Item Description	D Effective Cutting Diameter	D_a^*	Facing Pitch	Ramping Angle		Helical Hole min. - max.		a_p max Helical / Linear	Max RPM
					A °	B °				
12mm	8000VD92-100R-12	87,95	106,00	87,95	0.31	0.47	192	210	1,80	10800
	8000VD92-125R-12	112,95	131,00	112,95	0.24	0.36	242	260	1,80	9200
	8000VD92-160R-12	147,95	166,00	147,95	0.18	0.28	312	330	1,80	7800
	8000VD92-200R-12	187,95	206,00	187,95	0.14	0.21	392	410	1,80	6800
	8000VD92-250R-12	237,95	256,00	237,95	0.11	0.17	492	510	1,80	5900
16mm	8000VE92-100R-16	82,15	106,00	82,15	0.39	0.47	186	210	2,50	10800
	8000VE92-125R-16	107,15	131,00	107,15	0.29	0.36	236	260	2,50	9200
	8000VE92-160R-16	142,15	166,00	142,15	0.22	0.27	306	330	2,50	7800
	8000VE92-200R-16	182,15	206,00	182,15	0.17	0.20	386	410	2,50	6800
	8000VE92-250R-16	232,15	256,00	232,15	0.13	0.16	486	510	2,50	5900

* Denotes non stock items.

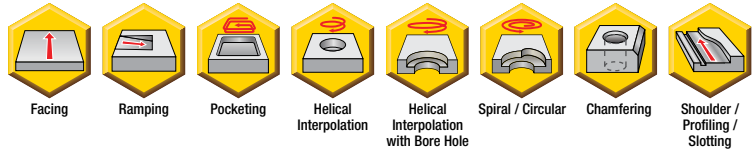
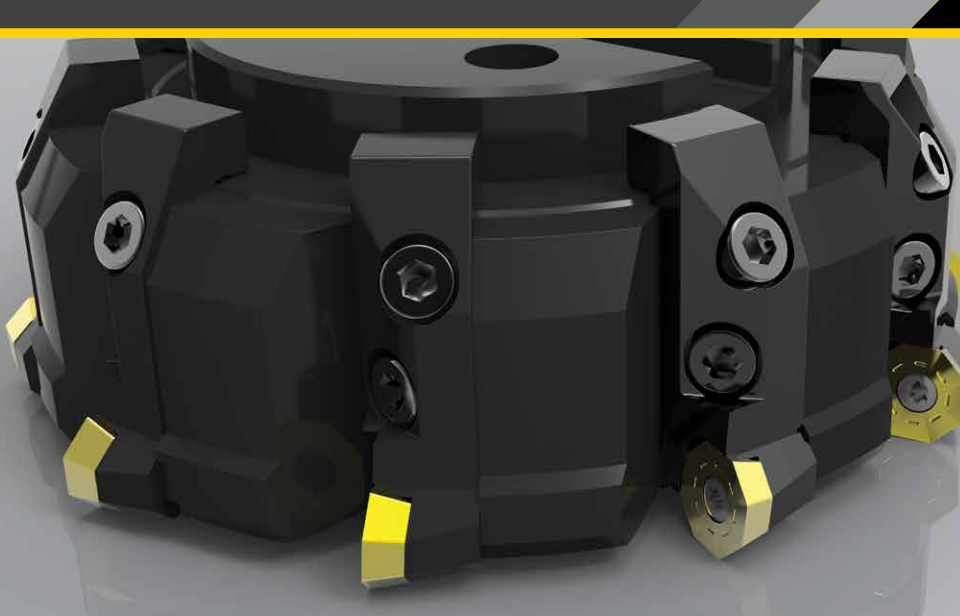


Ramp angle A uses one outside cutting edge only.

Ramp angle B uses two cutting edges (one outside and one inside edge).

A = max ramp angle utilising full face contact

B = max ramp angle utilising full contact + internal corner radius



42° CARTRIDGE FACE MILLING ASSEMBLIES

The **80.0VOD45** cutters are designed to machine all materials. Octagonal inserts offer up to eight economical cutting edges.

80.0VOD45 cutters are assembled with cartridges for OD..0404.. or OD..0605.. milling inserts for face milling applications.

The cutters series **8000VOD45** has an unequal medium pitch for reducing vibration and is for roughing, semi-finishing and finishing of Steel, Steel Alloys, Stainless Steel, Cast Iron and Aluminium Alloys.

The **8010VOD45** series has an equal medium pitch and is especially recommended for roughing, semi-finishing and finishing of High Temperature Alloys such as Iron Based Alloys, Cobalt Based Alloys, Nickel Based Alloys and Titanium.

The **8000VOD45** series can be assembled with a particular wiper cartridge for finishing when a fine finished surface is required. The corresponding pocket on the body for the finishing cartridge is marked with a "F".

Note: The 8010 series are not possible to assemble with a wiper cartridge.

80_0VOD45-_{R-04} & -06

80.0VOD45-_{R-04}:

Maximum $a_p = 3,50\text{mm}$
($a_{p1 \text{ max}} = 8\text{mm}$)
Effective Cutting Diameter
Range = 100mm to 400mm

** Denotes non stock items 8000VOD45 diameter 315 - 400mm

** Denotes non stock items 8010VOD45 diameter 100 - 200mm

80.0VOD45-_{R-06}:

Maximum $a_p = 4,50\text{mm}$
($a_{p1} = 10\text{mm}$)
Effective Cutting Diameter
Range = 100mm to 400mm

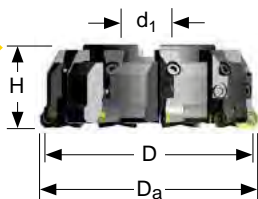
** Denotes non stock items 8000VOD45 diameter 315 - 400mm

** Denotes non stock items 8010VOD45 diameter 100 - 200mm





Cartridge Face Mills



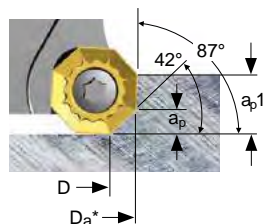
Cutter Body & Cartridges



80VOD45R-04



81FS00R-12



Depth of Cut (ap)

Product		Dimensions (mm)							Spares				
EDP	Item Description	D Effective Cutting Diameter	Da*	H	d1	ap max	ap1 max	No. of Teeth	EDP		EDP		Screw Tightening Nm
8000VOD45- R-04 Bodies with Unequal Medium Pitch & Cartridges													
021837	8000VOD45-100R-04	100	108	68	32	3,50	8,00	6	015270	F4011T	015241	T20	3,10
021838	8000VOD45-125R-04	125	133	63	40	3,50	8,00	8					
021839	8000VOD45-160R-04	160	168	63	40	3,50	8,00	10					
021840	8000VOD45-200R-04	200	208	63	60	3,50	8,00	12					
021841	8000VOD45-250R-04	250	258	63	60	3,50	8,00	16					
021842	8000VOD45-315R-04**	315	323	80	60	3,50	8,00	20					
021843	8000VOD45-400R-04**	400	408	80	60	3,50	8,00	24					
8010VOD45- R-04 Bodies with Equal Medium Pitch & Cartridges													
021936	8010VOD45-100R-04**	100	108	68	32	3,50	8,00	6	015270	F4011T	015241	T20	3,10
021937	8010VOD45-125R-04**	125	133	63	40	3,50	8,00	8					
021938	8010VOD45-160R-04**	160	168	63	40	3,50	8,00	10					
021939	8010VOD45-200R-04**	200	208	63	60	3,50	8,00	12					

** Denotes non stock items.

Da* = Outside Diameter

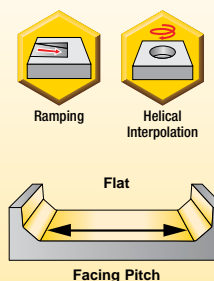
Product		Spares								
EDP	Item Description	EDP		EDP		Screw Tightening Nm	Mounting Screw EDP		Adjustment Screw EDP	
Cartridge & Spares										
014131	80VOD45R-04	015270	F4011T	015241	T20	3,10	022646	7065	-	-
Finishing Cartridge & Spares										
014953	81FS00R-12	015266	D5013T	015241	T20	6,00	022646	7065	016858	72.602

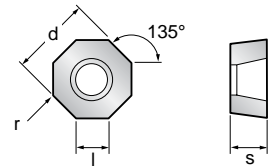
Note: Mounting instructions refer to pages A161 - A164.

80.0VOD45- R-04 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	Max RPM
021837	8000VOD45-100R-04	100	0.17	196	214	2,00	10800
021838	8000VOD45-125R-04	125	0.14	246	264	2,00	10000
021839	8000VOD45-160R-04	160	0.11	316	334	2,00	8000
021840	8000VOD45-200R-04	200	0.09	396	414	2,00	6800
021841	8000VOD45-250R-04	250	0.07	496	514	2,00	5900
021842	8000VOD45-315R-04**	315	-	-	-	-	5200
021843	8000VOD45-400R-04**	400	-	-	-	-	4500
021936	8010VOD45-100R-04**	100	0.17	196	214	2,00	10800
021937	8010VOD45-125R-04**	125	0.14	246	264	2,00	10000
021938	8010VOD45-160R-04**	160	0.11	316	334	2,00	8000
021939	8010VOD45-200R-04**	200	0.09	396	414	2,00	6800

** Denotes non stock items.





Cartridge Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	hm min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
ap max.	ap min. - max.	ap min. - max.	d	l	s	r	hm min			
024911	ODET0404APFN-441	GH1	◆	◆	◆	12,70	4,00	4,76	Facet	0,02
022198	ODET0404APEN-44	X500	-	-	●●●●●	12,70	4,00	4,76	Facet	0,04
031470	ODET0404APEN-44	SP6519	-	-	●●●●●	12,70	4,00	4,76	Facet	0,04
022199	ODET0404APEN-44	MP91M	-	-	●●●●●	12,70	4,00	4,76	Facet	0,04
022061	ODMT0404APEN-41	X500	-	●●	-	12,70	4,00	4,76	Facet	0,06
031472	ODMT0404APEN-41	SP6519	-	●●●	-	12,70	4,00	4,76	Facet	0,06
017775	ODMT0404APEN-41	MP91M	-	●●●	-	12,70	4,00	4,76	Facet	0,06
030768	ODMT040408EN-412	X500	-	●●●	-	12,70	4,00	4,76	0,80	0,06
030769	ODMT040408EN-412	X700	-	●●●	-	12,70	4,00	4,76	0,80	0,06
031540	ODMT040408EN-412	SP6519	-	●●●	-	12,70	4,00	4,76	0,80	0,06
015143	ODMT040408EN-41	X500	●●●	-	-	12,70	4,00	4,76	0,80	0,06
030330	ODMT040408EN-41	X700	●●●	●●●	-	12,70	4,00	4,76	0,80	0,06
031471	ODMT040408EN-41	SP6519	●●●	-	-	12,70	4,00	4,76	0,80	0,06
017303	ODMT040408EN-41	MP91M	●●●	-	-	12,70	4,00	4,76	0,80	0,06
027884	ODEW0404APTR-RA	SC3025	-	◆	◆	12,70	4,00	4,76	Wiper Facet	0,19
017672	ODMW040408SN	X500	●●●●●	-	-	12,70	4,00	4,76	0,80	0,27
031462	ODMW040408SN	SP6519	●●●	-	-	12,70	4,00	4,76	0,80	0,27
017304	ODMW040408SN	MP91M	●●●	-	-	12,70	4,00	4,76	0,80	0,27
029096	ODMW040408SN	SC3025	◆	-	-	12,70	4,00	4,76	0,80	0,27

 Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: Feed recommendations can be found on page A127. Speed recommendations can be found on page A128.

INSERT APPLICATION NOTES:
 ODMW040408SN X500 should be used on Stainless Steel and High Temperature Alloys with heavy scale.

ODMW040408SN inserts should generally be used for heavy duty applications only.

ODMT040408EN-41 and ODMT040408EN-412 in Grade X700 is recommended for medium roughing of Stainless Steel and High Temperature Alloys when a stronger cutting edge is required.

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	hm min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
ap max.	ap min. - max.	ap min. - max.	d	l	s	r	hm min			
Wiper Inserts										
017237	SPHX12M512EN	GH1	-	-	●●●●●	12,70	12,70	5,00	1,20	0,02
031455	SPHX12M512N	SA9608	-	-	●●●●●	12,70	12,70	5,00	1,20	0,02

 Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: Mounting instruction for wiper inserts refer to pages A161 - A164.



Cartridge Face Mills

80.0VOD45- R-04 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
FN-441	GH1	Facing	-	-	-	-	-	-	-	0,04 - 0,30	0,04 - 0,25	-	-	-	-	-	-
EN-44	X500	Facing	0,06 - 0,30	0,06 - 0,27	0,06 - 0,25	0,06 - 0,20	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-44	SP6519	Facing	0,06 - 0,30	0,06 - 0,27	0,06 - 0,25	0,06 - 0,20	0,06 - 0,25	0,06 - 0,25	0,06 - 0,23	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-44	MP91M	Facing	0,06 - 0,30	0,06 - 0,27	-	-	0,06 - 0,25	0,06 - 0,25	0,06 - 0,23	-	-	-	-	-	-	-	-
APEN-41	X500	Facing	0,06 - 0,35	0,06 - 0,22	-	-	-	-	-	-	-	-	-	-	-	-	-
APEN-41	SP6519	Facing	0,06 - 0,35	0,06 - 0,22	-	-	0,06 - 0,25	0,06 - 0,25	0,06 - 0,23	-	-	-	-	-	-	-	-
APEN-41	MP91M	Facing	0,06 - 0,35	0,06 - 0,22	-	-	0,06 - 0,25	0,06 - 0,25	0,06 - 0,23	-	-	-	-	-	-	-	-
EN-412	X500	Facing	-	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,15	0,06 - 0,15	0,06 - 0,15	0,06 - 0,25	-	-
EN-412	X700	Facing	-	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,15	0,06 - 0,15	0,06 - 0,15	0,06 - 0,25	-	-
EN-412	SP6519	Facing	-	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,15	0,06 - 0,15	0,06 - 0,15	0,06 - 0,25	-	-
EN-41	X500	Facing	-	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,30	-	-
EN-41	X700	Facing	-	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,30	-	-
EN-41	SP6519	Facing	0,06 - 0,35	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,30	-	-
EN-41	MP91M	Facing	-	-	-	-	0,06 - 0,35	0,06 - 0,35	0,06 - 0,35	-	-	-	-	-	-	-	-
TR-RA	SC3025	Facing	-	-	-	-	0,19 - 0,35	0,19 - 0,35	0,19 - 0,35	-	-	-	-	-	-	-	-
SN	X500	Facing	-	0,32 - 0,50	0,30 - 0,40	0,30 - 0,40	-	-	-	-	-	0,20 - 0,30	0,20 - 0,30	0,20 - 0,30	0,20 - 0,33	-	-
SN	SP6519	Facing	0,32 - 0,55	0,32 - 0,50	-	-	-	-	-	-	-	-	-	-	-	-	-
SN	MP91M	Facing	0,32 - 0,55	0,32 - 0,50	-	-	0,32 - 0,50	0,32 - 0,50	0,32 - 0,50	-	-	-	-	-	-	-	-
SN	SC3025	Facing	-	-	-	-	0,32 - 0,50	0,32 - 0,50	0,32 - 0,50	-	-	-	-	-	-	-	-

Wiper Inserts Feed /revolution (fn in mm)

SPHX	GH1	Facing	1,00 - 4,00	1,00 - 3,00	0,80 - 2,50	0,80 - 2,00	1,00 - 2,50	0,80 - 2,20	0,80 - 2,00	-	-	-	-	-	-	-	-
SPHX	SA9608	Facing	1,00 - 4,00	1,00 - 3,00	0,80 - 2,50	0,80 - 2,00	1,00 - 2,50	0,80 - 2,20	0,80 - 2,00	-	-	0,50 - 1,50	0,50 - 1,50	0,50 - 1,50	0,50 - 1,80	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A128.



Cartridge Face Mills

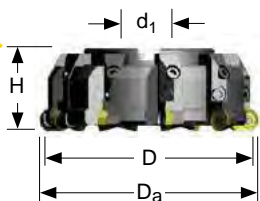
Speed v_c (m/min)																
80.0VOD45- R-04 Series			Wear Resistance													
			Speed min. - max..													
Coolant Recommendation																
Recommended ● Possible ◎																
ISO	Materials	Rm and Hardness	Water	Oil	CVD X Grade	PVD X Grade	PVD Standard	CVD Standard	CVD Standard	Uncoated Micrograin	Uncoated Cermet					
			Water	Oil	X500	X700	SP6519	MP91M	SC3025	GH1*	SA9608					
P	Unalloyed Steel	<600 N/mm ² <180 HBN	◎	●	130 - 270		◎	●			●	240 - 345	●	265 - 380		
		<950 N/mm ² <280 HBN			115 - 240			●			●	215 - 305		235 - 335		
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	◎	●	100 - 210		◎	●			●	190 - 270	●	205 - 295		
		950-1200 N/mm ² 280-355 HBN			75 - 160			●			●	140 - 205		155 - 225		
		1200-1400 N/mm ² 355-415 HBN		●	50 - 100		●	50 - 130		●	90 - 130	●	100 - 145			
M	Stainless Steel	Austenitic + Ferritic 300 series	◎	●	115 - 250	◎	●	115 - 270			◎	●	215 - 305	◎	●	235 - 335
		Martensitic 400 series			100 - 220			105 - 235			●	●	195 - 275		215 - 305	
	PH Stainless	Refractory P.H.	●		50 - 110	●	50 - 115	50 - 120			●	●	90 - 180	●	100 - 200	
K	Cast Iron	Grey GG-Fl						140 - 295			150 - 395		135 - 290		280 - 400	
		Spheroidal-Ductile GGG-FGS					◎	●	110 - 240	●	115 - 285	●	120 - 335	◎	●	220 - 315
		Malleable GTS - MN/MP							100 - 220		105 - 260		105 - 275		115 - 200	200 - 285
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN									●	400 - 3050				
		Aluminium + Silicon > 16% Si 92 HBN										●	295 - 2440			
S	High Temperature Alloys	Iron Based			23 - 48			23 - 55							50 - 75	
		Cobalt Based			21 - 44			22 - 48							48 - 70	
		Nickel Based	●		24 - 51	●		25 - 53	●				●		52 - 75	
		Titanium Based			35 - 73			36 - 75							60 - 95	
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN														
		Chilled Cast Iron >1400 N/mm ² > 400 HBN														

* Note: ODET04...441 in Grade GH1 can only be used for Aluminium.

* Note: Wiper Insert SPHX12M512EN GH1 can be used for Steel, Steel Alloys, Stainless Steel, Cast Iron and High Temperature Alloys.



Cartridge Face Mills



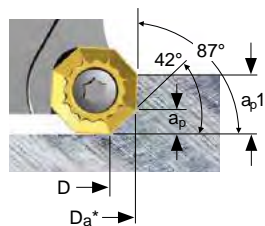
Cutter Body & Cartridges



80VOD45R-06



81FS00R-12



Depth of Cut (ap)

Product		Dimensions (mm)							Spares				
EDP	Item Description	D Effective Cutting Diameter	Da*	H	d1	ap max	ap1 max	No. of Teeth	EDP		EDP		Screw Tightening Nm
8000VOD45- R-06 Bodies with Unequal Medium Pitch & Cartridges													
026638	8000VOD45-100R-06	100	110	68	32	4,50	10,00	6	015270		015241	T20	3,10
026639	8000VOD45-125R-06	125	135	63	40	4,50	10,00	8					
026640	8000VOD45-160R-06	160	170	63	40	4,50	10,00	10					
026641	8000VOD45-200R-06	200	210	63	60	4,50	10,00	12					
026642	8000VOD45-250R-06	250	260	63	60	4,50	10,00	16					
026643	8000VOD45-315R-06**	315	325	80	60	4,50	10,00	20					
026644	8000VOD45-400R-06**	400	410	80	60	4,50	10,00	24					
8010VOD45- R-06 Bodies with Equal Medium Pitch & Cartridges													
026645	8010VOD45-100R-06**	100	110	68	32	4,50	10,00	6	015270		015241	T20	3,10
026646	8010VOD45-125R-06**	125	135	63	40	4,50	10,00	8					
026647	8010VOD45-160R-06**	160	170	63	40	4,50	10,00	10					
026648	8010VOD45-200R-06**	200	210	63	60	4,50	10,00	12					

* Denotes non stock items.

Da* = Outside Diameter

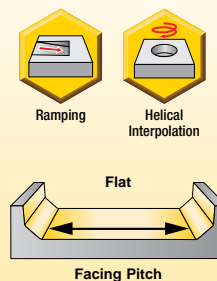
Product		Spares								
EDP	Item Description	EDP		EDP		Screw Tightening Nm	Cartridge Screw EDP		Adjustment Screw EDP	
Cartridge & Spares										
026587	80VOD45R-06	015270	F4011T	015241	T20	3,10	022646	7065	-	-
Finishing Cartridge & Spares										
014953	81FS00R-12	015266	D5013T	015241	T20	6,00	022646	7065	016858	72.602

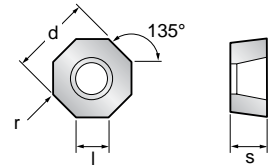
Note: Mounting instructions refer to pages A161 - A164.

80.0VOD45- R-06 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	Max RPM
026638	8000VOD45-100R-06	100	0.22	194	218	2,60	10800
026639	8000VOD45-125R-06	125	0.18	244	268	2,60	10000
026640	8000VOD45-160R-06	160	0.14	314	338	2,60	8000
026641	8000VOD45-200R-06	200	0.11	394	418	2,60	6800
026642	8000VOD45-250R-06	250	0.09	494	518	2,60	5900
026643	8000VOD45-315R-06**	315	-	-	-	-	5200
026644	8000VOD45-400R-06**	400	-	-	-	-	4500
026645	8010VOD45-100R-06**	100	0.22	194	218	2,60	10800
026646	8010VOD45-125R-06**	125	0.18	244	268	2,60	10000
026647	8010VOD45-160R-06**	160	0.14	314	338	2,60	8000
026648	8010VOD45-200R-06**	200	0.11	394	418	2,60	6800

** Denotes non stock items.





Cartridge Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			ap max. 4,50	ap min. - max. 1,00 - 2,00	ap min. - max. 0,20 - 1,00					
026588	ODET0605APFN-441	GH1	◆	◆	◆	16,00	6,00	5,55	Facet	0,02
026592	ODET0605APEN-44	X500	-	-	●●●●●	16,00	6,00	5,55	Facet	0,04
031501	ODET0605APEN-44	SP6519	-	-	◆◆◆◆◆	16,00	6,00	5,55	Facet	0,04
034513	ODET0605APEN-44	SP4019	-	-	◆◆◆◆◆	16,00	6,00	5,55	Facet	0,04
026591	ODET0605APEN-44	MP91M	-	-	◆◆◆◆◆	16,00	6,00	5,55	Facet	0,04
026590	ODMT0605APEN-41	X500	●●●◆	●●●●●	-	16,00	6,00	5,55	Facet	0,06
031502	ODMT0605APEN-41	SP6519	●●●◆	◆◆◆◆◆	-	16,00	6,00	5,55	Facet	0,06
034514	ODMT0605APEN-41	SP4019	◆◆◆◆	◆◆◆◆	-	16,00	6,00	5,55	Facet	0,06
026589	ODMT0605APEN-41	MP91M	-	◆◆◆◆	-	16,00	6,00	5,55	Facet	0,06
027885	ODEW0605APTR-RA	SC3025	-	◆	◆	16,00	6,00	5,55	Facet	0,19
026596	ODMW060512TN	X500	●●●●●	-	-	16,00	6,00	5,55	1,20	0,17
031503	ODMW060512TN	SP6519	◆◆	-	-	16,00	6,00	5,55	1,20	0,17
034515	ODMW060512TN	SP4019	●●●	-	◆	16,00	6,00	5,55	1,20	0,17
026595	ODMW060512TN	MP91M	◆◆◆	-	-	16,00	6,00	5,55	1,20	0,17
025838	ODMW060512SN	X500	●●	-	-	16,00	6,00	5,55	1,20	0,27
031483	ODMW060512SN	SP6519	◆◆	-	-	16,00	6,00	5,55	1,20	0,27
025836	ODMW060512SN	MP91M	◆◆◆	-	-	16,00	6,00	5,55	1,20	0,27
029097	ODMW060512SN	SC3025	◆	-	-	16,00	6,00	5,55	1,20	0,27

 Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: Feed recommendations can be found on page A132. Speed recommendations can be found on page A133.

INSERT APPLICATION NOTES:
 ODMW060512TN X500 or SP4019 should be used in Stainless Steel and High Temperature Alloys with heavy scale.

ODMW060512TN should be used when the machine tool has low power available.

ODMW060512SN Geometry should be used for heavy duty applications.

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			ap max. -	ap min. - max. -	ap min. - max. 0,20 - 1,00					
Wiper Inserts										
017237	SPHX12M512EN	GH1	-	-	◆◆◆◆◆	12,70	12,70	5,00	1,20	0,02
031455	SPHX12M512EN	SA9608	-	-	◆◆◆◆◆	12,70	12,70	5,00	1,20	0,02

 Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page a5.

Note: Mounting instruction for wiper inserts refer to page A161.



Cartridge Face Mills

80.0VOD45- R-06 Feeds f_z (mm/tooth)

Geometry	Grade	Operatlon	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Grey Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
FN-441	GH1	Facing	-	-	-	-	-	-	-	0,04 - 0,30	0,04 - 0,25	-	-	-	-	-	-
EN-44	X500	Facing	0,06 - 0,35	0,06 - 0,30	0,06 - 0,27	0,06 - 0,20	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-44	SP6519	Facing	0,06 - 0,35	0,06 - 0,30	0,06 - 0,27	0,06 - 0,20	0,06 - 0,30	0,06 - 0,30	0,06 - 0,30	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-44	SP4019	Facing	-	-	0,06 - 0,27	0,06 - 0,20	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,25	-	-
EN-44	MP91M	Facing	0,06 - 0,35	0,06 - 0,27	-	-	0,06 - 0,30	0,06 - 0,30	0,06 - 0,30	-	-	-	-	-	-	-	-
EN-41	X500	Facing	0,06 - 0,38	0,06 - 0,35	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,30	-	-
EN-41	SP6519	Facing	0,06 - 0,38	0,06 - 0,35	0,06 - 0,35	0,06 - 0,30	0,06 - 0,38	0,06 - 0,38	0,06 - 0,35	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,30	-	-
EN-41	SP4019	Facing	-	-	0,06 - 0,35	0,06 - 0,30	-	-	-	-	-	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	0,06 - 0,30	-	-
EN-41	MP91M	Facing	0,06 - 0,38	0,06 - 0,35	-	-	0,06 - 0,38	0,06 - 0,38	0,06 - 0,35	-	-	-	-	-	-	-	-
TR-RA	SC3025	Facing	-	-	-	-	0,19 - 0,40	0,19 - 0,40	0,19 - 0,40	-	-	-	-	-	-	-	-
TN	X500	Facing	0,24 - 0,55	0,24 - 0,50	0,24 - 0,40	0,24 - 0,32	-	-	-	-	-	0,17 - 0,25	0,17 - 0,25	0,17 - 0,25	0,20 - 0,28	-	-
TN	SP6519	Facing	0,24 - 0,55	0,24 - 0,50	-	-	-	-	-	-	-	-	-	-	-	-	-
TN	SP4019	Facing	-	-	0,24 - 0,40	0,24 - 0,32	-	-	-	-	-	0,17 - 0,25	0,17 - 0,25	0,17 - 0,25	0,20 - 0,28	0,05 - 0,10	0,05 - 0,12
TN	MP91M	Facing	0,24 - 0,55	0,24 - 0,50	-	-	0,24 - 0,50	0,24 - 0,50	0,17 - 0,50	-	-	-	-	-	-	-	-
SN	X500	Facing	0,32 - 0,60	0,32 - 0,55	-	-	-	-	-	-	-	-	-	-	-	-	-
SN	SP6519	Facing	0,32 - 0,60	0,32 - 0,55	-	-	-	-	-	-	-	-	-	-	-	-	-
SN	MP91M	Facing	0,32 - 0,55	0,32 - 0,55	-	-	0,32 - 0,55	0,32 - 0,55	0,32 - 0,55	-	-	-	-	-	-	-	-
SN	SC3025	Facing	-	-	-	-	0,32 - 0,55	0,32 - 0,55	0,32 - 0,55	-	-	-	-	-	-	-	-

Wiper Inserts Feed /revolution (fn in mm)

SPHX	GH1	Facing	1,00 - 4,00	1,00 - 3,00	0,80 - 2,50	0,80 - 2,00	1,00 - 2,50	0,80 - 2,20	0,80 - 2,00	-	-	-	-	-	-	-	-
SPHX	SA9608	Facing	1,00 - 4,00	1,00 - 3,00	0,80 - 2,50	0,80 - 2,00	1,00 - 2,50	0,80 - 2,20	0,80 - 2,00	-	-	0,50 - 1,50	0,50 - 1,50	0,50 - 1,50	0,50 - 1,80	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A133.



Cartridge Face Mills

Speed v_c (m/min)																									
80.0VOD45- R-06 Series			Wear Resistance																						
			Speed min. - max..																						
Coolant Recommendation																									
Recommended ● Possible ◎																									
ISO	Materials	Rm and Hardness	Water	No Coolant	CVD X Grade	Water	No Coolant	PVD Standard	Water	No Coolant	PVD Standard	Water	No Coolant	CVD Standard	Water	No Coolant	CVD Standard	Water	No Coolant	Uncoated Micrograin	Water	No Coolant	Uncoated Cermet		
			●	◎	X500	●	◎	SP6519	●	◎	SP4019	●	◎	MP91M	●	◎	SC3025	●	◎	GH1*	●	◎	SA9608		
P	Unalloyed Steel	<600 N/mm ² <180 HBN	◎	●	130 - 270	◎	●	130 - 295						●						●			●	265 - 380	
		<950 N/mm ² <280 HBN			115 - 240			115 - 260													●			●	235 - 335
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	◎	●	100 - 210	◎	●	100 - 230							●						●			●	205 - 295
		950-1200 N/mm ² 280-355 HBN			75 - 160			75 - 175													●			●	155 - 225
		1200-1400 N/mm ² 355-415 HBN			●		●	50 - 100						●						●			●	100 - 145	
M	Stainless Steel	Austenitic + Ferritic 300 series	◎	●	115 - 250	◎	●	115 - 270	◎	●	120 - 280									◎	●	215 - 305	◎	●	235 - 335
		Martensitic 400 series			100 - 220			105 - 235													◎	●	195 - 275	◎	●
	PH Stainless	Refractory P.H.	●		50 - 110	●		50 - 120	●		50 - 130									●			●	100 - 200	
K	Cast Iron	Grey GG-Ft						140 - 295																280 - 400	
		Spheroidal-Ductile GGG-FGS			◎	●	110 - 240							●			●			◎	●	120 - 245	●		220 - 315
		Malleable GTS - MN/MP					100 - 220																	●	200 - 285
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN																				●		400 - 3050	
		Aluminium + Silicon > 16% Si 92 HBN																							295 - 2440
S	High Temperature Alloys	Iron Based			●		●	23 - 48			●		●	23 - 55			24 - 63						●	50 - 75	
		Cobalt Based																							48 - 70
		Nickel Based																							52 - 75
		Titanium Based																							60 - 95
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN																							
		Chilled Cast Iron >1400 N/mm ² > 400 HBN								●															

* Note: ODET04...441 in Grade GH1 can only be used for Aluminium.

* Note: SPHX12M512EN GH1 can be used for Steel, Steel Alloys, Stainless Steel, Cast Iron and High Temperature Alloys.



Cartridge Face Mills

80_0VOD45 Technical Information

Feed rate compensation: For 42° cutting, divide the h_m value by the sine of the approach angle (the sine of 42° = 0,669)

i.e.: $\frac{h_m}{0,669}$ or $\frac{0,08}{0,669} = 0,12\text{mm}$ programmed feed rate



Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness

a_e = Radial engagement

f_z = Feed per tooth

d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$



45° CARTRIDGE FACE MILLING ASSEMBLIES

The robust cutter series 8000VS45-_R-12 is combined with SC..12M5.. square insert.

8000VS45-_R-12 cutters are assembled with 45° cartridges for face milling applications.

This type of cutter utilises 5mm thick and 7° degrees clearance inserts. Due to this feature, these cutters are capable of running higher feed rates compared to other cutters with 45° lead angle.

8000VS45-_R-12 is ideal for applications when machining surfaces with rough scale or irregular stock. These cutters feature a negative rake angle which provide excellent chip evacuation.

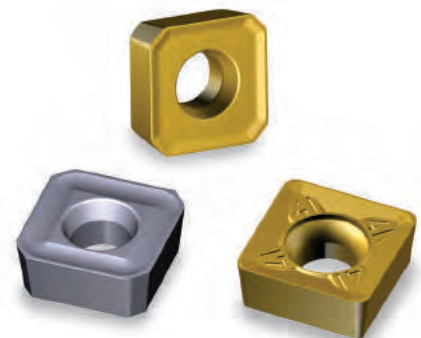
The cutter series 8000VS45-_R-12 has an unequal medium pitch for reducing vibration and are suitable for roughing, semi-finishing and finishing of Steel, Steel Alloys, Cast Iron, and Stainless Steel.

8000VS45.. series can be assembled with a particular wiper cartridge for finishing when a fine finished surface is required. The corresponding pocket on the body for the finishing cartridge is marked with a "F" .

8000VS45-_R-12

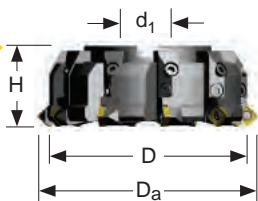
8000VS45-_R-12:
Maximum $a_p = 7\text{mm}$
Effective Cutting Diameter
Range = 100mm to 400mm

** Denotes non stock items
diameter 315mm - 400mm





Cartridge Face Mills



Cutter Body & Cartridges

Product		Dimensions (mm)						Spares					
EDP	Item Description	D Effective Cutting Diameter	Da*	H	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm	
8000VS45- R-12 Bodies with Unequal Medium Pitch & Cartridge													
021851	8000VS45-100R-12	100	115	68	32	7	6	015266		D5013T	015241	T20	6,00
021852	8000VS45-125R-12	125	140	63	40	7	8						
021853	8000VS45-160R-12	160	175	63	40	7	10						
021854	8000VS45-200R-12	200	215	63	60	7	12						
021855	8000VS45-250R-12	250	265	63	60	7	16						
021856	8000VS45-315R-12**	315	330	80	60	7	20						
021857	8000VS45-400R-12**	400	415	80	60	7	24						

* Denotes non stock items.

Da* = Outside Diameter

Note: 8000VS45 series are only available in 8000V.



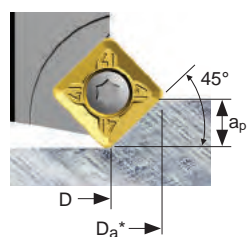
80VS45R-12

Product		Spares								
EDP	Item Description	EDP		EDP		Screw Tightening Nm	Cartridge Screw EDP		Adjustment Screw EDP	
Cartridge & Spares										
014946	80VS45R-12	015266	D5013T	015241	T20	6,00	022646	7065	-	-
Finishing Cartridge & Spares										
014953	81FS00R-12	015266	D5013T	015241	T20	6,00	022646	7065	016858	72.602

Note: Mounting instructions refer to pages A161 - A164.



81FS00R-12

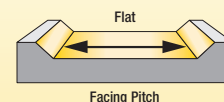


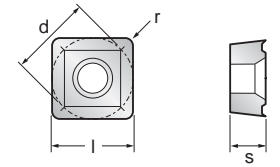
Depth of Cut (ap)

8000VS45- R-12 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	Max RPM
021851	8000VS45-100R-12	100	-	-	-	-	10800
021852	8000VS45-125R-12	125	-	-	-	-	9200
021853	8000VS45-160R-12	160	-	-	-	-	7800
021854	8000VS45-200R-12	200	-	-	-	-	6800
021855	8000VS45-250R-12	250	-	-	-	-	5900
021856	8000VS45-315R-12**	315	-	-	-	-	5200
021857	8000VS45-400R-12**	400	-	-	-	-	4500

** Denotes non stock items.





Cartridge Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			ap max. 7,00	ap min. - max. 1,00 - 3,50	ap min. - max. 0,20 - 1,00					
Insert selection with facet										
034591	SCCT12M5ACTR	X400	◆◆	●●	◆	12,7	12,7	5,00	Facet	0,15
034552	SCCT12M5ACTR	SP4019	◆◆	◆◆	◆◆	12,7	12,7	5,00	Facet	0,15
017695	SCCT12M5ACTR	GH1	-	-	■	12,7	12,7	5,00	Facet	0,15
017312	SCCT12M5ACER	MP91M	-	●●●	◆◆◆	12,7	12,7	5,00	Facet	0,03
017698	SCHAT12M5ACTN	X500	◆◆	●●	●●	12,70	12,70	5,00	Facet	0,15
031504	SCHAT12M5ACTN	SP6519	◆◆◆	◆◆◆	◆◆◆	12,70	12,70	5,00	Facet	0,15
017313	SCHAT12M5ACTN	MP91M	■	◆	●●●	12,70	12,70	5,00	Facet	0,15
015144	SCKT12M5ACSN-41	X500	●	-	-	12,70	12,70	5,00	Facet	0,12
031556	SCKT12M5ACSN-41	SP6519	●●●	-	-	12,70	12,70	5,00	Facet	0,12
017314	SCKT12M5ACSN-41	MP91M	◆	-	-	12,70	12,70	5,00	Facet	0,12
Insert selection with corner radius										
015226	SCMT12M512EN-41	X500	-	◆◆●	-	12,70	12,70	5,00	1,20	0,06
031475	SCMT12M512EN-41	SP6519	-	◆◆◆	-	12,70	12,70	5,00	1,20	0,06
017317	SCMT12M512EN-41	MP91M	-	◆◆◆	-	12,70	12,70	5,00	1,20	0,06
034554	SCMT12M512T	X400	◆◆	-	-	12,70	12,70	5,00	1,20	0,15
024129	SCMT12M512T	X500	◆◆	-	-	12,70	12,70	5,00	1,20	0,15
034555	SCMT12M512T	SP6519	◆◆◆	-	-	12,70	12,70	5,00	1,20	0,15
034553	SCMT12M512T	SP4019	◆◆◆	-	-	12,70	12,70	5,00	1,20	0,15
017316	SCMT12M512T	MP91M	◆◆◆	-	-	12,70	12,70	5,00	1,20	0,15

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: Feed recommendations can be found on page A138. Speed recommendations can be found on page A139.

INSERT APPLICATION NOTES:
 All inserts with a radius should only be used for semi roughing applications, where a finished surface is not required.

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			ap max.	ap min. - max.	ap min. - max. 0,20 - 1,00					
Wiper Inserts										
017237	SPHX12M512EN	GH1	-	-	◆◆◆◆	12,55	12,55	5,00	Wiper Facet	0,02
031455	SPHX12M512EN	SA9608	-	-	◆◆◆◆	12,55	12,55	5,00	Wiper Facet	0,02

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: Mounting instruction for wiper inserts refer to page A161.



8000VS45- _R-12 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
Insert selection with facet																	
TR	X400	Facing	0,15 - 0,50	0,12 - 0,45	-	-	-	-	-	-	-	-	-	-	-	0,06 - 0,10	0,08 - 0,10
TR	SP4019	Facing	-	-	0,12 - 0,33	0,12 - 0,22	0,15 - 0,36	0,15 - 0,36	0,15 - 0,36	-	-	-	-	-	-	0,06 - 0,10	0,08 - 0,10
TR	GH1	Facing	-	-	-	-	0,15 - 0,30	0,15 - 0,30	0,15 - 0,25	-	-	-	-	-	-	-	-
ER	MP91M	Facing	0,05 - 0,25	0,05 - 0,23	-	-	0,05 - 0,25	0,05 - 0,25	0,05 - 0,23	-	-	-	-	-	-	-	-
TN	X500	Facing	-	-	0,15 - 0,33	0,15 - 0,22	-	-	-	-	-	-	-	-	-	-	-
TN	SP6519	Facing	0,15 - 0,45	0,15 - 0,40	0,15 - 0,33	0,15 - 0,22	0,15 - 0,36	0,15 - 0,36	0,15 - 0,36	-	-	-	-	-	-	-	-
TN	MP91M	Facing	0,15 - 0,40	0,15 - 0,35	-	-	0,12 - 0,40	0,12 - 0,40	0,12 - 0,40	-	-	-	-	-	-	0,06 - 0,10	0,08 - 0,10
SN-41	X500	Facing	-	-	-	0,12 - 0,22	-	-	-	-	-	-	-	-	-	-	-
SN-41	SP6519	Facing	0,12 - 0,40	0,12 - 0,38	0,12 - 0,33	-	-	-	-	-	-	-	-	-	-	-	-
SN-41	MP91M	Facing	-	-	-	-	0,12 - 0,40	0,12 - 0,40	0,12 - 0,40	-	-	-	-	-	-	-	-
Insert selection with corner radius																	
EN-41	X500	Facing	-	-	0,06 - 0,30	0,06 - 0,20	0,06 - 0,30	0,06 - 0,25	-	-	-	-	-	-	-	-	-
EN-41	SP6519	Facing	0,06 - 0,30	0,06 - 0,28	0,06 - 0,30	0,06 - 0,20	0,06 - 0,30	0,06 - 0,25	0,06 - 0,25	-	-	-	-	-	-	-	-
EN-41	MP91M	Facing	0,06 - 0,30	0,06 - 0,28	-	-	0,06 - 0,30	0,12 - 0,25	0,06 - 0,25	-	-	-	-	-	-	-	-
T	X400	Facing	0,15 - 0,38	0,15 - 0,35	-	-	-	-	-	-	-	-	-	-	-	-	-
T	X500	Facing	-	-	0,15 - 0,30	0,15 - 0,20	-	-	-	-	-	-	-	-	-	-	-
T	SP6519	Facing	0,15 - 0,35	0,15 - 0,33	0,15 - 0,30	0,15 - 0,20	0,12 - 0,36	0,12 - 0,36	0,12 - 0,36	-	-	-	-	-	-	-	-
T	SP4019	Facing	-	-	0,12 - 0,30	0,12 - 0,20	0,12 - 0,36	0,12 - 0,36	0,12 - 0,36	-	-	-	-	-	-	-	-
T	MP91M	Facing	0,12 - 0,38	0,12 - 0,32	-	-	0,12 - 0,36	0,12 - 0,36	0,12 - 0,36	-	-	-	-	-	-	-	-
Wiper Inserts Feed /revolution f_n (mm / rev.)																	
SPHX	GH1	Facing	1,00 - 4,00	1,00 - 3,00	0,80 - 2,50	0,80 - 0,20	1,00 - 2,50	0,80 - 2,20	0,80 - 2,00	-	-	-	-	-	-	-	-
SPHX	SA9608	Facing	1,00 - 4,00	1,00 - 3,00	0,80 - 2,50	0,80 - 0,20	1,00 - 2,50	0,80 - 2,20	0,80 - 2,00	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A139.



Cartridge Face Mills

Speed v_c (m/min)																										
8000VS45- R-12 Series			Wear Resistance																							
			- ← → +																							
			Speed min. - max.																							
Coolant Recommendation			PVD X Grade		CVD X Grade		PVD Standard		PVD Standard		CVD Standard		Uncoated Micrograin		Uncoated Cermet											
ISO	Materials	Rm and Hardness	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕											
			X400	X500	SP6519	SP4019	MP91M	GH1*	SA9608																	
P	Unalloyed Steel	<600 N/mm ² <180 HBN	⊕	⊖	120 - 260			⊕	⊖	130 - 295			⊕	⊖	140 - 345			⊕	⊖	230 - 345			⊕	⊖	265 - 380	
		<950 N/mm ² <280 HBN	⊕	⊖	105 - 230			⊕	⊖	115 - 260			⊕	⊖	120 - 305			⊕	⊖	215 - 305			⊕	⊖	235 - 335	
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	⊕	⊖	95 - 200			⊕	⊖	100 - 230			⊕	⊖	105 - 270			⊕	⊖	190 - 270			⊕	⊖	205 - 295	
		950-1200 N/mm ² 280-355 HBN	⊕	⊖	70 - 150			⊕	⊖	75 - 175			⊕	⊖	80 - 205			⊕	⊖	140 - 205			⊕	⊖	155 - 225	
		1200-1400 N/mm ² 355-415 HBN	⊕	⊖	45 - 95			⊕	⊖	50 - 110			⊕	⊖	50 - 130			⊕	⊖	90 - 130			⊕	⊖	100 - 145	
M	Stainless Steel	Austenitic + Ferritic 300 series		⊕	⊖	115 - 250			⊕	⊖	115 - 270			⊕	⊖	120 - 280			⊕	⊖	215 - 305			⊕	⊖	235 - 335
		Martensitic 400 series		⊕	⊖	100 - 220			⊕	⊖	105 - 235			⊕	⊖	110 - 250			⊕	⊖	195 - 275			⊕	⊖	215 - 305
	PH Stainless	Refractory P.H.		⊕	⊖	50 - 110			⊕	⊖	50 - 120			⊕	⊖	50 - 130			⊕	⊖	90 - 180			⊕	⊖	100 - 200
K	Cast Iron	Grey GG-Ft		⊕	⊖	120 - 280			⊕	⊖	140 - 295			⊕	⊖	145 - 330			⊕	⊖	145 - 365			⊕	⊖	280 - 400
		Spheroidal-Ductile GGG-FGS		⊕	⊖	105 - 205			⊕	⊖	110 - 240			⊕	⊖	115 - 255			⊕	⊖	115 - 285			⊕	⊖	220 - 315
		Malleable GTS - MN/MP		⊕	⊖	95 - 170			⊕	⊖	100 - 220			⊕	⊖	105 - 235			⊕	⊖	105 - 260			⊕	⊖	200 - 285
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN																								
		Aluminium + Silicon > 16% Si 92 HBN																								
S	High Temperature Alloys	Iron Based																								
		Cobalt Based																								
		Nickel Based																								
		Titanium Based																								
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN		⊕	⊖	45 - 95			⊕	⊖	50 - 100			⊕	⊖	50 - 105			⊕	⊖						
		Chilled Cast Iron >1400 N/mm ² > 400 HBN		⊕	⊖	35 - 80			⊕	⊖	40 - 90			⊕	⊖	40 - 95			⊕	⊖						

Note: SCCT12M5ACTR in grade GH1 should only be used for machining Cast Iron.
 Note: Wiper Insert SPHX12M512EN GH1 can be used for Steel, Steel Alloys, Stainless Steel and Cast Iron.



8000VS45_R-12 Technical Information

Feed rate compensation: For 45° cutting, divide the h_m value by the sine of the approach angle (the sine of 45° = 0,707)

i.e.: $\frac{h_m}{0,707}$ or $\frac{0,08}{0,707} = 0,113\text{mm}$ programmed feed rate



Cartridge Face Mills

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

- h_m = Average chip thickness
- a_e = Radial engagement
- f_z = Feed per tooth
- d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$



45° CARTRIDGE FACE MILLING ASSEMBLIES

The **80.0VSE45** cutter series is primarily designed to machine Stainless Steel and High Temperature Alloys. Also Steel, Steel Alloys, Cast Iron and Aluminium can be machined. Especially, if thin wall components need to be machined. Due to its very positive design requires this cutter series lower power.

The square inserts design with 15° degrees clearance and very positive chip geometry is ideal for reducing build-up edge on tough materials.

Applications:

The 80.0VSE45 cutters are assembled with cartridges for SD..1204.. milling inserts. These cutters are ideal for face milling applications. Available with medium pitch.

The **8000VSE45** cutter series has an **unequal** medium pitch for reducing vibration and are mainly for roughing, semi-finishing and finishing of Steel, Steel Alloys, Stainless Steel, Cast Iron and Aluminium.

The **8010VSE45** cutters series has an **equal** medium pitch and is especially recommended for roughing, semi-finishing and finishing of High Temperature Alloys such as Iron Based Alloys, Cobalt Based Alloys, Nickel Based Alloys and Titanium.

Also, the 8000VSE45 cutter series can be mounted with a particular wiper cartridge for finishing when a fine finished surface is required. The corresponding pocket on the body for the finishing cartridge is marked with a "F".

Note: The 8010 series are not possible to assemble with a wiper cartridge.

80_0VSE-45- _R-12

8000VSE45- _R-12:

Maximum $a_p = 7,00\text{mm}$
Effective Cutting Diameter
Range = 100mm to 400mm

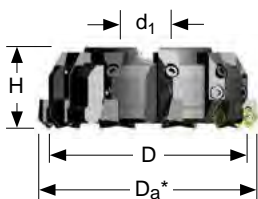
** Denotes non stock items diameter
315mm - 400mm

8010VSE45- _R-12:

Maximum $a_p = 7,00\text{mm}$
Effective Cutting Diameter
Range = = 100mm to 200mm

** Denotes non stock items diameter
100mm - 200mm





Cutter Body & Cartridges

Product		Dimensions (mm)						Spares				
EDP	Item Description	D Effective Cutting Diameter	Da*	H	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm
8000VSE45- R-12 Bodies with Unequal Medium Pitch & Cartridges												
021859	8000VSE45-100R-12	100	115	68	32	7	6	015270		015241		3,10
021862	8000VSE45-125R-12	125	140	63	40	7	8					
021865	8000VSE45-160R-12	160	175	63	40	7	10					
021868	8000VSE45-200R-12	200	215	63	60	7	12					
021871	8000VSE45-250R-12	250	265	63	60	7	16					
021874	8000VSE45-315R-12**	315	330	80	60	7	20					
021877	8000VSE45-400R-12**	400	415	80	60	7	24					
8010VSE45- R-12 Bodies with Equal Medium Pitch & Cartridges												
021945	8010VSE45-100R-12**	100	115	68	32	7	6	015270		015241		3,10
021948	8010VSE45-125R-12**	125	140	63	40	7	8					
021951	8010VSE45-160R-12**	160	175	63	40	7	10					
021954	8010VSE45-200R-12**	200	215	63	60	7	12					

* Denotes non stock items.

Da* = Outside Diameter



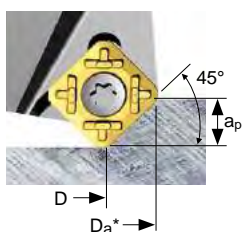
80_VSE45_R12

Product		Spares									
EDP	Item Description	EDP		EDP		Screw Tightening Nm	Cartridge Screw EDP		Adjustment Screw EDP		
Cartridge & Spares											
014948	80VSE45R-12	015270	F4011T	015241	T20	3,10	022646	7065	-	-	
Finishing Cartridge & Spares											
014953	81FS00R-12	015266	D5013T	015241	T20	6,00	022646	7065	016858	72.602	

Note: Mounting instructions refer to pages A161 - A164.



81FS00R-12

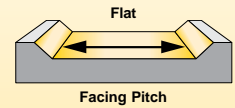


Depth of Cut (ap)

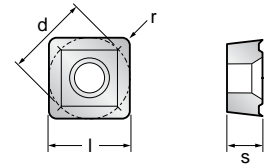


80.0VSE45- R-12 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	Max RPM
021859	8000VSE45-100R12	100	-	-	-	-	10800
021862	8000VSE45-125R12	125	-	-	-	-	9200
021865	8000VSE45-160R12	160	-	-	-	-	7800
021868	8000VSE45-200R12	200	-	-	-	-	6800
021871	8000VSE45-250R12	250	-	-	-	-	5900
021874	8000VSE45-315R12**	315	-	-	-	-	5200
021877	8000VSE45-400R12**	400	-	-	-	-	4500
021945	8010VSE45-100R12**	100	-	-	-	-	10800
021948	8010VSE45-125R12**	125	-	-	-	-	9200
021951	8010VSE45-160R12**	160	-	-	-	-	7800
021954	8010VSE45-200R12**	200	-	-	-	-	6800



** Denotes non stock items.



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			ap max. 7,00	ap min. - max. 1,00 - 3,00	ap min. - max. 0,20 - 1,00					
Insert selection with facet										
034522	SDEX1204AEFN-701	SP4019	-	-	◆◆◆◆◆	12,70	12,70	4,76	Facet	0,02
015149	SDEX1204AEFN-701	GH1	◆	◆	◆	12,70	12,70	4,76	Facet	0,02
017243	SDCT1204AEFN	GH1	■	■	■	12,70	12,70	4,76	Facet	0,02
015187	SDHT1204AEEN-421	X500	-	-	●●●	12,70	12,70	4,76	Facet	0,04
031477	SDHT1204AEEN-421	SP6519	-	-	●●●●●	12,70	12,70	4,76	Facet	0,04
017321	SDHT1204AEEN-421	MP91M	-	-	●◆	12,70	12,70	4,76	Facet	0,04
029457	SDKT1204AEEN-45	X500	-	●●●	-	12,70	12,70	4,76	Facet	0,05
031532	SDKT1204AEEN-45	SP6519	-	●●	-	12,70	12,70	4,76	Facet	0,05
029456	SDKT1204AEEN-45	MP91M	-	●	-	12,70	12,70	4,76	Facet	0,05
017729	SDHT1204AETN-42	X500	◆◆◆	◆◆◆	-	12,70	12,70	4,76	Facet	0,15
031478	SDHT1204AETN-42	SP6519	●●◆◆◆	●●◆◆◆	-	12,70	12,70	4,76	Facet	0,15
017322	SDHT1204AETN-42	MP91M	●	●◆◆	●●	12,70	12,70	4,76	Facet	0,15
034517	SDCW1204AETN	X400	◆◆	-	◆	12,70	12,70	4,76	Facet	0,15
034516	SDCW1204AETN	SP4019	●●◆	-	■	12,70	12,70	4,76	Facet	0,10
031404	SDCW1204AETN	SA9808	-	-	◆◆	12,70	12,70	4,76	Facet	0,17
017730	SDHW1204AETN	X500	●●	-	-	12,70	12,70	4,76	Facet	0,15
017324	SDHW1204AETN	MP91M	●◆	-	-	12,70	12,70	4,76	Facet	0,15

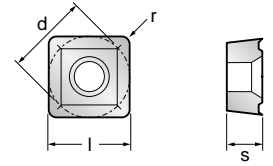


Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 9.

INSERT APPLICATION NOTES:

SDHW1204AETN X500 should be used for machining Stainless Steel and High Temperature Alloys with heavy scale and generally when the conditions are unstable.

Note: Feed recommendations can be found on page A146. Speed recommendations can be found on page A147.



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			ap max. 7,00	ap min. - max. 1,00 - 3,00	ap min. - max. 0,20 - 1,00					
Insert selection with corner radius										
030717	SDHT120412EN-422	X500	■◆◆	■◆◆	-	12,70	12,70	4,76	1,20	0,05
030728	SDHT120412EN-422	SP6519	◆■◆	◆■◆	-	12,70	12,70	4,76	1,20	0,05
031218	SDHT120412EN-423	X500	■◆◆	■◆◆	-	12,70	12,70	4,76	1,20	0,06
031321	SDHT120412EN-423	SP6519	◆■◆	◆■◆	-	12,70	12,70	4,76	1,20	0,06
014411	SDMT120412EN-41	X500	●●●	●●●■◆	-	12,70	12,70	4,76	1,20	0,05
031480	SDMT120412EN-41	SP6519	■◆●	■◆●	-	12,70	12,70	4,76	1,20	0,05
017326	SDMT120412EN-41	MP91M	●■◆	●■◆	-	12,70	12,70	4,76	1,20	0,05
015233	SDMW120412TN	X500	●●	-	-	12,70	12,70	4,76	1,20	0,15
034518	SDMW120412TN	SP6519	◆■◆	-	-	12,70	12,70	4,76	1,20	0,15

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			ap max. -	ap min. - max. -	ap min. - max. 0,20 - 1,00					
Wiper Inserts										
017237	SPHX12M512EN	GH1	-	-	■◆◆◆	12,55	12,55	5,00	Wiper Facet	0,02
031455	SPHX12M512N	SA9608	-	-	◆◆◆◆	12,55	12,55	5,00	Wiper Facet	0,02

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: Mounting instruction for wiper inserts refer to page A161.

INSERT APPLICATION NOTES:

SDMW120412TN X500 should be used for machining Stainless Steel and High Temperature Alloys with heavy scale and generally when the conditions are unstable.

SDHT120412EN-423 X500 and SP6519 are recommended for Stainless Steel and High Temperature Alloys when machining conditions are unstable.

Radius inserts are only for semi-roughing applications where a finished surface is not required.

Note: Feed recommendations can be found on page A146. Speed recommendations can be found on page A147.



80.0VSE45_R12 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si I92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
Insert selection with facet																	
FN-701	SP4019	Facing	-	-	0,05 - 0,25	0,05 - 0,20	-	-	-	0,04 - 0,25	0,04 - 0,25	0,04 - 0,15	0,04 - 0,15	0,04 - 0,15	0,04 - 0,18	-	-
FN-701	GH1	Facing	-	-	-	-	-	-	-	0,04 - 0,30	0,04 - 0,30	-	-	-	-	-	-
FN	GH1	Facing	-	-	-	-	-	-	-	0,04 - 0,30	0,04 - 0,30	-	-	-	-	-	-
EN-421	X500	Facing	-	-	0,05 - 0,22	0,05 - 0,20	-	-	-	-	-	0,05 - 0,20	0,05 - 0,20	0,05 - 0,20	0,05 - 0,22	-	-
EN-421	SP6519	Facing	0,05 - 0,30	0,05 - 0,25	0,05 - 0,22	0,05 - 0,20	0,05 - 0,28	0,05 - 0,28	0,05 - 0,28	-	-	0,05 - 0,20	0,05 - 0,20	0,05 - 0,20	0,05 - 0,22	-	-
EN-421	MP91M	Facing	0,05 - 0,30	0,05 - 0,25	-	-	0,05 - 0,28	0,05 - 0,28	0,05 - 0,28	-	-	-	-	-	-	-	-
EN-45	X500	Facing	-	-	0,07 - 0,25	0,07 - 0,22	-	-	-	-	-	0,07 - 0,18	0,07 - 0,18	0,07 - 0,18	0,07 - 0,20	-	-
EN-45	SP6519	Facing	0,07 - 0,35	0,07 - 0,30	-	-	-	-	-	-	-	-	-	-	-	-	-
EN-45	MP91M	Facing	-	-	-	-	0,07 - 0,30	0,07 - 0,30	0,07 - 0,30	-	-	-	-	-	-	-	-
TN-42	X500	Facing	-	-	0,15 - 0,27	0,15 - 0,25	-	-	-	-	-	0,15 - 0,20	0,15 - 0,20	0,15 - 0,20	0,15 - 0,23	-	-
TN-42	SP6519	Facing	0,15 - 0,35	0,15 - 0,30	0,15 - 0,27	0,15 - 0,25	0,15 - 0,30	0,15 - 0,30	0,15 - 0,30	-	-	0,15 - 0,20	0,15 - 0,20	0,15 - 0,20	0,15 - 0,23	-	-
TN-42	MP91M	Facing	0,15 - 0,35	0,15 - 0,30	-	-	0,18 - 0,30	0,18 - 0,30	0,18 - 0,30	-	-	-	-	-	-	0,08 - 0,12	0,08 - 0,12
TN	X400	Facing	0,15 - 0,38	0,15 - 0,33	-	-	-	-	-	-	-	-	-	-	-	0,08 - 0,12	0,08 - 0,12
TN	SP4019	Facing	-	-	0,15 - 0,30	0,15 - 0,27	0,15 - 0,30	0,15 - 0,30	0,15 - 0,30	-	-	-	-	-	-	0,08 - 0,12	0,08 - 0,12
TN	SA9808	Facing	0,17 - 0,25	0,17 - 0,23	-	-	-	-	-	-	-	-	-	-	-	-	-
TN	X500	Facing	-	-	-	0,15 - 0,27	-	-	-	-	-	0,15 - 0,18	0,15 - 0,18	0,15 - 0,18	0,15 - 0,20	-	-
TN	MP91M	Facing	0,15 - 0,38	0,15 - 0,33	-	-	0,15 - 0,30	0,15 - 0,30	0,15 - 0,30	-	-	-	-	-	-	-	-
Insert selection with corner radius																	
EN-422	X500	Facing	-	-	0,05 - 0,25	0,05 - 0,22	-	-	-	-	-	0,05 - 0,18	0,05 - 0,18	0,05 - 0,18	0,05 - 0,20	-	-
EN-422	SP6519	Facing	-	-	0,05 - 0,25	0,05 - 0,22	-	-	-	-	-	0,05 - 0,18	0,05 - 0,18	0,05 - 0,18	0,05 - 0,20	-	-
EN-423	X500	Facing	-	-	0,05 - 0,25	0,05 - 0,22	-	-	-	-	-	0,05 - 0,18	0,05 - 0,18	0,05 - 0,18	0,05 - 0,20	-	-
EN-423	SP6519	Facing	-	-	0,05 - 0,25	0,05 - 0,22	-	-	-	-	-	0,05 - 0,18	0,05 - 0,18	0,05 - 0,18	0,05 - 0,20	-	-
EN-41	X500	Facing	0,05 - 0,35	0,05 - 0,30	0,05 - 0,25	0,05 - 0,22	0,05 - 0,30	0,05 - 0,30	0,05 - 0,30	-	-	0,05 - 0,18	0,05 - 0,18	0,05 - 0,18	0,05 - 0,20	-	-
EN-41	SP6519	Facing	0,05 - 0,35	0,05 - 0,30	-	-	0,05 - 0,30	0,05 - 0,30	0,05 - 0,30	-	-	-	-	-	-	-	-
EN-41	MP91M	Facing	0,05 - 0,35	0,05 - 0,30	-	-	0,05 - 0,30	0,05 - 0,30	0,05 - 0,30	-	-	-	-	-	-	-	-
TN	X500	Facing	-	-	-	0,15 - 0,27	-	-	-	-	-	0,15 - 0,18	0,15 - 0,18	0,15 - 0,18	0,15 - 0,20	-	-
TN	SP6519	Facing	0,15 - 0,38	0,15 - 0,33	-	-	0,15 - 0,30	0,15 - 0,30	0,15 - 0,30	-	-	-	-	-	-	-	-
Wiper Inserts Feed /revolution f_n (mm / rev.)																	
SPHX	GH1	Facing	1,00 - 4,00	1,00 - 3,00	0,80 - 2,50	0,80 - 2,00	1,00 - 2,50	0,80 - 2,20	0,80 - 2,00	-	-	-	-	-	-	-	-
SPHX	SA9608	Facing	1,00 - 4,00	1,00 - 3,00	0,80 - 2,50	0,80 - 2,00	1,00 - 2,50	0,80 - 2,20	0,80 - 2,00	-	-	0,50 - 1,50	0,50 - 1,50	0,5 - 1,50	0,50 - 1,80	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A147.



Speed v_c (m/min.)			Wear Resistance																				
80_0VSE45- R-12 Series			- ← → +																				
Coolant Recommendation Recommended ● Possible ○			Speed min. - max.																				
ISO	Materials	Rm and Hardness	PVD X Grade		CVD X Grade		PVD Standard		PVD Standard		CVD Standard		Uncoated Micrograin		Uncoated Cermet		Uncoated Cermet						
			●	○	●	○	●	○	●	○	●	○	●	○	●	○	●	○					
			X400	X500	SP6519	SP4019	MP91M	GH1*	SA9808	SA9608													
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	○	120 - 260	●	○	130 - 270	●	○	130 - 295	●	○	140 - 345	●	○	240 - 345	●	○	240 - 345	●	○	265 - 380
		<950 N/mm ² <280 HBN	●	○	105 - 230	●	○	115 - 240	●	○	115 - 260	●	○	120 - 305	●	○	215 - 305	●	○	215 - 305	●	○	235 - 335
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○	●	95 - 200	○	●	100 - 210	○	●	100 - 230	○	●	105 - 270	○	●	190 - 270	○	●	190 - 270	○	●	205 - 295
		950-1200 N/mm ² 280-355 HBN	○	●	70 - 150	○	●	75 - 160	○	●	75 - 175	○	●	80 - 205	○	●	140 - 205	○	●	140 - 205	○	●	155 - 225
		1200-1400 N/mm ² 355-415 HBN	○	●	45 - 95	○	●	50 - 100	○	●	50 - 110	○	●	50 - 130	○	●	90 - 130	○	●	90 - 130	○	●	100 - 145
M	Stainless Steel	Austenitic + Ferritic 300 series	○	●		○	●	115 - 250	○	●	115 - 270	○	●	120 - 280	○	●	215 - 305	○	●		○	●	235 - 335
		Martensitic 400 series	○	●		○	●	100 - 220	○	●	105 - 235	○	●	110 - 250	○	●	195 - 275	○	●		○	●	215 - 305
	PH Stainless	Refractory P.H.				○	●	50 - 110	○	●	50 - 120	○	●	50 - 130	○	●	90 - 180	○	●		○	●	100 - 200
K	Cast Iron	Grey GG-Ft				○	●	120 - 280	○	●	140 - 295	○	●	145 - 330	○	●	145 - 365	○	●	135 - 290			280 - 400
		Spheroidal-Ductile GGG-FGS				○	●	105 - 205	○	●	110 - 240	○	●	115 - 255	○	●	115 - 285	○	●	120 - 245			220 - 315
		Malleable GTS - MN/MP				○	●	95 - 170	○	●	100 - 220	○	●	105 - 235	○	●	105 - 260	○	●	115 - 200			200 - 285
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN									400-2895					400-3050							
		Aluminium + Silicon > 16% Si 92 HBN									295-2320					295-2440							
S	High Temperature Alloys	Iron Based						23 - 48			23 - 55			24 - 63								50 - 75	
		Cobalt Based				○	●	21 - 44			22 - 48			23 - 52								48 - 70	
		Nickel Based				○	●	24 - 51			25 - 55			26 - 59								52 - 75	
		Titanium Based						35 - 73			36 - 79			37 - 84								60 - 95	
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	○	●	45 - 95						50 - 100			50 - 105									
		Chilled Cast Iron >1400 N/mm ² > 400 HBN	○	●	35 - 80						40 - 90			40 - 95									

* Note: SDXE1204AEFN-701 and SDCT1204AEFN GH1 can only be used for Aluminium.
 * Note: SPHX12M512EN GH1 can be used for Steel, Steel Alloys, Stainless Steel, and Cast Iron.



80.0VSE45 Technical Information

Feed rate compensation: For 45° cutting, divide the h_m value by the sine of the approach angle (the sine of 45° = 0,707)

i.e.: $\frac{h_m}{0,707}$ or $\frac{0,08}{0,707} = 0,113\text{mm}$ programmed feed rate



Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness

a_e = Radial engagement

f_z = Feed per tooth

d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$



CARTRIDGE ROUND INSERT MILLING ASSEMBLIES

The **80.0VR00-_R-16** cutter series with 6,35mm thick round button inserts is suitable to machine very efficiently irregular surfaces and rough scale. This cutter can also be used for heavy duty applications up to 8mm depth of cut.

Applications:

80.0VR00-_R-16 cutters are assembled with cartridges for RP.1606.. milling inserts for face milling applications. Available with medium pitch.

The cutter series **8000VR00-_R-16** has an unequal medium pitch for reducing vibration and is for roughing of Steel, Steel Alloys, Stainless Steel and Cast Iron.

The cutter series **8010VR00** has an equal medium pitch and is especially recommended for roughing of High Temperature Alloys such as, Iron Based Alloys, Cobalt Based Alloys, Nickel Based Alloys and Titanium.

Also, the 8000VR00-_R-16 series can be mounted with a particular wiper cartridge for finishing, when a fine finished surface is required. The corresponding pocket at the body for the finishing cartridge is marked with an "F".

Note: The 8010 series are not possible to assemble with wiper cartridge.



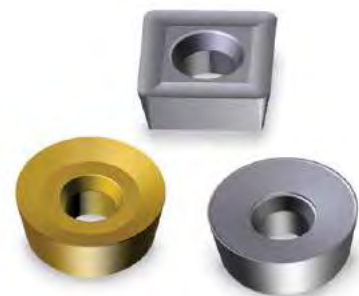
80.0VR00-_R-16

8000VR00-_R-16:
Maximum $a_p = 8,00\text{mm}$
Diameter Range $D_{a^*} = 116\text{mm}$ to 416mm

**Denotes non stock items
Diameter 331mm - 416mm

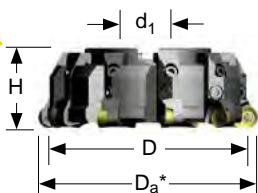
8010VR00-_R-16:
Maximum $a_p = 8,00\text{mm}$
Diameter Range $D_{a^*} = 116\text{mm}$ to 216mm

**Denotes non stock items
Diameter 116mm - 216mm





Cartridge Face Mills



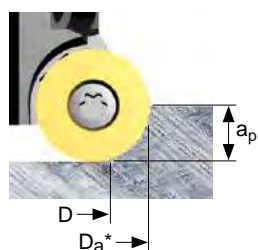
Cutter Body & Cartridges



80VRP00R-16



81FS00R-12



Depth of Cut (ap)

Product		Dimensions (mm)						Spares					
EDP	Item Description	D Effective Cutting Diameter	Da*	H	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm	
8000VR00- R-16 Bodies with Unequal Medium Pitch & Cartridges													
021844	8000VR00-100R-16	100	116	68	32	8	6	015266		D5013T	015241	T20	6,00
021845	8000VR00-125R-16	125	141	63	40	8	8						
021846	8000VR00-160R-16	160	176	63	40	8	10						
021847	8000VR00-200R-16	200	216	63	60	8	12						
021848	8000VR00-250R-16	250	266	63	60	8	16						
021849	8000VR00-315R-16**	315	331	80	60	8	20						
021850	8000VR00-400R-16**	400	416	80	60	8	24						
8010VR00- R-16 Bodies with Equal Medium Pitch & Cartridges													
021940	8010VR00-100R-16**	100	116	68	32	8	6	015266		D5013T	015241	T20	6,00
021941	8010VR00-125R-16**	125	141	63	40	8	8						
021942	8010VR00-160R-16**	160	176	63	40	8	10						
021943	8010VR00-200R-16**	200	216	63	60	8	12						

** Denotes non stock items.

Da* = Outside Diameter

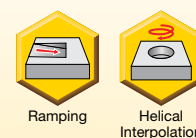
Product		Spares								
EDP	Item Description	EDP		EDP		Screw Tightening Nm	Cartridge Screw EDP		Adjustment Screw EDP	
Cartridge & Spares										
014316	80VRP00R-16	015266	D5013T	015241	T20	6,00	022646	7065	-	-
Finishing Cartridge & Spares										
014953	81FS00R-12	015266	D5013T	015241	T20	6,00	022646	7065	016858	72.602

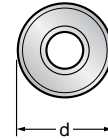
Note: Mounting instructions refer to pages A161 - A164.

80.0VR00- R-16 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	Max RPM
021844	8000VR00-100R-16	100	0.32	202	230	4,00	10800
021845	8000VR00-125R-16	125	0.26	252	280	4,00	9200
021846	8000VR00-160R-16	160	0.21	322	350	4,00	7800
021847	8000VR00-200R-16	200	0.17	402	430	4,00	6800
021848	8000VR00-250R-16	250	0.14	502	530	4,00	5900
021849	8000VR00-315R-16**	315	-	-	-	-	5200
021850	8000VR00-400R-16**	400	-	-	-	-	4500
021940	8010VR00-100R-16**	100	0.32	202	230	4,00	10800
021941	8010VR00-125R-16**	125	0.26	252	280	4,00	9200
021942	8010VR00-160R-16**	160	0.21	322	350	4,00	7800
021943	8010VR00-200R-16**	200	0.17	402	430	4,00	6800

** Denotes non stock items.





Cartridge Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			ap max. 8,00	ap min. - max. 1,00 - 3,00	ap min. - max. 0,20 - 1,00					
015223	RPMT1606M0E-41	X500	●●	●●●	-	16,00	-	6,35	8,00	0,05
017311	RPMT1606M0E-41	MP91M	●	■	-	16,00	-	6,35	8,00	0,05
030390	RPHT1606M0S	X400	◆◆	◆◆◆	-	16,00	-	6,35	8,00	0,15
017692	RPHT1606M0T	X500	●●◆	●●◆◆	-	16,00	-	6,35	8,00	0,10
034566	RPHT1606M0T	SP6519	■◆◆	■◆◆◆	-	16,00	-	6,35	8,00	0,10

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

RPHT1606M0S and RPHT1606M0T should be used for heavy duty applications.

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			ap max. -	ap min. - max. -	ap min. - max. 0,20 - 1,00					

Wiper Inserts

017237	SPHX12M512EN	GH1	-	-	■◆◆◆	12,55	12,55	5,00	Wiper	0,02
031455	SPHX12M512EN	SA9608	-	-	◆◆◆◆	12,55	12,55	5,00	Wiper	0,02

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Note: Mounting instruction for wiper inserts refer to page A164.

80.0VR00- R-16 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
E-41	X500	Facing	-	-	0,04 - 0,27	0,04 - 0,16	-	-	-	-	-	0,04 - 0,13	0,04 - 0,13	0,04 - 0,13	0,04 - 0,16	-	-
E-41	MP91M	Facing	-	-	-	-	0,10 - 0,35	0,10 - 0,35	0,10 - 0,30	-	-	-	-	-	-	-	-
S	X400	Facing	0,15 - 0,50	0,15 - 0,45	-	-	-	-	-	-	-	-	-	-	-	0,10 - 0,15	0,10 - 0,15
T	X500	Facing	0,15 - 0,45	0,10 - 0,40	0,10 - 0,40	0,10 - 0,35	0,10 - 0,40	0,10 - 0,40	0,10 - 0,35	-	-	0,10 - 0,28	0,10 - 0,28	0,10 - 0,28	0,10 - 0,30	-	-
T	SP6519	Facing	0,15 - 0,45	0,10 - 0,40	0,10 - 0,40	0,10 - 0,35	0,10 - 0,40	0,10 - 0,40	0,10 - 0,35	-	-	0,10 - 0,28	0,10 - 0,28	0,10 - 0,28	0,10 - 0,30	-	-

Wiper Inserts Feed /revolution f_n (mm / rev.)

SPHX	GH1	Facing	1,00 - 4,00	1,00 - 3,00	0,80 - 2,50	0,80 - 2,00	1,00 - 2,50	0,80 - 2,20	0,80 - 2,00	-	-	-	-	-	-	-	-
SPHX	SA9608	Facing	1,00 - 4,00	1,00 - 3,00	0,80 - 2,50	0,80 - 2,00	1,00 - 2,50	0,80 - 2,20	0,80 - 2,00	-	-	0,50 - 1,50	0,50 - 1,50	0,50 - 1,50	0,50 - 1,80	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A152.



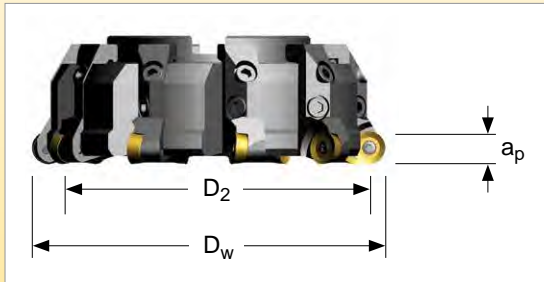
Cartridge Face Mills

Speed v_c (m/min)														
80.0VR00- R-16 Series			Wear Resistance											
			Speed min. - max.											
Coolant Recommendation			PVD X Grade		CVD X Grade		PVD Standard		CVD Standard		Uncoated Micrograin		Uncoated Cermet	
ISO	Materials	Rm and Hardness	Recommended ●	Possible ○	Recommended ●	Possible ○	Recommended ●	Possible ○	Recommended ●	Possible ○	Recommended ●	Possible ○	Recommended ●	Possible ○
			⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗
P	Unalloyed Steel	<600 N/mm ² <180 HBN	○	●	○	●	○	●			●	○	●	○
		<950 N/mm ² <280 HBN	○	●	○	●	○	●			●	○	●	○
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○	●	○	●	○	●			●	○	●	○
		950-1200 N/mm ² 280-355 HBN	○	●	○	●	○	●			●	○	●	○
		1200-1400 N/mm ² 355-415 HBN	○	●	○	●	○	●			●	○	●	○
M	Stainless Steel	Austenitic + Ferritic 300 series			○	●	○	●			○	●	○	●
		Martensitic 400 series			○	●	○	●			○	●	○	●
	PH Stainless	Refractory P.H.			○	●	○	●			○	●	○	●
K	Cast Iron	Grey GG-Ft												
		Spheroidal-Ductile GGG-FGS			○	●	○	●		●	○	●	○	●
		Malleable GTS - MN/MP												
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN												
		Aluminium + Silicon > 16% Si 92 HBN												
S	High Temperature Alloys	Iron Based												
		Cobalt Based			○	●	○	●						
		Nickel Based												
		Titanium Based												
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	○	●										
		Chilled Cast Iron >1400 N/mm ² > 400 HBN												

* Note: Wiper Insert SPHX12M512EN GH1 can be used for Steel, Steel Alloys, Stainless Steel and Cast Iron.



80.0VR00- R-16 Technical Information



Working Diameter:

Formula to evaluate the correct working diameter based on axial depth of cut (a_p).

$$D_w = D_2 + 2 \times \sqrt{r^2 - (r - a_p)^2}$$

where: D_w = Working Diameter
 D_2 = Diameter of cutter insert centre to centre
 r = Insert radius
 a_p = Axial Depth of Cut

80.0VR00- R-16 Technical Information

Formula to find programmed feed rate based on radial engagement and axial depth of cut.

$$f_z = \frac{h_m}{\frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}}$$

where:
 f_z = Feed per tooth
 h_m = Average chip thickness
 r = Insert radius
 a_e = Radial Depth of Cut
 a_p = Axial Depth of Cut

Formula to calculate the average chip thickness h_m in relation with radial engagement and depth of cut.

$$h_m = f_z \times \frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}$$



Simplified formulas to evaluate h_m and f_z based on axial depth of cut or radial engagement.

Calculation of the average chip thickness in relation with the D.O.C. (Axial)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_p}}$$

h_m = Average chip thickness
 a_p = Depth of cut
 f_z = Feed per tooth
 d = Insert diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_p}{d}}$$

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
 a_e = Radial engagement
 f_z = Feed per tooth
 d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

With round inserts, the thickness of the chip varies depending on the axial depth of cut (a_p) and is related to the size of the cutting edge-preparation. For best tool life it is important to maintain the proper chip thickness as shown below. This chart calculates in relation with axial depth of cut (a_p) only and not radial cut (a_e).

RP..1606.. Insert

Insert	Insert size (mm)	a_p d.o.c. (mm)	h_m (mm)		f_z (mm/z)	
			min.	max.	min.	max.
RPMT1606MOE-41	16	2,00	0,05	0,20	0,14	0,56
	16	3,00	0,05	0,20	0,12	0,46
	16	4,00	0,05	0,20	0,11	0,40
	16	5,00	0,05	0,20	0,09	0,36
	16	6,00	0,05	0,20	0,08	0,33
	16	8,00	0,05	0,20	0,07	0,28
RPHT1606MOS	16	4,00	0,15	0,28	0,30	0,56
	16	5,00	0,15	0,28	0,27	0,50
	16	6,00	0,15	0,28	0,24	0,46
	16	8,00	0,15	0,28	0,21	0,40
RPHT1606MOT	16	2,00	0,10	0,25	0,28	0,71
	16	3,00	0,10	0,25	0,23	0,58
	16	4,00	0,10	0,25	0,20	0,50
	16	5,00	0,10	0,25	0,18	0,45
	16	6,00	0,10	0,25	0,16	0,41
	16	8,00	0,10	0,25	0,14	0,35



CARTRIDGE ROUND INSERT MILLING ASSEMBLIES

The **80.0VR00-_R-20** cutter series with 6,35mm thick round button inserts is one of our strongest cutters.

These cutters machine very efficiently irregular surfaces and rough scale. They can also be used in heavy duty applications up to 10mm depth of cut.

This cutter series has an anti-rotation design which ensures a precise number of indexes per insert. This gives a maximum possible usage of the available edges for roughing applications.

This unique patented pocket system prevents the inserts from rotating in the pocket, during heavy feed machining and unstable conditions.

Applications:

The **80.0VR00-_R-20** cutters are assembled with cartridges for RD..2006.. milling inserts for face milling applications. Available with medium pitch.

The cutters series **8000VR00-_R-20** has an unequal medium pitch for reducing vibration and are for roughing of Steel, Steel Alloys, Stainless Steel and Cast Iron.

The cutter series **8010VR00-_R-20** has an equal medium pitch and is especially recommended for roughing, of High Temperature Alloys such as Iron Based Alloys, Cobalt Based Alloys, Nickel Based Alloys and Titanium.

NOTE: The **80.0VR00-_R-20** series when mounted with cartridge **80VR00-_R-20** using RD..2006.. round button inserts cannot utilise the wiper cartridge for finishing, when a fine finished surface is required.



80.0VR00-_R-20

8000VR00-_R-20:

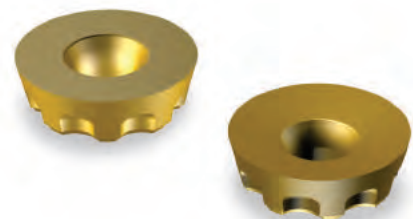
Maximum $a_p = 10,00\text{mm}$
Diameter Range $D_a^* =$
116mm to 416mm

**Denotes non stock items diameter
331mm - 416mm

8010VR00-_R-20:

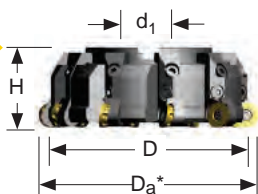
Maximum $a_p = 10,00\text{mm}$
Diameter Range $D_a^* =$
116mm to 216mm

**Denotes non stock items diameter
116mm - 216mm





Cartridge Face Mills



Cutter Body & Cartridges



80VRD00R-20

Product		Dimensions (mm)						Spares					
EDP	Item Description	D Effective Cutting Diameter	Da*	H	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm	
8000VR00- R-20 Bodies with Unequal Medium Pitch & Cartridges													
033139	8000VR00-100R-20	96	116	68	32	10,00	6	029640		D6014T	015241	T20	10,50
033140	8000VR00-125R-20	121	141	63	40	10,00	8						
033141	8000VR00-160R-20	156	176	63	40	10,00	10						
033142	8000VR00-200R-20	196	216	63	60	10,00	12						
033143	8000VR00-250R-20	246	266	63	60	10,00	16						
033144	8000VR00-315R-20**	311	331	80	60	10,00	20						
033145	8000VR00-400R-20**	396	416	80	60	10,00	24						
8010VR00- R-20 Bodies with Equal Medium Pitch & Cartridges													
033146	8010VR00-100R-20**	96	116	68	32	10,00	6	029640		D6014T	015241	T20	10,50
033147	8010VR00-125R-20**	121	141	63	40	10,00	8						
033148	8010VR00-160R-20**	156	176	63	40	10,00	10						
033149	8010VR00-200R-20**	196	216	63	60	10,00	12						

** Denotes non stock items.

Da* = Outside Diameter

Product		Spares								
EDP	Item Description	EDP		EDP		Screw Tightening Nm	Cartridge Screw EDP		Adjustment Screw EDP	-
Cartridge & Spares										
030969	80VRD00R-20	029640	D6014T	015241	T20	10,50	022646	7065	-	-

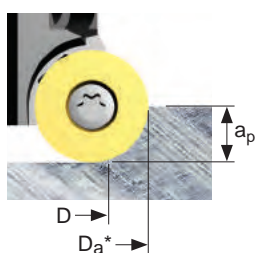
Note: Mounting instructions refer to pages A161 - A164.

Note: RD..2006.. Round button cutter assemblies cannot utilise the finishing wiper cartridges.

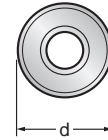
80.0VR00- R-20 Technical Information (mm)

Product		Dimensions						
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	Max RPM	
033139	8000VR00-100R-20	96	3.30	194	230	5,00	10800	
033140	8000VR00-125R-20	121	2.35	244	280	5,00	9200	
033141	8000VR00-160R-20	156	1.80	314	350	5,00	7800	
033142	8000VR00-200R-20	196	1.40	396	430	5,00	6800	
033143	8000VR00-250R-20	246	1.10	494	530	5,00	5900	
033144	8000VR00-315R-20**	311	1.00	624	660	5,00	5200	
033145	8000VR00-400R-20**	396	0.75	794	830	5,00	4500	
033146	8010VR00-100R-20**	96	3.30	194	230	5,00	10800	
033147	8010VR00-125R-20**	121	2.35	244	280	5,00	9200	
033148	8010VR00-160R-20**	156	1.80	314	350	5,00	7800	
033149	8010VR00-200R-20**	196	1.40	396	430	5,00	6800	

** Denotes non stock items.



Depth of Cut (ap)



Cartridge Face Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			a _p max. 10,00	a _p min. - max. 1,00 - 3,00	a _p min. - max. 0,20 - 1,00					
029310	RDHT2006M0E-42-X8	X500	■ ◆	◆ ◆	-	20,00	-	6,35	10,00	0,08
031533	RDHT2006M0E-42-X8	SP6519	◆ ◆	◆ ◆	-	20,00	-	6,35	10,00	0,08
029309	RDHW2006M0E-X8	X500	-	● ● ● ● ◆	-	20,00	-	6,35	10,00	0,10
031661	RDHW2006M0S-X8	X500	● ● ◆	■ ■ ■	-	20,00	-	6,35	10,00	0,15
031662	RDHW2006M0S-X8	SP6519	■ ■ ■	◆ ◆ ◆	-	20,00	-	6,35	10,00	0,15
031660	RDHW2006M0S-25-X8	X500	● ● ●	-	-	20,00	-	6,35	10,00	0,25
031576	RDHW2006M0S-25-X8	SP6519	◆ ◆ ◆	-	-	20,00	-	6,35	10,00	0,25

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

INSERT APPLICATION NOTES:

- RDHW2006M0E-X8 X500 should be your first choice for medium roughing application when machining Titanium without heavy scale.
- RDHW2006M0S-X8 SP6519 should be used when machining Stainless Steel with heavy scale.
- RDHW2006M0S-X8 X500 should be used when machining High Temperature Alloys with heavy scale.
- RDHT2006M0E-42-X8 should be used when the machine tool has low power available and when the conditions are stable.
- RDHW2006M0S-25-X8 should be used for heavy duty applications.

80.0VR00- R-20 Feeds f _z (mm/tooth)																	
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
E-42-X8	X500	Facing	-	-	0,15 - 0,35	0,15 - 0,30	-	-	-	-	-	0,12 - 0,25	0,12 - 0,25	0,12 - 0,25	0,12 - 0,30	-	-
E-42-X8	SP6519	Facing	-	-	0,15 - 0,35	0,15 - 0,28	-	-	-	-	-	0,12 - 0,25	0,12 - 0,25	0,12 - 0,25	0,12 - 0,30	-	-
E-X8	X500	Facing	0,20 - 0,30	0,18 - 0,28	0,20 - 0,40	0,20 - 0,30	0,20 - 0,35	0,20 - 0,35	0,20 - 0,30	-	-	0,20 - 0,28	0,20 - 0,28	0,20 - 0,28	0,20 - 0,32	-	-
S-X8	X500	Facing	0,25 - 0,45	0,25 - 0,35	0,25 - 0,45	0,25 - 0,32	0,25 - 0,45	0,25 - 0,45	0,25 - 0,40	-	-	0,25 - 0,32	0,25 - 0,32	0,25 - 0,32	0,25 - 0,35	-	-
S-X8	SP6519	Facing	0,25 - 0,45	0,25 - 0,35	-	-	0,25 - 0,45	0,25 - 0,45	0,25 - 0,40	-	-	-	-	-	-	-	-
S-25-X8	X500	Facing	0,35 - 0,60	0,35 - 0,50	-	-	0,35 - 0,60	0,35 - 0,55	0,35 - 0,45	-	-	-	-	-	-	-	-
S-25-X8	SP6519	Facing	0,35 - 0,55	0,35 - 0,45	-	-	0,35 - 0,55	0,35 - 0,50	0,35 - 0,40	-	-	-	-	-	-	-	-

Speed recommendations can be found on page A158.

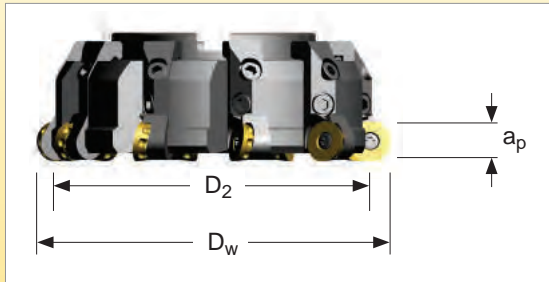


Cartridge Face Mills

Speed v_c (m/min)						
80_VR00_R20 Series				Wear Resistance		
				-	↔	+
Coolant Recommendation				Speed min. - max.		
Recommended ● Possible ○				CVD X Grade		PVD Standard
ISO	Materials	Rm and Hardness		X500		SP6519
P	Unalloyed Steel	<600 N/mm ² <180 HBN	○ ●	130 - 270	○ ●	130 - 295
		<950 N/mm ² <280 HBN	○ ●	115 - 240	○ ●	115 - 260
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○ ●	100 - 210	○ ●	100 - 230
		950-1200 N/mm ² 280-355 HBN	○ ●	75 - 160	○ ●	75 - 175
		1200-1400 N/mm ² 355-415 HBN	○ ●	50 - 100	○ ●	50 - 110
M	Stainless Steel	Austenitic + Ferritic 300 series	○ ●	115 - 250	○ ●	115 - 270
		Martensitic 400 series	○ ●	100 - 220	○ ●	105 - 235
	PH Stainless	Refractory P.H.	○ ●	50 - 110	○ ●	50 - 120
K	Cast Iron	Grey GG-FI	○ ●	120 - 280	○ ●	140 - 295
		Spheroidal-Ductile GGG-FGS	○ ●	105 - 205	○ ●	110 - 240
		Malleable GTS - MN/MP	○ ●	95 - 170	○ ●	100 - 220
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN	○ ●		○ ●	
		Aluminium + Silicon > 16% Si 92 HBN	○ ●		○ ●	
S	High Temperature Alloys	Iron Based	○ ●	23 - 48	○ ●	23 - 55
		Cobalt Based	○ ●	21 - 44	○ ●	22 - 48
		Nickel Based	○ ●	24 - 51	○ ●	25 - 55
		Titanium Based	○ ●	35 - 73	○ ●	36 - 79
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	○ ●		○ ●	
		Chilled Cast Iron >1400 N/mm ² > 400 HBN	○ ●		○ ●	



80.0VR00-_R-20 Technical Information



Working Diameter:

Formula to evaluate the correct working diameter based on axial depth of cut (a_p).

$$D_w = D_2 + 2 \times \sqrt{r^2 - (r - a_p)^2}$$

where: D_w = Working Diameter
 D_2 = Diameter of cutter insert centre to centre
 r = Insert radius
 a_p = Axial Depth of Cut

80.0VR00-_R-20 Technical Information

where:
 f_z = Feed per tooth a_e = Radial Depth of Cut
 h_m = Average chip thickness a_p = Axial Depth of Cut
 r = Insert radius

Formula to find programmed feed rate based on radial engagement and axial depth of cut.

$$f_z = \frac{h_m}{\frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}}$$

Formula to calculate the average chip thickness h_m in relation with radial engagement and depth of cut.

$$h_m = f_z \times \frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}$$



Simplified formulas to evaluate h_m and f_z based on axial depth of cut or radial engagement.

Calculation of the average chip thickness in relation with the D.O.C. (Axial)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_p}}$$

h_m = Average chip thickness
 a_p = Depth of cut
 f_z = Feed per tooth
 d = Insert diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_p}{d}}$$

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
 a_e = Radial engagement
 f_z = Feed per tooth
 d = Cutter diameter

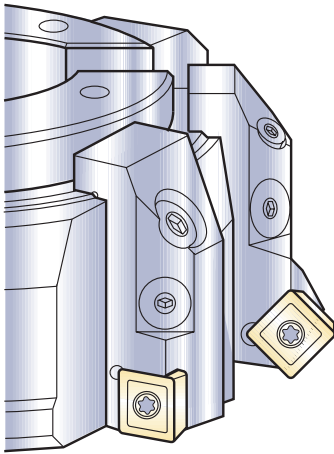
Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

With round inserts, the thickness of the chip varies depending on the axial depth of cut (a_p) and is related to the size of the cutting edge-preparation. For best tool life it is important to maintain the proper chip thickness as shown below. This chart calculates in relation with axial depth of cut (a_p) only and not radial cut (a_e).

RD..2006.. Inserts

Insert	Insert size (mm)	a_p d.o.c. (mm)	h_m (mm)		f_z (mm/Z)	
			min.	max.	min.	max.
RDHT2006M0E-42-X8	20	1,00	0,08	0,18	0,36	0,80
	20	2,00	0,08	0,18	0,25	0,57
	20	3,00	0,08	0,18	0,21	0,46
	20	4,00	0,08	0,18	0,18	0,40
	20	5,00	0,08	0,18	0,16	0,36
	20	6,00	0,08	0,18	0,15	0,33
	20	8,00	0,08	0,18	0,13	0,28
	20	10,00	0,08	0,18	0,11	0,25
RDHW2006M0E-X8	20	1,00	0,10	0,20	0,45	0,89
	20	2,00	0,10	0,20	0,32	0,63
	20	3,00	0,10	0,20	0,26	0,52
	20	4,00	0,10	0,20	0,22	0,45
	20	5,00	0,10	0,20	0,20	0,40
	20	6,00	0,10	0,20	0,18	0,37
	20	8,00	0,10	0,20	0,16	0,32
	20	10,00	0,10	0,20	0,14	0,28
RDHW2006M0S-X8	20	3,00	0,15	0,25	0,39	0,65
	20	4,00	0,15	0,25	0,34	0,56
	20	5,00	0,15	0,25	0,30	0,50
	20	6,00	0,15	0,25	0,27	0,46
	20	8,00	0,15	0,25	0,24	0,40
RDHW2006M0S-25-X8	20	4,00	0,25	0,30	0,56	0,67
	20	5,00	0,25	0,30	0,50	0,60
	20	6,00	0,25	0,30	0,46	0,55
	20	8,00	0,25	0,30	0,40	0,47



Surface Finishing with 81FS00 Cartridges

The cartridge 81 FS 00 R-12 is intended to perform finishing operations when used in conjunction with other cartridges as shown in the diagram opposite. They have a fine adjusting set screw to enable the cartridge to be pulled back and pushed forward again to the initial preset position.

Stock removal for finishing should be no more than 1 mm and preferably 0,5 mm. The finishing insert actually removing a maximum 0,03 mm due to it trailing the main cutting inserts.

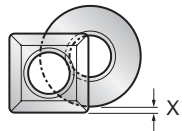
On the cutter series 8000V one, two or even three (according to diameter) of the roughing cartridges may be replaced by an 81 FS 00 R-12 finishing cartridge. One corresponding pocket for a wiper cartridge is marked with an "F".

These cartridges, having a fine adjusting set screw, are set according to the dimension (axial shift) "X".

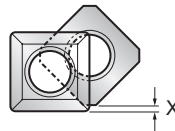
$X = 0,03 - 0,05 \text{ mm}$

(X = 0,02 mm with a pressed insert with a nose radius)

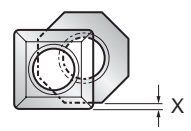
Maximum feed up to 3 mm/rev.



8000VR00 (R-16 only)



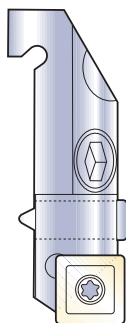
8000VS / VSE45



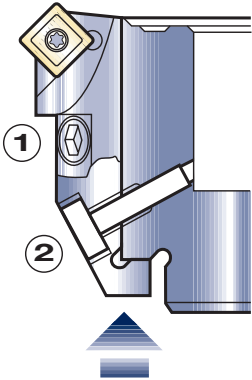
8000VOD45

Note: 8000V Series assemblies that cannot use wiper cartridges are 90 degree A-Style, 20mm Round Button and 12mm and 16mm High Feed Mills.

Also, all 8010V cutter series are not possible to assemble with a wiper insert cartridge.



Product	Spares				
	Finishing Insert Part Number	Finishing Cartridge	Cartridge Fixing Screw	Adjusting Cartridge Screw	Fixing Insert Screw
SPHX 12 M5 12-EN	81 FS 00 R-12	7065	72.602	D5013T	T20

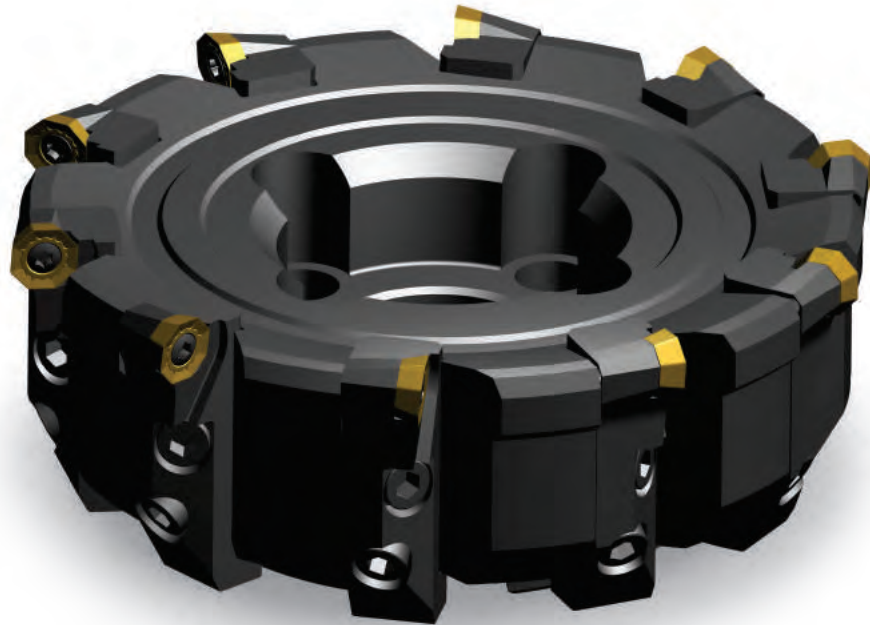


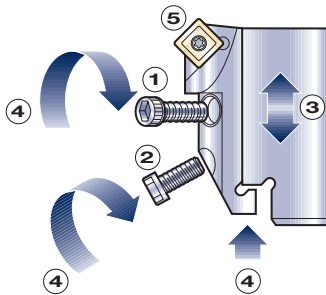
General Cartridge Mounting Instructions

For the majority of current applications, 8000V and 8010V cutters with interchangeable cartridges do not have to be adjusted. The cartridges therefore are mounted by pressing the calibrated heel up against the setting track on the tool body (runout 0,05 mm max., with inserts with ground wiper edges). However, if greater accuracy is required, they may be adjusted individually with a runout of 2- μ m.

A Mounting of Cartridges without Adjustment

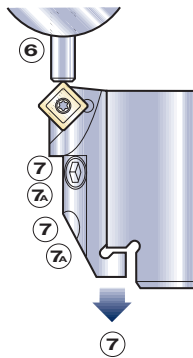
1. Lubricate the screw under the head and on the thread (preferably with copper paste).
2. Clean cartridges and their pockets located in the milling cutter.
3. Introduce the first cartridge into its pocket and check if it moves freely.
4. Introduce screw No. 1 and tighten it moderately whilst pushing the cartridge against its axial setting track; mount all the cartridges in the same way.
5. Introduce screw No. 2 and lock it (tightening torque 10 Nm).
6. Lock screw No. 1 well with an extended allen key (tightening torque 18 Nm).
7. Mount the indexable inserts.





B Mounting of Cartridges with Adjustment

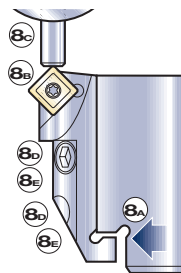
1. Lubricate the screws under the head and on the thread (preferably with copper paste).
2. Clean the cartridges and their pockets located in the milling cutter.
3. Introduce the first cartridge into its pocket and check it moves freely.
4. Introduce screws No. 1 and No. 2 while pushing the cartridge against its axial setting track, tighten screw No. 1.
5. Mount an insert with ground periphery which will serve as a gauge.
6. Gauge the height of the first mounted cartridge, then set the pre-setter to zero. Set the pre-setter so that the measuring system indicates +0,02 mm.
7. Slightly loosen both screws; reverse the cartridge to just below zero in relation to pre-set +0,02mm and again moderately tighten screw No. 1. Using screw No. 2 advance the cartridge to zero. Then loosen screw No. 2.



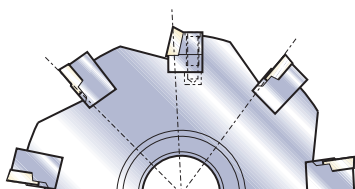
Instructions for Tightening

After height zero has been reached:

- A Lock screw No. 1 securely with the extended allen key (tightening torque 14 Nm). When doing this it is possible that the cartridge may reverse a little.
 - B Re-tighten screw No. 2 to jack cartridge back to zero position.
8. To adjust the other cartridges, proceed as follows:
 - A Mount the cartridge using screw No. 1 which must be moderately tightened.
 - B Mark, as a reference face with a red felt-tipped pen, the insert from the preceding cartridge and introduce it so as to use the same wiper edge.
 - C Rotate the cutter (8A) with the mounted insert (8B) in the position of the lens (8C) on the pre-setter to measure the height.
 - D Introduce screw No. 2 which will help push the cartridge up to position zero on the dial. Loosen the screw.
 - E From this point onwards, follow the tightening instructions described above
 - F Then tighten all screws Nr.2 moderately.
 9. Once the mounting of the cartridges is complete, mount the indexable inserts.



NOTE: By proceeding in this way with the mounting of cartridges, the insert seats should all be at a precise height ($\pm 0,002$); only variations in the insert dimensions will then influence the axial runout of the milling cutter.



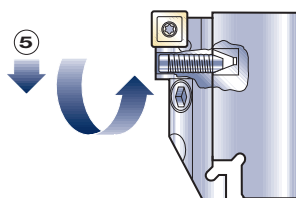
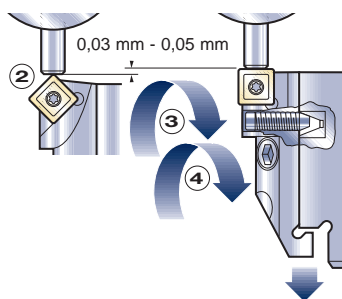
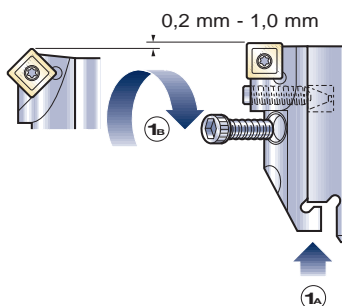
C Mounting & Setting of the Finishing Cartridges

The 8000V series of milling cutters have no additional and independent pockets, but according to their diameter one, two or even three roughing cartridges can be replaced by one finishing cartridge - 81 FS 00 R-12. One corresponding pocket is marked with an "F".

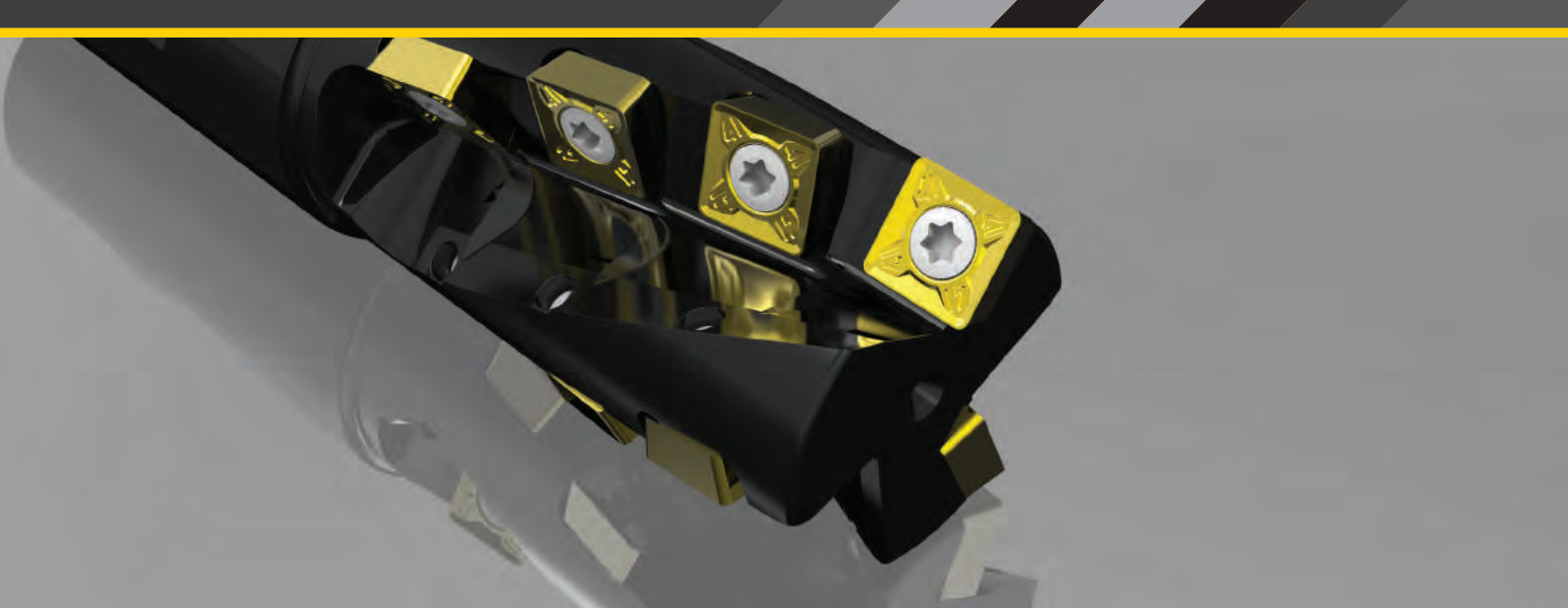
NOTE: When using two or even three finishing cartridges, their equal spacing on the milling cutter circumference must be ensured and the axial runout between the edges of the wiper inserts must be as small as possible.

MOUNTING & SETTING INSTRUCTIONS

1. **A** After the 81 FS 00 R-12 cartridge and its pocket in the cutter body have been cleaned, place the cartridge into its pocket and locate the heel against the setting track.
- B** Introduce the cartridge fixing screw and lightly tighten. The finishing inserts will protrude from the cutting plane of the roughing cartridges 0,2 to 1mm depending upon the roughing inserts being used.
2. Check each insert on the roughing cartridges, whose mounting is described in **A** and **B** so that the highest insert can be marked and used to set the pre-setter to zero.
3. **A** Rotate the cutter until the plunger / lens is placed above the centre of the finishing insert cutting edge.
- B** Screw in the set screw, which will move the 81 FS 00 R-12 finishing cartridge off the setting track until the measuring system indicates +0,03 to 0,05 mm from the zero already set. If the roughing cartridges are equipped with SCMT utility inserts (with as pressed periphery), the offset should only be +0,02mm.
- C** Loosen the cartridge fixing screw and move the cartridge up and down to verify the dimension already set. If necessary, correct the preset dimension by adjusting the set screw.
4. Lightly tighten the cartridge fixing screw.
5. The 81 FS 00 R-12 finishing cartridges are able to be pulled back or pushed forward as necessary to allow for roughing or finishing work as they will always return to the dimension as preset in 3 B and C. So, simply unscrew the fixing screw, push the finishing cartridge either forward or backwards, then lock the screw again.



Note: Not suitable for use on 8010 V cutter bodies.



LONG EDGE MILLING CUTTER

The teeth on **5210 VS** cutters are set with a pronounced left hand helix angle. The chosen angle allows, in most cases, at least two teeth to be engaged in the material continuously allowing a progressive attack on the material by each cutting stroke, thereby reducing insert fracture.

A cutter with a left hand helix has the added advantage of absorbing any looseness in the spindle thus reducing vibration. Cutting starts with the top of each tooth which decreases torsion and initial bending of the tool body.

The negative helix allows a large area for chip formation and chip flow. The indexable inserts used on these tools are particularly thick for high shock resistance and also protection of the tool body.

The 5210VS09/12 series is specifically designed for roughing applications on Steel and Cast Iron.



5210VS

5210VS09:

Maximum a_p = 50mm
Diameter Range = 32mm only

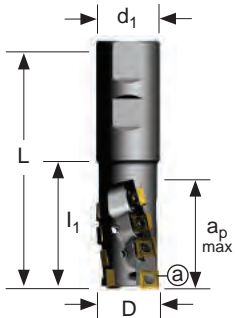
5210VS12:

Maximum a_p = 68mm for Diameter 80mm
77mm for Diameter 100mm
Diameter Range = 80mm to 100mm



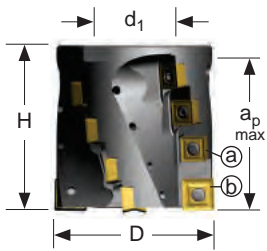


Shoulder Mills



Weldon Shank

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
5210VS09 Weldon Shank												
015235	5210VS09WA032R50	32	119	57	32	50	3	015262	F4010T	015240	T15	3,10
5210VS12 Shell Mill Fixation												
021656	5210VS12-080R68	80	82	-	32	68	4	015266	D5013T	015241	T20	6,00
021657	5210VS12-100R77	100	92	-	40	77	6	015266	D5013T	015241	T20	6,00



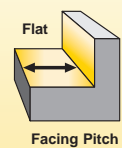
Shell Mill Fixation

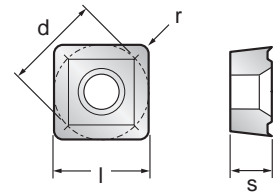
5210VS Assembly Information			
Product		Necessary inserts to assemble the cutter	
EDP	Item Description	No. of inserts Pos. a	No. of inserts Pos. b
5210VS09 Weldon Shank			
015235	5210VS09WA032R50	11 x SC 09 only	-
5210VS12 Shell Mill Fixation			
021656	5210VS12-080R68	14 x SO..12M6	2 x SO..15M6
021657	5210VS12-100R77	27 x SO..12M6	2 x SO..15M6

For the 5210VS12 Both inserts (a) and (b) are required to complete each cutter.

5210VS Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.	a _p max Helical / Linear	Max RPM	
015235	5210VS09WA032R50	32,00	-	-	-	35500	
021656	5210VS12-080R68	80,00	-	-	-	20500	
021657	5210VS12-100R77	100,00	-	-	-	18000	





Product			Application & Material			Dimensions (mm)					
EDP	Item Description	Grade	Insert Letter a. or b. for 12mm Inserts	Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼	d (IC)	l	s	r	h _m min
				Depth of Cut (mm)							
				ap max.*	ap min. - max.	ap min. - max.					
SCMT09T308											
015147	SCMT09T308EN-41	X500	-	●●	-	-	9,52	9,52	3,97	0,80	0,04
031474	SCMT09T308EN-41	SP6519	-	●●	-	-	9,52	9,52	3,97	0,80	0,04
017315	SCMT09T308EN-41	MP91M	-	●●	-	-	9,52	9,52	3,97	0,80	0,04
SCMT09T308T											
034550	SCMT09T308T	X400	-	◆◆◆	-	-	9,52	9,52	3,97	0,80	0,15
031568	SCMT09T308T	SP6519	-	◆◆◆	-	-	9,52	9,52	3,97	0,80	0,15
034551	SCMT09T308T	SP4019	-	◆◆◆	-	-	9,52	9,52	3,97	0,80	0,15
SOMET12M612											
015190	SOMET12M612SN-B	X500	a.	●◆●	-	-	12,70	12,70	6,00	1,20	0,15
031506	SOMET12M612SN-B	SP6519	a.	◆◆◆	-	-	12,70	12,70	6,00	1,20	0,15
017329	SOMET12M612SN-B	MP91M	a.	◆◆◆	-	-	12,70	12,70	6,00	1,20	0,15
SOMET15M612											
015192	SOMET15M612SN-B	X500	b.	●◆●	-	-	15,88	15,88	6,00	1,20	0,15
031557	SOMET15M612SN-B	SP6519	b.	◆◆◆	-	-	15,88	15,88	6,00	1,20	0,15
017330	SOMET15M612SN-B	MP91M	b.	◆◆◆	-	-	15,88	15,88	6,00	1,20	0,15

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Determined by selection of cutter

INSERT APPLICATION NOTES:
If the insert SCMT09T308EN-41 Grade SP6519 chips prematurely then use alternative Grade X500

Note: Feed recommendations can be found on page A168. Speed recommendations can be found on page A169.



Shoulder Mills

5210VS Feeds f_z (mm/rev)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
SCMT09																	
EN-41	X500	Profiling	0,10 - 0,30	0,10 - 0,28	-	-	-	-	-	-	-	-	-	-	-	-	-
EN-41	SP6519	Profiling	0,10 - 0,30	0,10 - 0,28	-	-	-	-	-	-	-	-	-	-	-	-	-
EN-41	MP91M	Profiling	-	-	-	-	0,12 - 0,33	0,12 - 0,33	0,12 - 0,33	-	-	-	-	-	-	0,08 - 0,13	0,08 - 0,15
T	X400	Profiling	0,20 - 0,40	0,20 - 0,35	-	-	-	-	-	-	-	-	-	-	-	0,10 - 0,15	-
T	SP6519	Profiling	0,20 - 0,38	0,20 - 0,33	-	-	0,20 - 0,40	0,20 - 0,35	0,20 - 0,30	-	-	-	-	-	-	-	-
T	SP4019	Profiling	-	-	-	-	0,20 - 0,40	0,20 - 0,35	0,20 - 0,30	-	-	-	-	-	-	0,10 - 0,15	0,10 - 0,15
SOMT12																	
SN-B	X500	Profiling	0,50 - 0,90	0,40 - 0,70	-	-	0,50 - 0,90	0,50 - 0,90	0,40 - 0,70	-	-	-	-	-	-	-	-
SN-B	SP6519	Profiling	0,50 - 0,90	0,40 - 0,70	-	-	0,50 - 0,90	0,50 - 0,90	0,40 - 0,70	-	-	-	-	-	-	-	-
SN-B	MP91M	Profiling	0,50 - 0,90	0,40 - 0,90	-	-	0,50 - 0,90	0,50 - 0,90	0,40 - 0,70	-	-	-	-	-	-	0,30 - 0,40	0,30 - 0,40
SOMT15																	
SN-B	X500	Profiling	0,50 - 0,90	0,40 - 0,70	-	-	0,50 - 0,90	0,50 - 0,90	0,40 - 0,70	-	-	-	-	-	-	-	-
SN-B	SP6519	Profiling	0,50 - 0,90	0,40 - 0,70	-	-	0,50 - 0,90	0,50 - 0,90	0,40 - 0,70	-	-	-	-	-	-	-	-
SN-B	MP91M	Profiling	0,50 - 0,90	0,40 - 0,70	-	-	0,50 - 0,90	0,50 - 0,90	0,40 - 0,70	-	-	-	-	-	-	0,30 - 0,40	0,30 - 0,40

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A169.



Speed v_c (m/min)													
5210VS Series			Wear Resistance										
			- ← → +										
Coolant Recommendation			Speed min. - max.										
Recommended ● Possible ◉			PVD X Grade		CVD X Grade		PVD Standard		PVD Standard		CVD Standard		
ISO	Materials	Rm and Hardness	☹	☹	☹	☹	☹	☹	☹	☹	☹		
			X400	X500	SP6519	SP4019	MP91M						
P	Unalloyed Steel	<600 N/mm ² <180 HBN	◉ ●	120 - 260	◉ ●	130 - 270	◉ ●	130 - 295			●	140 - 345	
		<950 N/mm ² <280 HBN	◉ ●	105 - 230	◉ ●	115 - 240	◉ ●	115 - 260			●	120 - 305	
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	◉ ●	95 - 200	◉ ●	100 - 210	◉ ●	100 - 230			●	105 - 270	
		950-1200 N/mm ² 280-355 HBN	◉ ●	70 - 150	◉ ●	75 - 160	◉ ●	75 - 175			●	80 - 205	
		1200-1400 N/mm ² 355-415 HBN	●	45 - 95	●	50 - 100	●	50 - 110			●	50 - 130	
M	Stainless Steel	Austenitic + Ferritic 300 series											
		Martensitic 400 series											
	PH Stainless	Refractory P.H.											
K	Cast Iron	Grey GG-Ft											
		Spheroidal-Ductile GGG-FGS	◉ ●		120 - 280	◉ ●		140 - 295	●		145 - 330		145 - 365
		Malleable GTS - MN/MP			105 - 205	◉ ●		110 - 240	●		115 - 255	●	115 - 285
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN											
		Aluminium + Silicon > 16% Si 92 HBN											
S	High Temperature Alloys	Iron Based											
		Cobalt Based											
		Nickel Based											
		Titanium Based											
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	●	45 - 95						●	50 - 100	●	50 - 105
		Chilled Cast Iron >1400 N/mm ² > 400 HBN		35 - 80							●	40 - 90	●

Shoulder Mills



Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
 a_e = Radial engagement
 f_z = Feed per tooth
 d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

Multiplication factor for the feed rate based on the percentage of radial engagement of the cutter diameter

Cutter Ø 32mm			Cutter Ø 80mm			Cutter Ø 100mm		
a_e %	a_e mm	Coefficient Factor	a_e %	a_e mm	Coefficient Factor	a_e %	a_e mm	Coefficient Factor
5	1,60	2,30	5	4,00	2,30	5	5,00	2,30
10	3,20	1,66	10	8,00	1,66	10	10,00	1,66
15	4,80	1,40	15	12,00	1,40	15	15,00	1,40
20	6,40	1,25	20	16,00	1,25	20	20,00	1,25
25	8,00	1,16	25	20,00	1,16	25	25,00	1,16
35	11,20	1,05	35	28,00	1,05	35	35,00	1,05
50 - 100	16,00 - 32,00	1,00	50 - 100	40,00 - 80,00	1,00	50 - 100	50,00 - 100,00	1,00

Example: 80mm diameter cutter using a 8,0mm radial engagement (a_e) = 10% of the cutter diameter.
 At 10%, your coefficient is 1,66 (see chart); therefore you must multiply your feed rate by 1,66 for correcting the feed for profiling.



HIGH PERFORMANCE LONG EDGE MILLING CUTTERS

The Stellram 5230VS09 and VS12 Cutter Series is perfectly qualified for profiling and full slotting.

Designed for high material removal rates in Titanium and High Temperature Alloys. Several applications have shown metal removal rates of up to two times greater than the previous operating cutting parameters.

The advanced Chevron design ensures that one cutting point is always in contact with the material during entrance and exit. This provides optimum harmonic stability - resulting in maximum tool life and a 30% improvement in surface finish. A generous flute capacity coupled with each individual cutting edge having its own jet of coolant, provides for excellent chip evacuation. This works to further enhance surface finish and increases metal removal rates to a higher level of productivity.

The advanced 5230VS series is ideal for rough machining of Steel, Alloyed Steel, Stainless Steel and particular for Titanium and High Temperature Alloys.

Features and Benefits

- Insert positioning provides smooth progressive penetration and cutting action for extended tool life.
- Individual coolant jets to each insert provides constant chip evacuation and temperature stability in the cutting zone.
- The advanced Chevron design improves stability and lowers power consumption, increasing tool life up to 2 times greater than comparable cutter in today's market.
- Proven versatility in a wide application area in Titanium and High Temperature Alloys increasing productivity.

5230VS

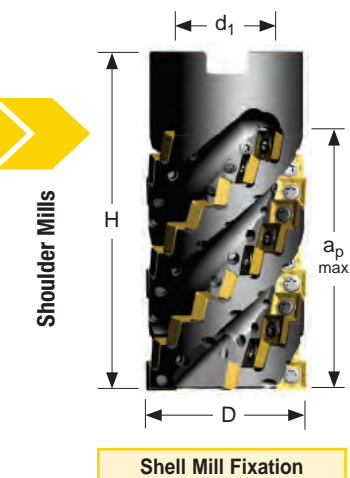
5230VS09:

(a_p max is determined by selection of Cutter Diameter)
Diameter Range and Maximum a_p =
50mm Dia. with a_p 51mm or 80mm

5230VS12:

(a_p max is determined by selection of Cutter Diameter)
Diameter Range and Maximum a_p =
63mm Dia. with a_p 57mm or 94mm
80mm Dia. with a_p 65mm or 110mm
100mm Dia. with a_p 76mm or 133mm





Product		Dimensions (mm)								Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	ap max	ap max Slotting*	No. of flutes	No. of inserts	EDP		EDP		Screw Tightening Nm
5230VS09 Shell Mill Fixation														
031419	5230VS09-A050Z4R51	50	76	-	27	51	44	4	28	015269	F3508T	015240	T15	2,10
031603	5230VS09-A050Z4R80	50	106	-	27	80	-	4	44	015269	F3508T	015240	T15	2,10

* Note: Please do not surpass the recommended max. ap for slotting.

Shell Mills are supplied with inserts screws, coolant control screws, steel coolant plug, nord-lock washer and mounting screw.

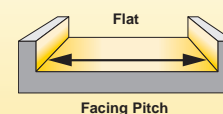
5230VS09 Spare Parts								
Cutter	Coolant Control Screw			Screwdriver EDP	Steel Coolant Plug		Coolant Plug tightening Nm	
	Screw EDP	Screw	Qty.		EDP	Description		
5230VS09-A050Z4R51	015062	F3006T	8	013214	T9	031436	SB-3413	34
5230VS09-A050Z4R80			12			031582	SB-3621	

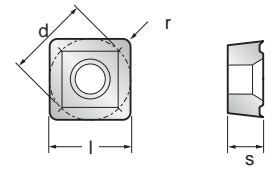
5230VS09 Torque Values and Spare Parts						
Cutter	Nord Lock Washer		Mounting Bolt		**Torque Values in Nm	
	EDP	Description	EDP	Description	Normal Condition	Excessive Condition
5230VS09-A050Z4R51	031258	NLW-0.375	031268	M12-1.75 ISO x 30mm SHCS	80	100
5230VS09-A050Z4R80						

** Torque values for mounting bolts. Excessive condition is when long reach extensions are required or when cutting parameters are elevated to extreme parameters.

5230VS09 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	Max RPM
031419	5230VS09-A050Z4R51	50	-	-	-	-	32500
031603	5230VS09-A050Z4R80	50	-	-	-	-	32500





Shoulder Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing ▽	Semi-Finishing ▽▽	Finishing ▽▽▽	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max* or a _e max.*	a _p max. and a _e max. 15% D**	a _p min. - max.					
031261	SDHT09T308EN-422	X500	◆	●●●	-	9,52	9,52	3,97	0,80	0,03
033075	SDHT09T308EN-422	SP6519	◆	◆◆	-	9,52	9,52	3,97	0,80	0,03
031260	SDHT09T308EN-423	X500	◆	-	-	9,52	9,52	3,97	0,80	0,04
033074	SDHT09T308EN-423	SP6519	◆	◆◆	-	9,52	9,52	3,97	0,80	0,04
014410	SDMT09T308EN-41	X500	●	■	-	9,52	9,52	3,97	0,80	0,04
031479	SDMT09T308EN-41	SP6519	■	■	-	9,52	9,52	3,97	0,80	0,04
017325	SDMT09T308EN-41	MP91M	■	●	-	9,52	9,52	3,97	0,80	0,04
015232	SDMW09T308TN	X500	●	-	-	9,52	9,52	3,97	0,80	0,15
031482	SDMW09T308TN	SP6519	◆	-	-	9,52	9,52	3,97	0,80	0,15
017327	SDMW09T308TN	MP91M	◆	-	-	9,52	9,52	3,97	0,80	0,15

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Note: Please do not surpass the recommended max. a_p for slotting as shown on the steel body page A172.

* Note: a_p max. for profiling is only possible when a_e < 75% of the Diameter.

** Note: For semi finishing, axial engagement a_p for slotting and radial engagement a_e for profiling should be max. 15% of the Diameter. SDHT09T308EN-423 to be used in unstable conditions.

Note: Feed recommendations can be found on page A174. Speed recommendations can be found on page A175.



Shoulder Mills

5230VS09 Feeds f_z (mm/flute)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminium & Alloys <16% Si T16 HBN	Aluminium & Silicon >16% Si P2 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
EN-422	X500	Shoulder/Profiling	-	-	0,05 - 0,13	0,05 - 0,12	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	0,05 - 0,11	-	-
		Slotting	-	-	0,04 - 0,11	0,04 - 0,10	-	-	-	-	-	0,05 - 0,07	0,05 - 0,07	0,05 - 0,08	0,05 - 0,09	-	-
EN-422	SP6519	Shoulder/Profiling	-	-	0,05 - 0,12	0,05 - 0,11	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	0,05 - 0,11	-	-
		Slotting	-	-	0,04 - 0,10	0,04 - 0,09	-	-	-	-	-	0,05 - 0,07	0,05 - 0,07	0,05 - 0,08	0,05 - 0,09	-	-
EN-423	X500	Shoulder/Profiling	-	-	-	0,05 - 0,12	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	0,05 - 0,11	-	-
		Slotting	-	-	-	0,05 - 0,10	-	-	-	-	-	0,05 - 0,07	0,05 - 0,07	0,05 - 0,08	0,05 - 0,09	-	-
EN-423	SP6519	Shoulder/Profiling	-	-	0,05 - 0,13	0,05 - 0,11	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	0,05 - 0,11	-	-
		Slotting	-	-	0,04 - 0,10	0,04 - 0,09	-	-	-	-	-	0,05 - 0,07	0,05 - 0,07	0,05 - 0,08	0,05 - 0,09	-	-
EN-41	X500	Shoulder/Profiling	0,05 - 0,15	0,05 - 0,14	0,05 - 0,13	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,13	-	-	-	-	-	-	-	-
		Slotting	0,05 - 0,12	0,05 - 0,11	0,05 - 0,11	-	0,05 - 0,12	0,05 - 0,12	0,05 - 0,11	-	-	-	-	-	-	-	-
EN-41	SP6519	Shoulder/Profiling	0,05 - 0,15	0,05 - 0,14	-	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,13	-	-	-	-	-	-	-	-
		Slotting	0,05 - 0,12	0,05 - 0,11	-	-	0,05 - 0,12	0,05 - 0,12	0,05 - 0,11	-	-	-	-	-	-	-	-
EN-41	MP91M	Shoulder/Profiling	0,05 - 0,13	0,05 - 0,13	-	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,13	-	-	-	-	-	-	-	-
		Slotting	0,05 - 0,11	0,05 - 0,10	-	-	0,05 - 0,12	0,05 - 0,12	0,05 - 0,11	-	-	-	-	-	-	-	-
TN	X500	Shoulder/Profiling	0,15 - 0,18	0,15 - 0,17	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TN	SP6519	Shoulder/Profiling	0,15 - 0,18	0,15 - 0,17	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TN	MP91M	Shoulder/Profiling	-	-	-	-	0,15 - 0,18	0,15 - 0,18	0,15 - 0,17	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Note: Above feed rates are calculated on centreline.

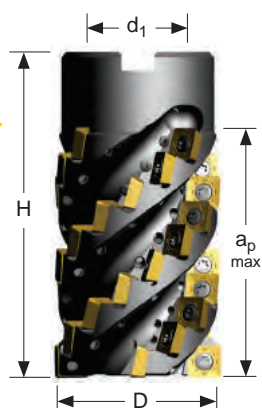
Speed recommendations can be found on page A175.



Speed v_c (m/min)										
5230VS Series			Wear Resistance							
			- ← → +							
Coolant Recommendation			Speed min. - max.							
Recommended ● Possible ○			CVD X Grade		PVD Standard		CVD Standard			
ISO	Materials	Rm and Hardness	Water	X500	Water	SP6519	Water	MP91M		
P	Unalloyed Steel	<600 N/mm ² <180 HBN	○	●	130 - 270	○	●	130 - 295	●	140 - 345
		<950 N/mm ² <280 HBN	○	●	115 - 240	○	●	115 - 260	●	120 - 305
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○	●	100 - 210	○	●	100 - 230	●	105 - 270
		950-1200 N/mm ² 280-355 HBN	○	●	75 - 160	○	●	75 - 175	●	80 - 205
		1200-1400 N/mm ² 355-415 HBN	○	●	50 - 100	○	●	50 - 110	●	50 - 130
M	Stainless Steel	Austenitic + Ferritic 300 series	○	●	115 - 250	○	●	115 - 270		
		Martensitic 400 series	○	●	100 - 220	○	●	105 - 235		
	PH Stainless	Refractory P.H.	○	●	50 - 110	○	●	50 - 120		
K	Cast Iron	Grey GG-FI	○	●	120 - 280	○	●	140 - 295	●	145 - 365
		Spheroidal-Ductile GGG-FGS	○	●	105 - 205	○	●	110 - 240	●	115 - 285
		Malleable GTS - MN/MP	○	●	95 - 170	○	●	100 - 220	●	105 - 260
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN								
		Aluminium + Silicon > 16% Si 92 HBN								
S	High Temperature Alloys	Iron Based	○	●	23 - 48	○	●	23 - 55		
		Cobalt Based	○	●	21 - 44	○	●	22 - 48		
		Nickel Based	○	●	24 - 51	○	●	25 - 55		
		Titanium Based	○	●	35 - 73	○	●	36 - 79		
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN								
		Chilled Cast Iron >1400 N/mm ² > 400 HBN								



Shoulder Mills



Shell Mill Fixation

Product		Dimensions (mm)								Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	a _p max	a _p max Slotting*	No. of flutes	No. of inserts	EDP		EDP		Screw Tightening Nm
5230VS12 Shell Mill Fixation														
031228	5230VS12-A063Z4R57	63	85	-	27	57	52	4	24	015270	F4011T	015241	T20	3,10
031229	5230VS12-A063Z4R94	63	124	-	27	94	-	4	40	015270	F4011T	015241	T20	3,10
031604	5230VS12-A080Z5R65	80	95	-	32	65	60	5	35	015270	F4011T	015241	T20	3,10
031605	5230VS12-A080Z5R110	80	143	-	32	110	-	5	60	015270	F4011T	015241	T20	3,10
031232	5230VS12-A100Z6R76	100	106	-	40	76	70	6	48	015270	F4011T	015241	T20	3,10
031233	5230VS12-A100Z6R133	100	165	-	40	133	-	6	84	015270	F4011T	015241	T20	3,10

* Note: Please do not surpass the recommended max. a_p for slotting.

Shell Mills are supplied with inserts screws, coolant control screws, steel coolant plug, nord-lock washer and mounting screw.

5230VS12 Spare Parts

Cutter	Coolant control screw			Screwdriver EDP		Steel Coolant Plug		Coolant Plug tightening Nm
	Screw EDP	Screw	Qty.			EDP	Description	
5230VS12-A063Z4R57	015062	F3006T	8	013214	T9	031262	SB-3229	34
5230VS12-A063Z4R94			12			031263	SB-3230	
5230VS12-A080Z5R65			10			031264	SB-3231	61
5230VS12-A080Z5R110			15			031265	SB-3232	
5230VS12-A100Z6R76			12			031266	SB-3233	
5230VS12-A100Z6R133			18			031267	SB-3234	61

5230VS12 Torque Values and Spare Parts

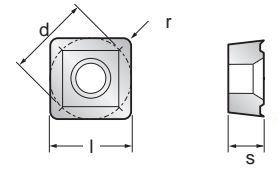
Cutter	Nord Lock Washer		Mounting Bolt		**Torque Values in Nm	
	EDP	Description	EDP	Description	Normal Condition	Excessive Condition
5230VS12-A063Z4R57	031258	NLW-0.375	031268	M12-1.75 ISO x 30mm SHCS	80	100
5230VS12-A063Z4R94						
5230VS12-A080Z5R65	031226	NLW-12SP	031269	M16-2 ISO x 40mm SHCS	110	150
5230VS12-A080Z5R110						
5230VS12-A100Z6R76	031259	NLW-16SP	031270	M20-2.5 ISO x 50mm SHCS	120	180
5230VS12-A100Z6R133						

** Torque values for mounting bolts. Excessive condition is when long reach extensions are required or when cutting parameters are elevated to extreme parameters.

5230VS12 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.	a _p max Helical / Linear	Max RPM	
031228	5230VS12-A063Z4R57	63	-	-	-	21000	
031229	5230VS12-A063Z4R94	63	-	-	-	21000	
031604	5230VS12-A080Z5R65	80	-	-	-	18500	
031605	5230VS12-A080Z5R110	80	-	-	-	18500	
031232	5230VS12-A100Z6R76	100	-	-	-	16000	
031233	5230VS12-A100Z6R133	100	-	-	-	16000	





Shoulder Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max* or a _e max.*	a _p max. and a _e max. 15% D**	a _p min. - max.					
030717	SDHT120412EN-422	X500	◆◆	●●●	-	12,70	12,70	4,76	1,20	0,05
030728	SDHT120412EN-422	SP6519	◆●	◆◆◆	-	12,70	12,70	4,76	1,20	0,05
031218	SDHT120412EN-423	X500	■	-	-	12,70	12,70	4,76	1,20	0,06
031321	SDHT120412EN-423	SP6519	■●	■	-	12,70	12,70	4,76	1,20	0,06
014411	SDMT120412EN-41	X500	●	■◆●	-	12,70	12,70	4,76	1,20	0,05
031480	SDMT120412EN-41	SP6519	■◆●	◆◆◆	-	12,70	12,70	4,76	1,20	0,05
017326	SDMT120412EN-41	MP91M	■	●◆◆	-	12,70	12,70	4,76	1,20	0,05
015233	SDMW120412TN	X500	●●	-	-	12,70	12,70	4,76	1,20	0,15
034518	SDMW120412TN	SP6519	◆◆	-	-	12,70	12,70	4,76	1,20	0,15
017328	SDMW120412TN	MP91M	◆	-	-	12,70	12,70	4,76	1,20	0,15

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Note: Please do not surpass the recommended max. a_p for slotting as shown on the steel body page A176.

* Note: a_p max. for profiling is only possible when a_e < 75% of the Diameter.

** Note: For semi finishing, axial engagement a_p for slotting and radial engagement a_e for profiling should be max. 15% of the Diameter. SDHT120412EN-423 to be used in unstable conditions.

Note: Feed recommendations can be found on page A178. Speed recommendations can be found on page A179.



Shoulder Mills

5230VS12 Feeds f_z (mm/flute)																	
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Grey Iron	Spheroidal Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
EN-422	X500	Shoulder/Profiling	-	-	0,05 - 0,15	0,05 - 0,14	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,11	0,05 - 0,14	-	-
		Slotting	-	-	0,05 - 0,12	0,05 - 0,11	-	-	-	-	-	0,05 - 0,09	0,05 - 0,09	0,05 - 0,09	0,05 - 0,11	-	-
EN-422	SP6519	Shoulder/Profiling	-	-	0,05 - 0,15	0,05 - 0,14	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,11	0,05 - 0,14	-	-
		Slotting	-	-	0,05 - 0,12	0,05 - 0,11	-	-	-	-	-	0,05 - 0,09	0,05 - 0,09	0,05 - 0,09	0,05 - 0,11	-	-
EN-423	X500	Shoulder/Profiling	-	-	-	0,05 - 0,14	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,11	0,05 - 0,14	-	-
		Slotting	-	-	-	0,05 - 0,11	-	-	-	-	-	0,05 - 0,09	0,05 - 0,09	0,05 - 0,09	0,05 - 0,11	-	-
EN-423	SP6519	Shoulder/Profiling	-	-	0,05 - 0,15	0,05 - 0,14	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,11	0,05 - 0,14	-	-
		Slotting	-	-	0,05 - 0,12	0,05 - 0,11	-	-	-	-	-	0,05 - 0,09	0,05 - 0,09	0,05 - 0,09	0,05 - 0,11	-	-
EN-41	X500	Shoulder/Profiling	0,05 - 0,17	0,05 - 0,16	0,05 - 0,15	-	0,05 - 0,17	0,05 - 0,17	0,05 - 0,16	-	-	-	-	-	-	-	-
		Slotting	0,05 - 0,14	0,05 - 0,13	0,05 - 0,12	-	0,05 - 0,14	0,05 - 0,14	0,05 - 0,13	-	-	-	-	-	-	-	-
EN-41	SP6519	Shoulder/Profiling	0,05 - 0,17	0,05 - 0,16	-	-	0,05 - 0,17	0,05 - 0,17	0,05 - 0,16	-	-	-	-	-	-	-	-
		Slotting	0,05 - 0,14	0,05 - 0,13	-	-	0,05 - 0,14	0,05 - 0,14	0,05 - 0,13	-	-	-	-	-	-	-	-
EN-41	MP91M	Shoulder/Profiling	0,05 - 0,17	0,05 - 0,16	-	-	0,05 - 0,17	0,05 - 0,17	0,05 - 0,16	-	-	-	-	-	-	-	-
		Slotting	0,05 - 0,14	0,05 - 0,13	-	-	0,05 - 0,14	0,05 - 0,14	0,05 - 0,13	-	-	-	-	-	-	-	-
TN	X500	Shoulder/Profiling	0,15 - 0,20	0,15 - 0,18	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TN	SP6519	Shoulder/Profiling	0,15 - 0,20	0,15 - 0,18	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TN	MP91M	Shoulder/Profiling	-	-	-	-	0,15 - 0,20	0,15 - 0,20	0,15 - 0,18	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Note: Above feed rates are calculated on centreline.
Speed recommendations can be found on page A179.



Shoulder Mills

Speed v_c (m/min)										
5230VS Series			Wear Resistance							
			- ← → +							
Coolant Recommendation			Speed min. - max.							
Recommended ● Possible ○			CVD X Grade		PVD Standard		CVD Standard			
ISO	Materials	Rm and Hardness	Water	Oil	Water	Oil	Water	Oil		
			X500	SP6519	MP91M					
P	Unalloyed Steel	<600 N/mm ² <180 HBN	○	●	130 - 270	○	●	130 - 295	●	140 - 345
		<950 N/mm ² <280 HBN	○	●	115 - 240	○	●	115 - 260	●	120 - 305
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○	●	100 - 210	○	●	100 - 230	●	105 - 270
		950-1200 N/mm ² 280-355 HBN	○	●	75 - 160	○	●	75 - 175	●	80 - 205
		1200-1400 N/mm ² 355-415 HBN	○	●	50 - 100	○	●	50 - 110	●	50 - 130
M	Stainless Steel	Austenitic + Ferritic 300 series	○	●	115 - 250	○	●	115 - 270		
		Martensitic 400 series	○	●	100 - 220	○	●	105 - 235		
	PH Stainless	Refractory P.H.	○	●	50 - 110	○	●	50 - 120		
K	Cast Iron	Grey GG-Ft	○	●	120 - 280	○	●	140 - 295	●	145 - 365
		Spheroidal-Ductile GGG-FGS	○	●	105 - 205	○	●	110 - 240	●	115 - 285
		Malleable GTS - MN/MP	○	●	95 - 170	○	●	100 - 220	●	105 - 260
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN								
		Aluminium + Silicon > 16% Si 92 HBN								
S	High Temperature Alloys	Iron Based	○	●	23 - 48	○	●	23 - 55		
		Cobalt Based	○	●	21 - 44	○	●	22 - 48		
		Nickel Based	○	●	24 - 51	○	●	25 - 55		
		Titanium Based	○	●	35 - 73	○	●	36 - 79		
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN								
		Chilled Cast Iron >1400 N/mm ² > 400 HBN								



Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness

a_e = Radial engagement

f_z = Feed per tooth

d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

h_m Correction Coefficient Chart

Cutter Ø 50mm			Cutter Ø 63mm			Cutter Ø 80mm			Cutter Ø 100mm		
a_e %	a_e (mm)	Coefficient Factor	a_e %	a_e (mm)	Coefficient Factor	a_e %	a_e (mm)	Coefficient Factor	a_e %	a_e (mm)	Coefficient Factor
5	2,50	2,30	5	3,15	2,30	5	4,00	2,30	5	5,00	2,30
10	5,00	1,66	10	6,30	1,66	10	8,00	1,66	10	10,00	1,66
15	7,5	1,40	15	9,45	1,40	15	12,00	1,40	15	15,00	1,40
20	10,00	1,25	20	12,60	1,25	20	16,00	1,25	20	20,00	1,25
25	12,50	1,16	25	15,75	1,16	25	20,00	1,16	25	25,00	1,16
35	17,50	1,05	35	22,05	1,05	35	28,00	1,05	35	35,00	1,05
50 - 100	25,00 - 50,00	1,00	50 - 100	31,50 - 63,00	1,00	50 - 100	40,00 - 80,00	1,00	50 - 100	50,00 - 100,00	1,00

Example: A 50mm diameter cutter using 5,00mm radial engagement (a_e) = 10% of the cutter diameter.

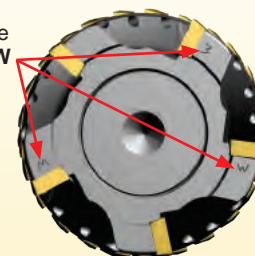
At 10%, your coefficient is 1,66 (see above table); therefore you must multiply your feed rate by 1,66 for correcting the feed for profiling.



The chart above shows the multiplication factor for the feed rate based on the percentage of the radial engagement of the cutter diameter.



Wiper pockets are identified with a **W** engraved on the face of the body.



The 5230VS cutter series is designed with wiper pockets which provide a much better face surface finish. The non-wiper pockets generate the 90° corner. The same inserts can be utilised in all pockets.



Pockets setting difference between wiper and non-wiper inserts.

Note: The true cutter diameter is measured at the non-wiper pockets.

0,15

0,13

0,6°



Non wiper pocket positions are set back & square to axis to give a true 90 degree approach.

Wiper pocket positions are in front and angled to allow facing.

Cutter Diameter (mm)	No. of Wiper Inserts
50	2
63	2
80	3
100	3



5230VS09 and VS12 Fitting Instructions for Shell Mill Cutters

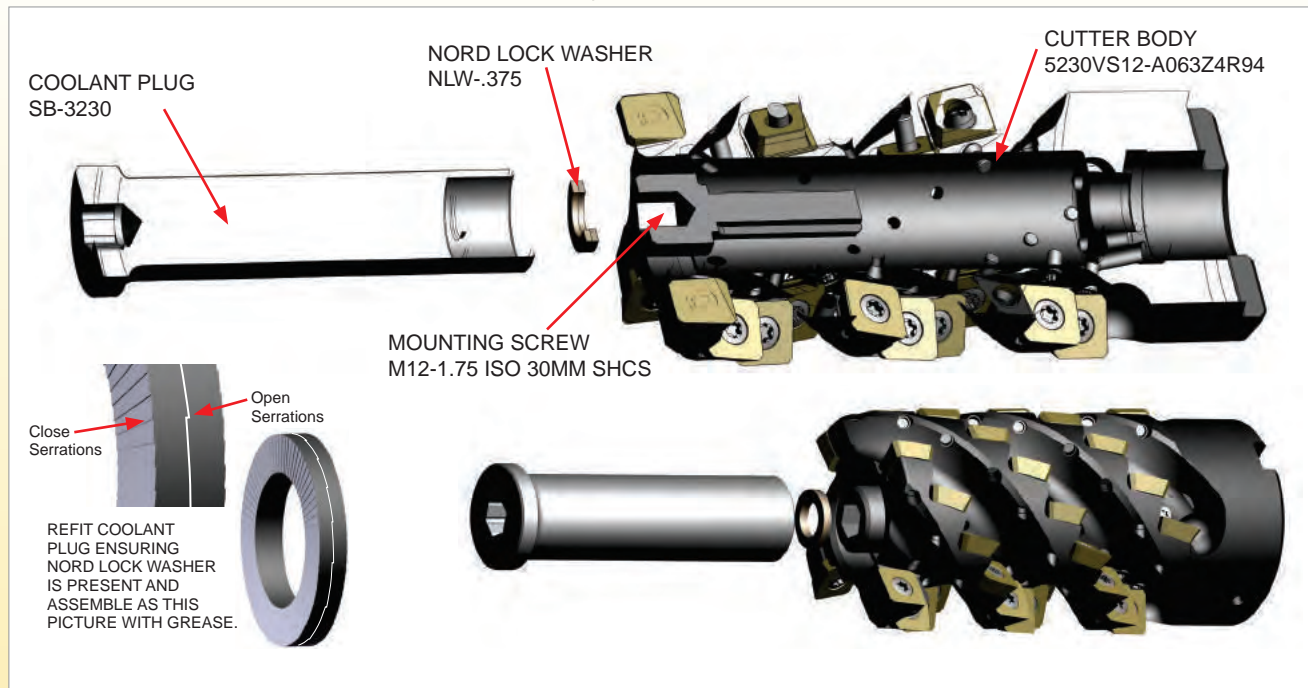
NOTE: All Shell Mill 5230VS09 and VS12 Chevron Porcupine Cutters are supplied assembled with mounting bolt, nord lock washer and steel coolant plug.

Please follow the instructions below to disassemble the cutter, attach the cutter to a shell mill adapter and reassemble coolant plug. It is very important to use the proper torque when reassembling the cutter with the mounting bolt, nord lock washer and coolant plug.



Shoulder Mills

Example of cutter: 5230VS12-A063Z4R94 assembly



1. Remove coolant plug. (Note: Ensure the nord lock washer is retained to the bottom of the coolant plug.)
2. Fit the cutter body to the shell mill adapter and secure using the mounting bolt supplied with the cutter.
Note: The mounting bolt must be properly torqued to the specified torque setting shown in the above chart in (page A182) Detail 1.
3. Refit coolant plug ensuring nord lock washer is present and in the proper location on the bottom of the coolant plug.
A small amount of grease can be used to hold the nord lock washer in place.
4. Tighten coolant plug with specified torque setting shown in the above chart in (page A182) Detail 2.
5. Note: If axial depth of cut (a_p) is less than maximum a_p of the cutter, then F3006T coolant control screws supplied separately can be used to block coolant holes forcing more coolant to the front of the cutter. If these screws are used, please secure with loctite or similar product.



Torque values for mounting bolts

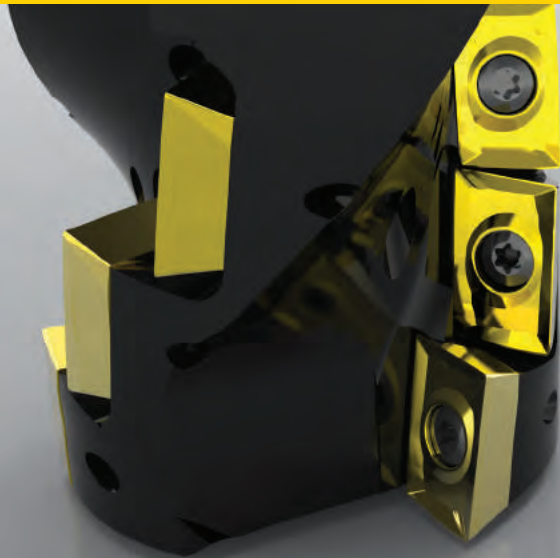
Excessive condition is when long reach extensions are required or when cutting parameters are elevated to extreme parameters.

5230VS09		Detail 1		Detail 2	
Cutter	Mounting Bolt Description	**Torque Values in Nm for Mounting Bolt		Coolant Plug Description	Coolant Plug tightening Nm
		Normal Condition	Excessive Condition		
5230VS09-A050Z4R51	M12-1.75 ISO x 30mm SHCS	80	100	SB-3413	34
5230VS09-A050Z4R80				SB-3621	

5230VS12		Detail 1		Detail 2	
Cutter	Mounting Bolt Description	**Torque Values in Nm for Mounting Bolt		Coolant Plug Description	Coolant Plug tightening Nm
		Normal Condition	Excessive Condition		
5230VS12-A063Z4R57	M12-1.75 ISO x 30mm SHCS	80	100	SB-3229	34
5230VS12-A063Z4R94				SB-3230	
5230VS12-A080Z5R65	M16-2 ISO x 40mm SHCS	110	150	SB-3231	61
5230VS12-A080Z5R110				SB-3232	
5230VS12-A100Z6R76	M20-2.5 ISO x 50mm SHCS	120	180	SB-3233	61
5230VS12-A100Z6R133				SB-3234	

Hex Keys
M12 = Hex Key Size 10
M16 = Hex Key Size 14
M20 = Hex Key Size 17

Shoulder Mills



LONG EDGE MILLING CUTTER

The 5315VA family is the long edge cutter version of our versatile 7690VA shoulder milling series.

This 5315VA series offers full effective flutes with right-hand helix angle for high feed rates.

This cutter is ideal for side milling and slotting applications.

The main characteristic of this cutter family is it's, lower cutting force due to the high helix design.

The 5315VA series are designed for roughing and semi-finishing applications, in Steel, Alloyed Steel, Stainless Steel, High Temperature Alloys, Cast Iron and Aluminium Alloys.



5315VA

5315VA12:

Maximum a_p = 23mm to 45mm
Diameter Range = 25mm to 40mm

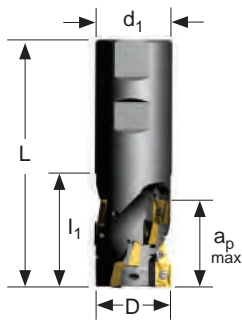
5315VA16:

Maximum a_p = 31mm to 61mm
Diameter Range = 50mm to 80mm

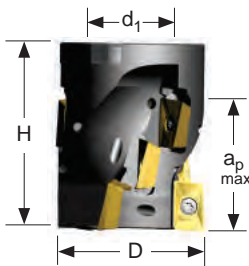




Shoulder Mills



Weldon Shank



Shell Mill Fixation

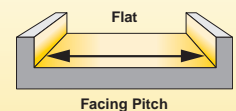
Product		Dimensions (mm)								Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	a _p max	a _{p1} max Slotting*	No. of flutes	No. of inserts	EDP		EDP		Screw Tightening Nm
5315VA12 Weldon Shank														
029106	5315VA12WA025R23	25	96	40	25	23	15	2	4	027860	F3007T	022157	T8	1,40
029107	5315VA12WA025R35	25	106	50	25	35	-	2	6	027860	F3007T	022157	T8	1,40
029108	5315VA12WA032R35	32	110	50	32	35	20	3	9	027860	F3007T	022157	T8	1,40
029109	5315VA12WA040R45	40	130	60	40	45	22	3	12	027860	F3007T	022157	T8	1,40
5315VA12 Shell Mill Fixation														
029110	5315VA12-A040R34	40	50	-	16	34	25	3	9	027860	F3007T	022157	T8	1,40

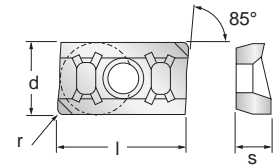
* Note: Please do not surpass the recommended max. a_p for slotting.

Note: Please note that a maximum of 0,8mm insert radius is allowed on the 5315VA12 range of cutters. Larger radii inserts can be used on the leading pocket only if the body is modified by the end user.

5315VA12 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a _p max Helical / Linear	Max RPM
029106	5315VA12WA025R23	25,00	-	-	-	-	36100
029107	5315VA12WA025R35	25,00	-	-	-	-	36100
029108	5315VA12WA032R35	32,00	-	-	-	-	36100
029109	5315VA12WA040R45	40,00	-	-	-	-	30400
029110	5315VA12-A040R34	40,00	-	-	-	-	26400





Shoulder Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max* or a _e max.*	a _p max. and a _e max. 15% D**	a _p min. - max.					
029098	ADGT12T3PDFR-721	GH1	◆	◆	-	7,87	12,70	3,97	Facet	0,04
030856	ADET12T308ER-48	X500	◆	◆	-	7,87	12,70	3,97	0,80	0,04
030857	ADET12T308ER-48	SP6519	●	●	-	7,87	12,70	3,97	0,80	0,04
030807	ADET12T3PDER-48	X500	◆	◆	-	7,87	12,70	3,97	Facet	0,04
030770	ADET12T3PDER-48	SP6519	●	●	-	7,87	12,70	3,97	Facet	0,04
029329	ADHT12T308ER-46	X500	◆	-	-	7,87	12,70	3,97	0,80	0,05
030406	ADHT12T308ER-46	X700	-	◆	-	7,87	12,70	3,97	0,80	0,05
031526	ADHT12T308ER-46	SP6519	◆	◆	-	7,87	12,70	3,97	0,80	0,05
029327	ADHT12T3PDER-46	X500	◆	-	-	7,87	12,70	3,97	Facet	0,05
031525	ADHT12T3PDER-46	SP6519	◆	◆	-	7,87	12,70	3,97	Facet	0,05
027913	ADKT12T3PDER-45	X500	◆	◆	-	7,87	12,70	3,97	Facet	0,08
031514	ADKT12T3PDER-45	SP6519	◆	◆	-	7,87	12,70	3,97	Facet	0,08
027915	ADKT12T3PDER-45	MP91M	◆	◆	-	7,87	12,70	3,97	Facet	0,08
027916	ADKT12T3PDER-45	SC3025	◆	◆	-	7,87	12,70	3,97	Facet	0,08

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Note: Please do not surpass the recommended max. a_p for slotting as shown on the steel body page A184.

* Note: Please respect the following rule for profiling with a_p max:
 for Weldon shank cutter Diameter 25mm a_e < 25% D
 for Weldon shank cutter Diameter 32mm a_e < 35% D
 for Weldon shank cutter Diameter 40mm a_e < 40% D
 for Shell mill cutter Diameter 40mm a_e < 75% D

** Note: For semi finishing, axial engagement a_p for slotting and radial engagement a_e for profiling should be max. 15% of the Diameter.

Note: Feed recommendations can be found on page A186. Speed recommendations can be found on page A187.



Shoulder Mills

5315VA12 Feeds f_z (mm/flute)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Grey Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
FR-721	GH1	Shoulder / Profiling	-	-	-	-	-	-	-	0,04 - 0,20	0,04 - 0,18	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	0,04 - 0,15	0,04 - 0,14	-	-	-	-	-	-
ER-48	X500	Shoulder / Profiling	-	-	-	-	-	-	-	-	-	0,04 - 0,09	0,04 - 0,09	0,04 - 0,10	0,04 - 0,14	-	-
		Slotting	-	-	-	-	-	-	-	-	-	0,04 - 0,07	0,04 - 0,07	0,04 - 0,08	0,04 - 0,12	-	-
ER-48	SP6519	Shoulder / Profiling	-	-	0,04 - 0,16	0,04 - 0,12	-	-	-	-	-	0,04 - 0,09	0,04 - 0,09	0,04 - 0,10	0,04 - 0,14	-	-
		Slotting	-	-	0,04 - 0,14	0,04 - 0,10	-	-	-	-	-	0,04 - 0,07	0,04 - 0,07	0,04 - 0,08	0,04 - 0,12	-	-
ER-46	X500	Shoulder / Profiling	-	-	0,05 - 0,16	0,05 - 0,14	-	-	-	-	-	0,04 - 0,09	0,04 - 0,09	0,04 - 0,10	0,04 - 0,14	-	-
		Slotting	-	-	0,05 - 0,13	0,05 - 0,11	-	-	-	-	-	0,04 - 0,07	0,04 - 0,07	0,04 - 0,08	0,04 - 0,12	-	-
ER-46	X700	Shoulder / Profiling	-	-	0,05 - 0,14	0,05 - 0,12	-	-	-	-	-	0,04 - 0,09	0,04 - 0,09	0,04 - 0,10	0,04 - 0,14	-	-
		Slotting	-	-	0,05 - 0,11	0,05 - 0,10	-	-	-	-	-	0,04 - 0,07	0,04 - 0,07	0,04 - 0,08	0,04 - 0,12	-	-
ER-46	SP6519	Shoulder / Profiling	-	-	0,05 - 0,16	0,05 - 0,12	-	-	-	-	-	-	-	-	-	-	-
		Slotting	-	-	0,05 - 0,13	0,05 - 0,10	-	-	-	-	-	-	-	-	-	-	-
ER-45	X500	Shoulder / Profiling	0,08 - 0,18	0,08 - 0,16	0,08 - 0,16	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	0,08 - 0,14	0,08 - 0,12	0,08 - 0,14	-	-	-	-	-	-	-	-	-	-	-	-
ER-45	SP6519	Shoulder / Profiling	0,08 - 0,18	0,08 - 0,16	-	-	0,08 - 0,18	0,08 - 0,16	0,08 - 0,14	-	-	-	-	-	-	-	-
		Slotting	0,08 - 0,14	0,08 - 0,12	-	-	0,08 - 0,14	0,08 - 0,12	0,08 - 0,10	-	-	-	-	-	-	-	-
ER-45	MP91M	Shoulder / Profiling	0,08 - 0,16	0,08 - 0,14	-	-	0,08 - 0,18	0,08 - 0,16	0,08 - 0,14	-	-	-	-	-	-	-	-
		Slotting	0,08 - 0,12	0,08 - 0,10	-	-	0,08 - 0,14	0,08 - 0,12	0,08 - 0,10	-	-	-	-	-	-	-	-
ER-45	SC3025	Shoulder / Profiling	-	-	-	-	0,08 - 0,18	0,08 - 0,16	0,08 - 0,14	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	0,08 - 0,14	0,08 - 0,12	0,08 - 0,10	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A187.

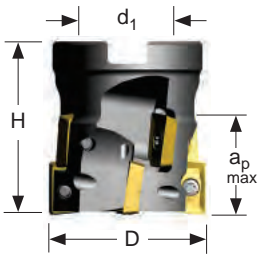


Speed v_c (m/min)																							
5315VA12 Series			Wear Resistance																				
			Speed min. - max.																				
Coolant Recommendation																							
Recommended ● Possible ○																							
ISO	Materials	Rm and Hardness			CVD X Grade			X700			PVD Standard			MP91M			SC3025			GH1	Uncoated Micrograin		
P	Unalloyed Steel	<600 N/mm ² <180 HBN	○	●	130 - 270				○	●	130 - 295			●	140 - 345								
		<950 N/mm ² <280 HBN	○	●	115 - 240				○	●	115 - 260			●	120 - 305								
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○	●	100 - 210				○	●	100 - 230			●	105 - 270								
		950-1200 N/mm ² 280-355 HBN	○	●	75 - 160				○	●	75 - 175			●	80 - 205								
		1200-1400 N/mm ² 355-415 HBN		●	50 - 100				●	50 - 110			●	50 - 130									
M	Stainless Steel	Austenitic + Ferritic 300 series	○	●	115 - 250	○	●	115 - 260	○	●	115 - 270												
		Martensitic 400 series	○	●	100 - 220				○	●	105 - 230												
	PH Stainless	Refractory P.H.	●		50 - 110	●		50 - 115	●		50 - 120												
K	Cast Iron	Grey GG-Fl									140 - 235			145 - 365			150 - 395						
		Spheroidal-Ductile GGG-FGS							○	●	110 - 240			●	115 - 285		●	120 - 335					
		Malleable GTS - MN/MP									100 - 220			105 - 260			105 - 275						
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN																			●	400 - 3050	
		Aluminium + Silicon > 16% Si 92 HBN																				●	295 - 2440
S	High Temperature Alloys	Iron Based			23 - 48			23 - 52			23 - 55												
		Cobalt Based	●		21 - 44	●		22 - 46	●		22 - 48												
		Nickel Based			24 - 51			25 - 53			25 - 55												
		Titanium Based			35 - 73			36 - 75			36 - 79												
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN																					
		Chilled Cast Iron >1400 N/mm ² > 400 HBN																					

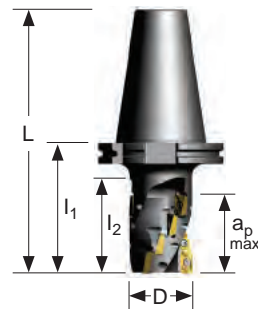
Shoulder Mills



Shoulder Mills



Shell Mill Fixation



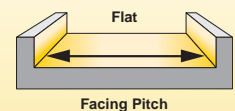
DIN 69871 Fixation

Product		Dimensions (mm)								Spares					
EDP	Item Description	D	L/H	l ₁	l ₂	d ₁	ap max	ap1 max Slotting*	No. of flutes	No. of inserts	EDP		EDP		Screw Tightening in. lbs.
5315VA16 Shell Mill Fixation - Medium and Fine Pitch															
025670	5315VA16-A050Z3R31	50	55	-	-	27	31	26	3	6	015262	D4010T	015240	T15	3,10
025671	5315VA16-A050Z4R31	50	55	-	-	27	31	26	4	8	015262	D4010T	015240	T15	3,10
025674	5315VA16-A063Z4R31	63	55	-	-	27	31	26	4	8	015262	D4010T	015240	T15	3,10
025675	5315VA16-A063Z5R31	63	55	-	-	27	31	26	5	10	015262	D4010T	015240	T15	3,10
025678	5315VA16-A080Z4R31	80	55	-	-	32	31	26	4	8	015262	D4010T	015240	T15	3,10
025679	5315VA16-A080Z5R31	80	55	-	-	32	31	26	5	10	015262	D4010T	015240	T15	3,10
5315VA16 DIN 69871 Fixation Taper 50															
025669	5315VA16GA50/050R61	50	207	105	75	-	61	48	3	12	015262	D4010T	015240	T15	3,10
025673	5315VA16GA50/063R61	63	207	105	75	-	61	52	3	12	015262	D4010T	015240	T15	3,10

Note: Please note that a maximum of 2,5mm insert radius is allowed on the 5315VA16 range of cutters. Larger radii inserts can be used on the leading pocket only if the body is modified by the end user.

5315VA16 Technical Information (mm)

Product		Dimensions					ap max Helical / Linear	Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.				
025670	5315VA16-A050Z3R31	50	-	-	-	-	23700	
025671	5315VA16-A050Z4R31	50	-	-	-	-	23700	
025674	5315VA16-A063Z4R31	63	-	-	-	-	20600	
025675	5315VA16-A063Z5R31	63	-	-	-	-	20600	
025678	5315VA16-A080Z4R31	80	-	-	-	-	18000	
025679	5315VA16-A080Z5R31	80	-	-	-	-	18000	
025669	5315VA16GA50/050R61	50	-	-	-	-	23700	
025673	5315VA16GA50/063R61	63	-	-	-	-	20600	

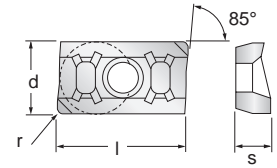



APET16-42

APHT16-42

APEX16-701

APHT16-F

APFW16-T

Shoulder Mills


Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max* or a _e max.*	a _p max. and a _e max. 15% D**	a _p min. - max.					
033180	APET160408TR-42	SP6519	●●●●○	■●●●○	-	9,52	16,66	4,76	0,80	0,10
033181	APET160410TR-42	SP6519	●●●●○	■●●●○	-	9,52	16,66	4,76	1,00	0,10
033182	APET160415TR-42	SP6519	●●●●○	■●●●○	-	9,52	16,66	4,76	1,50	0,10
033183	APET160420TR-42	SP6519	●●●●○	■●●●○	-	9,52	16,66	4,76	2,00	0,10
033184	APET160425TR-42	SP6519	●●●●○	■●●●○	-	9,52	16,66	4,76	2,50	0,10
015155	APHT1604PDTR-42	X500	●○	-	-	9,52	16,66	4,76	Facet	0,10
031466	APHT1604PDTR-42	SP6519	●●●●○	■●●●○	-	9,52	16,66	4,76	Facet	0,10
017293	APHT1604PDTR-42	MP91M	-	■●	-	9,52	16,66	4,76	Facet	0,10
033189	APEX1604PDFR-701	SP4019	●	●	-	9,52	16,66	4,76	Facet	0,02
014066	APEX1604PDFR-701	GH1	◆	◆	-	9,52	16,66	4,76	Facet	0,02
015154	APHT1604PDFR	GH1	■	■	-	9,52	16,66	4,76	Facet	0,02
033190	APFW1604PDTR	X400	●	◆	-	9,52	16,66	4,76	Facet	0,10
033191	APFW1604PDTR	SP4019	●	■	-	9,52	16,66	4,76	Facet	0,10
027883	APFW1604PDTR	SC3025	■	◆	-	9,52	16,66	4,76	Facet	0,10
017628	APFW1604PDTR	GH1	-	●	-	9,52	16,66	4,76	Facet	0,10

 Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

 * Note: Please do not surpass the recommended max. a_p for slotting as shown on the steel body page A188.

 * Note: Please respect the following rule for profiling with a_p max:

 for Shell mill cutter a_e < 75% of the Diameter
 for Taper 50 cutter a_e < 60% of the Diameter

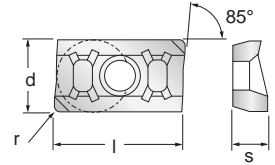
 ** Note: For semi finishing, axial engagement a_p for slotting and radial engagement a_e for profiling should be max. 15% of the Diameter.

APHT1604PDTR-42 X500 to be used for Stainless Steel with heavy scale or for unstable conditions.

APFW1604PDTR X400 should be used for Alloyed Steel with heavy scale or hardened steel.

APFW1604PDTR SP4019 should be used for High Temperature Alloys with heavy scale or hardened steel.

Note: Feed recommendations can be found on page A191. Speed recommendations can be found on page A193.



Shoulder Mills

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max.* or a _e max.*	a _p max. and a _e max. 15% D**	a _p min. - max.					
027869	APHT160408ER-46	X500	■	■	-	9,52	16,66	4,76	0,80	0,05
031495	APHT160408ER-46	SP6519	■	■	-	9,52	16,66	4,76	0,80	0,05
027870	APHT160416ER-46	X500	■	■	-	9,52	16,66	4,76	1,60	0,05
031496	APHT160416ER-46	SP6519	■	■	-	9,52	16,66	4,76	1,60	0,05
027871	APHT160424ER-46	X500	■	■	-	9,52	16,66	4,76	2,40	0,05
031497	APHT160424ER-46	SP6519	■	■	-	9,52	16,66	4,76	2,40	0,05
030811	APET1604PDER-48	X500	◆	◆	-	9,52	16,66	4,76	Facet	0,04
030773	APET1604PDER-48	SP6519	●	●	-	9,52	16,66	4,76	Facet	0,04
030860	APET160408ER-48	X500	◆	◆	-	9,52	16,66	4,76	0,80	0,04
030861	APET160408ER-48	SP6519	●	●	-	9,52	16,66	4,76	0,80	0,04
015156	APKT1604PDER-43	X500	●	-	-	9,52	16,66	4,76	Facet	0,08
031468	APKT1604PDER-43	SP6519	◆	-	-	9,52	16,66	4,76	Facet	0,08
017294	APKT1604PDER-43	MP91M	■	-	-	9,52	16,66	4,76	Facet	0,08
027887	APKT1604PDER-43	SC3025	◆	-	-	9,52	16,66	4,76	Facet	0,08
023115	APKT1604PDER-45	X500	-	●	-	9,52	16,66	4,76	Facet	0,08
031469	APKT1604PDER-45	SP6519	-	◆	-	9,52	16,66	4,76	Facet	0,08
023114	APKT1604PDER-45	MP91M	-	●	-	9,52	16,66	4,76	Facet	0,08



Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Note: Please do not surpass the recommended max. a_p for slotting as shown on the steel body page A188.

* Note: Please respect the following rule for profiling with a_p max:
for Shell mill cutter a_e < 75% of the Diameter
for Taper 50 cutter a_e < 60% of the Diameter

** Note: For semi finishing, axial engagement a_p for slotting and radial engagement a_e for profiling should be max. 15% of the Diameter.

APKT1604PDER-43 X500 to be used for steel when unstable conditions

Note: Feed recommendations can be found on page A192. Speed recommendations can be found on page A193.



5315VA16 Feeds f_z (mm/flute)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% SI T16 HBN	Aluminum & Silicon >16% SI 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN	
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
TR-42	X500	Shoulder / Profiling	-	-	0,10 - 0,25	0,10 - 0,22	-	-	-	-	-	-	-	-	-	-	-	
		Slotting	-	-	0,10 - 0,18	0,10 - 0,15	-	-	-	-	-	-	-	-	-	-	-	-
TR-42	SP6519	Shoulder / Profiling	0,10 - 0,25	0,10 - 0,22	0,10 - 0,25	0,10 - 0,22	-	-	-	-	-	-	-	-	-	-	-	
		Slotting	0,10 - 0,18	0,10 - 0,16	0,10 - 0,18	0,10 - 0,15	-	-	-	-	-	-	-	-	-	-	-	-
TR-42	MP91M	Shoulder / Profiling	-	-	-	-	0,08 - 0,25	0,08 - 0,20	0,08 - 0,20	-	-	-	-	-	-	-	0,08 - 0,10	-
		Slotting	-	-	-	-	0,08 - 0,18	0,08 - 0,15	0,08 - 0,15	-	-	-	-	-	-	-	-	-
FR-701	SP4019	Shoulder / Profiling	-	-	-	-	-	-	-	0,03 - 0,20	0,03 - 0,18	-	-	-	-	-	-	
		Slotting	-	-	-	-	-	-	-	0,03 - 0,07	0,03 - 0,17	-	-	-	-	-	-	-
FR-701	GH1	Shoulder / Profiling	-	-	-	-	-	-	-	0,03 - 0,18	0,03 - 0,16	-	-	-	-	-	-	
		Slotting	-	-	-	-	-	-	-	0,03 - 0,15	0,03 - 0,14	-	-	-	-	-	-	-
FR	GH1	Shoulder / Profiling	-	-	-	-	-	-	-	0,03 - 0,18	0,03 - 0,18	-	-	-	-	-	-	
		Slotting	-	-	-	-	-	-	-	0,03 - 0,15	0,03 - 0,14	-	-	-	-	-	-	-
TR	X400	Shoulder / Profiling	-	0,10 - 0,24	-	-	-	-	-	-	-	-	-	-	-	0,08 - 0,12	-	
		Slotting	-	0,10 - 0,16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TR	SP4019	Shoulder / Profiling	-	-	-	-	-	-	-	-	-	0,10 - 0,11	0,11 - 0,11	0,10 - 0,13	0,10 - 0,15	0,08 - 0,12	-	
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TR	SC3025	Shoulder / Profiling	-	-	-	-	0,10 - 0,25	0,10 - 0,25	0,10 - 0,20	-	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	0,10 - 0,17	0,10 - 0,17	0,10 - 0,15	-	-	-	-	-	-	-	-	-
TR	GH1	Shoulder / Profiling	-	-	-	-	0,10 - 0,20	0,10 - 0,20	0,10 - 0,18	-	-	-	-	-	-	-	-	
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A193.



Shoulder Mills

5315VA16 Feeds f_z (mm/flute)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
ER-46	X500	Shoulder / Profiling	-	-	0,05 - 0,25	0,05 - 0,22	-	-	-	-	-	0,05 - 0,11	0,05 - 0,11	0,05 - 0,12	0,05 - 0,14	-	-
		Slotting	-	-	0,05 - 0,18	0,05 - 0,15	-	-	-	-	-	0,05 - 0,09	0,05 - 0,09	0,05 - 0,10	0,05 - 0,12	-	-
ER-46	SP6519	Shoulder / Profiling	-	-	0,05 - 0,25	0,05 - 0,22	-	-	-	-	-	-	-	-	-	-	-
		Slotting	-	-	0,05 - 0,18	0,05 - 0,15	-	-	-	-	-	-	-	-	-	-	-
ER-48	X500	Shoulder / Profiling	-	-	-	-	-	-	-	-	-	0,05 - 0,11	0,05 - 0,11	0,05 - 0,12	0,05 - 0,14	-	-
		Slotting	-	-	-	-	-	-	-	-	-	0,05 - 0,09	0,05 - 0,09	0,05 - 0,10	0,05 - 0,12	-	-
ER-48	SP6519	Shoulder / Profiling	-	-	-	-	-	-	-	-	-	0,05 - 0,11	0,05 - 0,11	0,05 - 0,12	0,05 - 0,14	-	-
		Slotting	-	-	-	-	-	-	-	-	-	0,05 - 0,09	0,05 - 0,09	0,05 - 0,10	0,05 - 0,12	-	-
ER-43	X500	Shoulder / Profiling	0,08 - 0,25	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	0,08 - 0,18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ER-43	SP6519	Shoulder / Profiling	0,08 - 0,25	0,08 - 0,22	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	0,08 - 0,18	0,08 - 0,16	-	-	-	-	-	-	-	-	-	-	-	-	-
ER-43	MP91M	Shoulder / Profiling	0,08 - 0,23	0,08 - 0,20	-	-	0,08 - 0,23	0,08 - 0,23	0,08 - 0,20	-	-	-	-	-	-	-	-
		Slotting	0,08 - 0,16	0,08 - 0,14	-	-	0,08 - 0,16	0,08 - 0,16	0,08 - 0,14	-	-	-	-	-	-	-	-
ER-43	SC3025	Shoulder / Profiling	-	-	-	-	0,08 - 0,23	0,08 - 0,23	0,08 - 0,20	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	0,08 - 0,16	0,08 - 0,16	0,08 - 0,14	-	-	-	-	-	-	-	-
ER-45	X500	Shoulder / Profiling	-	0,08 - 0,20	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	-	0,08 - 0,14	-	-	-	-	-	-	-	-	-	-	-	-	-
ER-45	SP6519	Shoulder / Profiling	0,08 - 0,22	0,08 - 0,20	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	0,08 - 0,16	0,08 - 0,14	-	-	-	-	-	-	-	-	-	-	-	-	-
ER-45	MP91M	Shoulder / Profiling	0,08 - 0,20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	0,08 - 0,14	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys



Speed v_c (m/min)			Wear Resistance																
5315VA16 Series			Speed min. - max.																
Coolant Recommendation			Speed min. - max.																
Recommended ● Possible ◎			Speed min. - max.																
ISO	Materials	Rm and Hardness	PVD X Grade		CVD X Grade		PVD Standard		PVD Standard		PVD Standard		CVD Standard		Uncoated Micrograin				
			Water	No Water	Water	No Water	Water	No Water	Water	No Water	Water	No Water	Water	No Water	GH1				
P	Unalloyed Steel	<600 N/mm ² <180 HBN			130 - 270	◎	●	130 - 295					140 - 345						
		<950 N/mm ² <280 HBN		◎	●	115 - 240	◎	●	115 - 260					120 - 305					
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	◎	●	95 - 200	◎	●	100 - 210	◎	●	100 - 230			105 - 270					
		950-1200 N/mm ² 280-355 HBN			70 - 150			75 - 160			75 - 175			80 - 205					
		1200-1400 N/mm ² 355-415 HBN		●	45 - 95		●	50 - 100		●		50 - 110		●	50 - 130				
M	Stainless Steel	Austenitic + Ferritic 300 series			115 - 250	◎	●	115 - 270											
		Martensitic 400 series			100 - 220	◎	●	105 - 235											
	PH Stainless	Refractory P.H.			50 - 110		●	50 - 120											
K	Cast Iron	Grey GG-Fl											145 - 365		150 - 395		135 - 290		
		Spheroidal-Ductile GGG-FGS											●	115 - 285	●	120 - 335	◎	●	120 - 245
		Malleable GTS - MN/MP												105 - 260		105 - 275			115 - 200
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN							●	400 - 2895						●	400 - 3050		
		Aluminium + Silicon > 16% Si 92 HBN									295 - 2320							295 - 2440	
S	High Temperature Alloys	Iron Based			23 - 48			23 - 55					24 - 63						
		Cobalt Based			21 - 44			22 - 48						23 - 52					
		Nickel Based		●	24 - 51		●	25 - 55		●	26 - 59								
		Titanium Based			35 - 73			36 - 79			37 - 84								
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN		●	45 - 95					50 - 100		●	50 - 105						
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			35 - 80					40 - 90			●	40 - 95					

Shoulder Mills



Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness

a_e = Radial engagement

f_z = Feed per tooth

d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

Multiplication factor for the feed rate based on the percentage of radial engagement of the cutter diameter

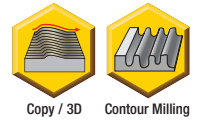
Cutter Ø 25mm			Cutter Ø 32mm			Cutter Ø 40mm		
a_e %	a_e mm	Coefficient Factor	a_e %	a_e mm	Coefficient Factor	a_e %	a_e mm	Coefficient Factor
5	1,25	2,30	5	1,60	2,30	5	2,00	2,30
10	2,50	1,66	10	3,20	1,66	10	4,00	1,66
15	3,75	1,40	15	4,80	1,40	15	6,00	1,40
20	5,00	1,25	20	6,40	1,25	20	8,00	1,25
25	6,25	1,16	25	8,00	1,16	25	10,00	1,16
35	8,75	1,05	35	11,20	1,05	35	14,00	1,05
50 - 100	12,50 - 25,00	1,00	50 - 100	16,00 - 32,00	1,00	50 - 100	20,00 - 40,00	1,00

Multiplication factor for the feed rate based on the percentage of radial engagement of the cutter diameter

Cutter Ø 50mm			Cutter Ø 63mm			Cutter Ø 80mm		
a_e %	a_e mm	Coefficient Factor	a_e %	a_e mm	Coefficient Factor	a_e %	a_e mm	Coefficient Factor
5	2,50	2,30	5	3,15	2,30	5	4,00	2,30
10	5,00	1,66	10	6,30	1,66	10	8,00	1,66
15	7,50	1,40	15	9,45	1,40	15	12,00	1,40
20	10,00	1,25	20	12,60	1,25	20	16,00	1,25
25	12,50	1,16	25	15,75	1,16	25	20,00	1,16
35	17,50	1,05	35	22,05	1,05	35	28,00	1,05
50 - 100	25,00 - 50,00	1,00	50 - 100	31,50 - 63,00	1,00	50 - 100	40,00 - 80,00	1,00

Example: 50mm diameter cutter using a 5,0mm radial engagement (a_e) = 10% of the cutter diameter.

At 10%, your coefficient is 1,66 (see chart); therefore you must multiply your feed rate by 1,66 for correcting the feed for profiling.



BALL NOSE CONTOUR MILLING CUTTER

The 5505VX.. Ball Nose Cutters have a reinforced design feature, which delivers a high volume of chip removal.

The chip breaker geometry provides excellent chip control and evacuation during machining and prevents edge build-up.

5505VX Roughing Ball Nose Cutters are ideal for roughing and semi-finishing profiles and complex contours.

One grade and one geometry are qualified to machine Steel, Alloyed Steel, Stainless Steel, High Temperature Alloys and Cast Iron.

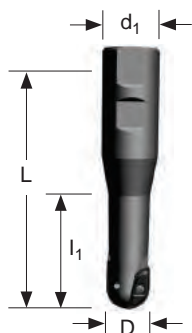
5505VX

5505VX:
Diameter Range = 16mm to 50mm

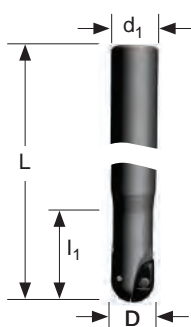




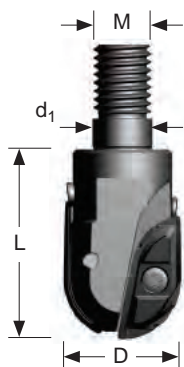
Contour Mills



Weldon Shank



Cylindrical Shank



Modular Head



Depth of Cut (ap)

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
5505VX Weldon Shank												
032133	5505VX20WA020R34	20	106	34	25	20	2	030672	FP3007T	031451	TP8	1,80
030840	5505VX25WA025R60	25	116	60	25	25	2	015262	D4010T	015240	T15	3,10
032132	5505VX25WA025R69	25	150	69	32	25	2	015262	D4010T	015240	T15	3,10
030842	5505VX32WA032R75	32	130	75	32	32	2	015266	D5013T	015241	T20	6,00
030843	5505VX32WA032R100	32	160	100	32	32	2	015266	D5013T	015241	T20	6,00
030844	5505VX40WA040R100	40	170	100	40	40	2	029640	D6014T	015241	T20	10,50
030845	5505VX40WA040R150	40	220	150	40	40	2	029640	D6014T	015241	T20	10,50
030846	5505VX50WA050R100	50	170	100	40	50	2	029641	F8017S	018288	KH5005	24,50
030847	5505VX50WA050R150	50	230	150	50	50	2	029641	F8017S	018288	KH5005	24,50
5505VX Cylindrical Shank												
030982	5505VX16CA20/016R30	16	180	30	20	16	2	031448	FP3006T	031451	TP8	1,80
030983	5505VX20CA25/020R40	20	200	40	25	20	2	030672	FP3007T	031451	TP8	1,80
030984	5505VX25CA025R55	25	250	55	25	25	2	015262	D4010T	015240	T15	3,10
030985	5505VX25CA32/025R55	25	250	55	32	25	2	015262	D4010T	015240	T15	3,10
030986	5505VX32CA032R65	32	250	65	32	32	2	015266	D5013T	015241	T20	6,00

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	M	d ₁	a _p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
5505VX Modular Head												
030849	5505VX16SA016R25	16	25	M8	8.5	16	2	031448	FP3006T	031451	TP8	1,80
030850	5505VX20SA020R35	20	35	M10	10.5	20	2	030672	FP3007T	031451	TP8	1,80
030851	5505VX25SA025R40	25	40	M12	12.5	25	2	015262	D4010T	015240	T15	3,10
030852	5505VX32SA032R50	32	50	M16	17.0	32	2	015266	D5013T	015241	T20	6,00

Note: For cylindrical shank extensions in high density alloy with through coolant refer to page A76.

Note: Do not remove the radial screw; this is a fixed location for the insert see page A200.

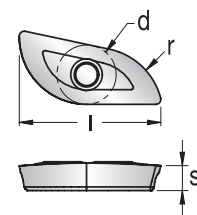


5505VX Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	Max RPM
032133	5505VX20WA020R34	-	85	-	-	-	34750
030840	5505VX25WA025R60	-	85	-	-	-	30500
032132	5505VX25WA025R69	-	85	-	-	-	30500
030842	5505VX32WA032R75	-	85	-	-	-	23250
030843	5505VX32WA032R100	-	85	-	-	-	23250
030844	5505VX40WA040R100	-	85	-	-	-	17250
030845	5505VX40WA040R150	-	85	-	-	-	17250
030846	5505VX50WA050R100	-	85	-	-	-	17250
030847	5505VX50WA050R150	-	85	-	-	-	17250
030982	5505VX16CA20/016R30	-	85	-	-	-	54000
030983	5505VX20CA25/020R40	-	85	-	-	-	34750
030984	5505VX25CA025R55	-	85	-	-	-	30500
030985	5505VX25CA32/025R55	-	85	-	-	-	30500
030986	5505VX32CA032R65	-	85	-	-	-	23250
030849	5505VX16SA016R25	-	85	-	-	-	54000
030850	5505VX20SA020R35	-	85	-	-	-	34750
030851	5505VX25SA025R40	-	85	-	-	-	30500
030852	5505VX32SA032R50	-	85	-	-	-	23250



Contour Mills



Contour Mills

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			a _p max.*	a _e / a _p max. 10% of the cutter diameter	a _e / a _p max. -					
030737	XPNT16/160308.R-F	SP6519	◆◆◆◆◆	◆◆◆◆◆	-	7,40	17,40	3,18	8,00	0,04
030743	XPNT20/20T306.R-F	SP6519	◆◆◆◆◆	◆◆◆◆◆	-	9,00	20,85	3,97	10,00	0,04
030746	XPNT25/250408.R-F	SP6519	◆◆◆◆◆	◆◆◆◆◆	-	11,00	26,00	4,76	12,50	0,04
030749	XPNT32/320612.R-F	SP6519	◆◆◆◆◆	◆◆◆◆◆	-	14,10	33,40	6,35	16,00	0,04
030755	XPNT40/40T716.R-F	SP6519	◆◆◆◆◆	◆◆◆◆◆	-	18,00	41,84	7,95	20,00	0,04
030758	XPNT50/50T716.R-F	SP6519	◆◆◆◆◆	◆◆◆◆◆	-	22,25	52,86	7,95	25,00	0,04

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Note: a_p max. is dependent on several insert sizes, see steel cutter pages 204 for a_p max.

5505VX Feeds f_z (mm/tooth)

Tool Diameter	Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 192 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
				Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
16	R-F	SP6519	Contouring	0,06 - 0,15	0,06 - 0,13	0,04 - 0,11	0,04 - 0,10	0,06 - 0,15	0,06 - 0,15	0,06 - 0,15	-	-	0,04 - 0,08	0,04 - 0,08	0,04 - 0,08	0,04 - 0,10	-	-
20	R-F	SP6519	Contouring	0,06 - 0,17	0,06 - 0,15	0,04 - 0,13	0,04 - 0,12	0,06 - 0,17	0,06 - 0,17	0,06 - 0,17	-	-	0,04 - 0,10	0,04 - 0,10	0,04 - 0,10	0,04 - 0,12	-	-
25	R-F	SP6519	Contouring	0,06 - 0,20	0,06 - 0,18	0,04 - 0,16	0,04 - 0,15	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	-	-	0,04 - 0,13	0,04 - 0,13	0,04 - 0,13	0,04 - 0,15	-	-
32	R-F	SP6519	Contouring	0,06 - 0,22	0,06 - 0,20	0,04 - 0,18	0,04 - 0,17	0,06 - 0,22	0,06 - 0,22	0,06 - 0,22	-	-	0,04 - 0,15	0,04 - 0,15	0,04 - 0,15	0,04 - 0,17	-	-
40	R-F	SP6519	Contouring	0,06 - 0,24	0,06 - 0,22	0,04 - 0,20	0,04 - 0,19	0,06 - 0,24	0,06 - 0,24	0,06 - 0,24	-	-	0,04 - 0,17	0,04 - 0,17	0,04 - 0,17	0,04 - 0,19	-	-
50	R-F	SP6519	Contouring	0,06 - 0,27	0,06 - 0,25	0,04 - 0,23	0,04 - 0,22	0,06 - 0,27	0,06 - 0,27	0,06 - 0,27	-	-	0,04 - 0,20	0,04 - 0,20	0,04 - 0,20	0,04 - 0,22	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A199.

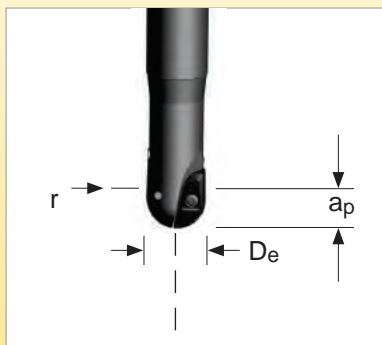


Contour Mills

Speed v_c (m/min)					
5505VX Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Standard
					SP6519
P	Unalloyed Steel	<600 N/mm ² <180 HBN	◎	●	130 - 295
		<950 N/mm ² <280 HBN	◎	●	115 - 260
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	◎	●	100 - 230
		950-1200 N/mm ² 280-355 HBN	◎	●	75 - 175
		1200-1400 N/mm ² 355-415 HBN	◎	●	50 - 110
M	Stainless Steel	Austenitic + Ferritic 300 series	◎	●	115 - 270
		Martensitic 400 series	◎	●	105 - 235
	PH Stainless	Refractory P.H.	●		50 - 120
K	Cast Iron	Grey GG-Ft	◎	●	140 - 295
		Spheroidal-Ductile GGG-FGS	◎	●	110 - 240
		Malleable GTS - MN/MP	◎	●	100 - 220
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			23 - 55
		Cobalt Based			22 - 48
		Nickel Based	●		25 - 55
		Titanium Based			36 - 79
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			



5505VX Technical Information



Working Diameter:

$$D_e = 2 \times \sqrt{r^2 - (r - a_p)^2}$$

where: D_e = Working Diameter
 r = Cutter radius
 a_p = Axial Depth of Cut



Contour Mills

5505VX Technical Information

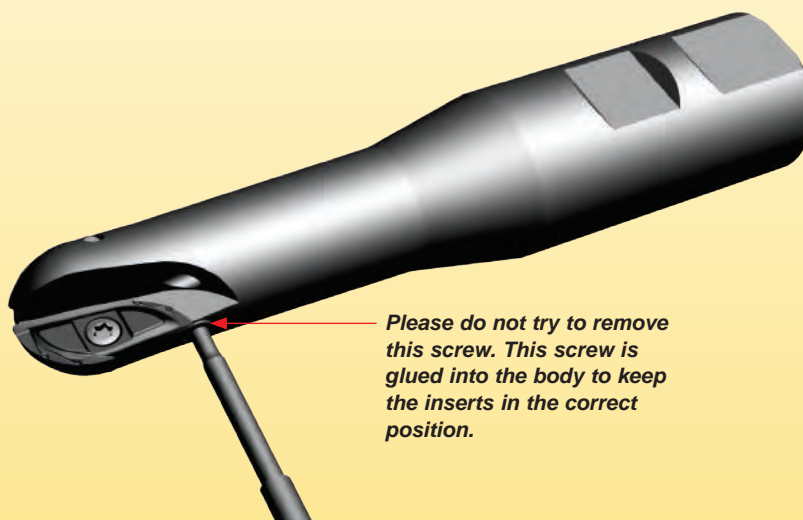
where:
 f_z = Feed per tooth a_e = Radial Depth of Cut
 h_m = Average chip thickness a_p = Axial Depth of Cut
 r = Insert radius

Average chip thickness: h_m

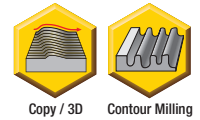
$$h_m = f_z \times \frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}$$

To find programmed feedrate: f_z

$$f_z = \frac{h_m}{\frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}}$$



Please do not try to remove this screw. This screw is glued into the body to keep the inserts in the correct position.



BALL NOSE FINISHING CONTOUR MILLING CUTTERS

5500V cutters are for profiling and finishing operations. A centrally located screw and vee-shaped insert base provide a very precise position in the tool body.

This precise insert position gives a max. run out of less than 0,02mm.

This cutter is ideal for contour and copy milling.

This specific insert geometry design allows finishing applications up to 90°

One grade for all applications. Grade SP1019 is a micrograin carbide substrate with a new generation TiAlN coating, that makes this new PVD grade virtually free of residual stress and extremely hard for unmatched performance. Ideal for finishing ball nose applications at higher surface speeds, or for greater wear resistance.

Qualified for a wide range of materials: Steels, Tool Steels, Stainless Steels, Cast Iron, High Temperature Alloys and Hardened Steel.

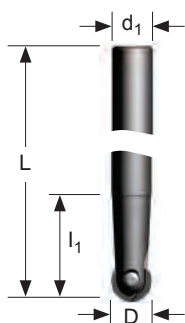
5500V

5000V:
Diameter Range = 8mm to 25mm

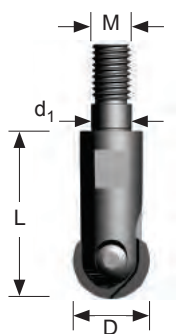




Contour Mills



Cylindrical Shank



Modular Head

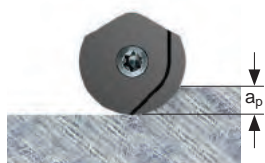
Product		Dimensions (mm)					Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	No. of Inserts*	EDP		EDP		Screw Tightening Nm
5500V Cylindrical Shank											
021666	5500V08CR	8	160	20	12	1	022149	55.671	018487	T6	0,40
021667	5500V10CR	10	160	25	12	1	015250	55.672	018488	T7	0,80
021668	5500V12CR	12	180	30	12	1	015251	55.674	013215	T10	2,10
021670	5500V16CR	16	200	40	16	1	022150	55.675	015240	T15	3,10
021672	5500V20CR	20	200	50	20	1	015252	55.676	015241	T20	6,00
021674	5500V25CR	25	200	50	25	1	015253	55.677	015241	T20	6,00

* Denotes: 5500V cutter bodies take one insert with a full ball nose insert designed with two cutting edges. When programming feed rates use two cutting edges and not one.

Product		Dimensions (mm)					Spares				
EDP	Item Description	D	L/H	M	d ₁	No. of Inserts*	EDP		EDP		Screw Tightening Nm
5500V Modular Head											
029128	5500V08SR25	8	25	M8	8.5	1	022149	55.671	018487	T6	0,40
029129	5500V10SR25	10	25	M8	8.5	1	015250	55.672	018488	T7	0,80
029130	5500V12SR35	12	35	M8	8.5	1	015251	55.674	013215	T10	2,10
029131	5500V16SR35	16	35	M8	8.5	1	022150	55.675	015240	T15	3,10
029132	5500V20SR35	20	35	M10	10.5	1	015252	55.676	015241	T20	6,00
029133	5500V25SR43	25	43	M12	12.5	1	015253	55.677	015241	T20	6,00

Note: For cylindrical shank extensions in high density alloy with through coolant refer to page A76. 5500V modular heads do not have through coolant capability.

* Denotes: 5500V cutter bodies take one insert with a full ball nose insert designed with two cutting edges. When programming feed rates use two cutting edges and not one.



Depth of Cut (ap)

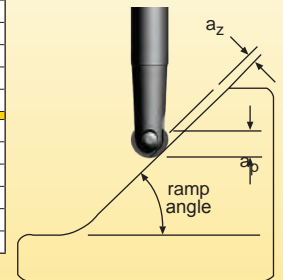


5500V Technical Information

Product		Angles ° / Dimensions (mm)												Max RPM
EDP	Item Description	Ramping Data												
		15°		30°		45°		60°		75°		85°		
		a_z max	a_p max	a_z max	a_p max	a_z max	a_p max	a_z max	a_p max	a_z max	a_p max	a_z max	a_p max	
021666	5500V08CR	3,0	3,9	2,0	3,5	1,2	2,0	0,5	2,0	0,1	1,1	0,1	0,4	71500
021667	5500V10CR	3,7	4,8	2,5	4,4	1,5	3,6	0,7	2,6	0,2	1,4	0,1	0,5	62000
021668	5500V12CR	4,5	5,8	3,0	5,2	1,8	4,2	0,8	3,0	0,2	1,4	0,1	0,6	60000
021670	5500V16CR	6,0	7,7	4,0	6,9	2,4	5,6	1,1	4,0	0,3	2,0	0,1	0,7	39500
021672	5500V20CR	7,4	9,6	5,0	8,6	3,0	7,1	1,3	5,0	0,4	2,9	0,1	0,9	33500
021674	5500V25CR	9,3	12,1	6,3	10,8	3,7	8,8	1,7	6,3	0,4	3,2	0,1	1,1	22000
029128	5500V08SR25	3,0	3,9	2,0	3,5	1,2	2,0	0,5	2,0	0,1	1,1	0,1	0,4	71500
029129	5500V10SR25	3,7	4,8	2,5	4,4	1,5	3,6	0,7	2,6	0,2	1,4	0,1	0,5	62000
029130	5500V12SR35	4,5	5,8	3,0	5,2	1,8	4,2	0,8	3,0	0,2	1,4	0,1	0,6	60000
029131	5500V16SR35	6,0	7,7	4,0	6,9	2,4	5,6	1,1	4,0	0,3	2,0	0,1	0,7	39500
029132	5500V20SR35	7,4	9,6	5,0	8,6	3,0	7,1	1,3	5,0	0,4	2,9	0,1	0,9	33500
029133	5500V25SR43	9,3	12,1	6,3	10,8	3,7	8,8	1,7	6,3	0,4	3,2	0,1	1,1	22000



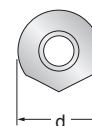
Ramping



Contour Mills



RG_S



Contour Mills

Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
					a _p / a _e min. - max. 0,10 - < 1,00					
031484	RG08S	SP1019	-	-	◆◆◆◆◆◆◆◆	8,00	-	1,75	4,00	0,02
031485	RG10S	SP1019	-	-	◆◆◆◆◆◆◆◆	10,00	-	2,00	5,00	0,02
031486	RG12S	SP1019	-	-	◆◆◆◆◆◆◆◆	12,00	-	2,50	6,00	0,02
031487	RG16S	SP1019	-	-	◆◆◆◆◆◆◆◆	16,00	-	3,00	8,00	0,02
031488	RG20S	SP1019	-	-	◆◆◆◆◆◆◆◆	20,00	-	3,50	10,00	0,02
031489	RG25S	SP1019	-	-	◆◆◆◆◆◆◆◆	25,00	-	4,00	12,50	0,02

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

Speed recommendations can be found on page A205.



5500V Feeds f_z (mm/tooth)

Insert Diameter	Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
				Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
8	S	SP1019	Contouring	0,02 - 0,06	0,02 - 0,06	0,02 - 0,05	0,02 - 0,04	0,02 - 0,07	0,02 - 0,07	0,02 - 0,07	0,02 - 0,08	0,02 - 0,07	0,02 - 0,04	0,02 - 0,04	0,02 - 0,04	0,02 - 0,05	0,02 - 0,04	0,02 - 0,04
10	S	SP1019	Contouring	0,02 - 0,08	0,02 - 0,08	0,02 - 0,07	0,02 - 0,06	0,02 - 0,09	0,02 - 0,07	0,02 - 0,09	0,02 - 0,10	0,02 - 0,09	0,02 - 0,06	0,02 - 0,06	0,02 - 0,06	0,02 - 0,07	0,02 - 0,06	0,02 - 0,06
12	S	SP1019	Contouring	0,02 - 0,10	0,02 - 0,10	0,02 - 0,09	0,02 - 0,08	0,02 - 0,11	0,02 - 0,11	0,02 - 0,11	0,02 - 0,12	0,02 - 0,11	0,02 - 0,08	0,02 - 0,08	0,02 - 0,08	0,02 - 0,09	0,02 - 0,08	0,02 - 0,08
16	S	SP1019	Contouring	0,02 - 0,14	0,02 - 0,14	0,02 - 0,13	0,02 - 0,12	0,02 - 0,15	0,02 - 0,15	0,02 - 0,15	0,02 - 0,16	0,02 - 0,15	0,02 - 0,12	0,02 - 0,12	0,02 - 0,12	0,02 - 0,13	0,02 - 0,12	0,02 - 0,12
20	S	SP1019	Contouring	0,02 - 0,18	0,02 - 0,18	0,02 - 0,17	0,02 - 0,16	0,02 - 0,19	0,02 - 0,19	0,02 - 0,19	0,02 - 0,20	0,02 - 0,18	0,02 - 0,16	0,02 - 0,16	0,02 - 0,16	0,02 - 0,17	0,02 - 0,16	0,02 - 0,16
25	S	SP1019	Contouring	0,02 - 0,23	0,02 - 0,23	0,02 - 0,22	0,02 - 0,21	0,02 - 0,24	0,02 - 0,24	0,02 - 0,24	0,02 - 0,25	0,02 - 0,22	0,02 - 0,21	0,02 - 0,21	0,02 - 0,21	0,02 - 0,22	0,02 - 0,21	0,02 - 0,21

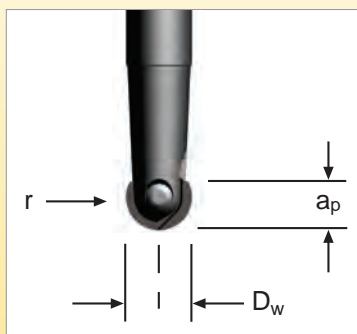
Note: HTA = High Temperature Alloys



Speed v_c (m/min)						
5500V Series			Speed min. - max.			
Coolant Recommendation						
Recommended ● Possible ◎						
ISO	Materials	Rm and Hardness			PVD Micrograin	
P	Unalloyed Steel	<600 N/mm ² <180 HBN			SP1019	
		<950 N/mm ² <280 HBN			225 - 380	
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			●	200 - 335
		950-1200 N/mm ² 280-355 HBN			●	175 - 295
		1200-1400 N/mm ² 355-415 HBN			●	130 - 225
M	Stainless Steel	Austenitic + Ferritic 300 series	◎	●	200 - 335	
		Martensitic 400 series	◎	●	180 - 305	
	PH Stainless	Refractory P.H.	●		85 - 145	
K	Cast Iron	Grey GG-Ft	◎	●	240 - 400	
		Spheroidal-Ductile GGG-FGS			185 - 340	
		Malleable GTS - MN/MP			170 - 285	
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN	●		400 - 2745	
		Aluminium + Silicon > 16% Si 92 HBN			295 - 2135	
S	High Temperature Alloys	Iron Based	●		40 - 67	
		Cobalt Based			37 - 63	
		Nickel Based			42 - 72	
		Titanium Based			61 - 103	
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN		●	50 - 110	
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			40 - 90	



5500V Technical Information



Working Diameter:

$$D_w = 2 \times \sqrt{r^2 - (r - a_p)^2}$$

where: D_w = Working Diameter
 r = Cutter radius
 a_p = Axial Depth of Cut

5500V Technical Information

where:
 f_z = Feed per tooth
 h_m = Average chip thickness
 r = Insert radius
 a_e = Radial Depth of Cut
 a_p = Axial Depth of Cut

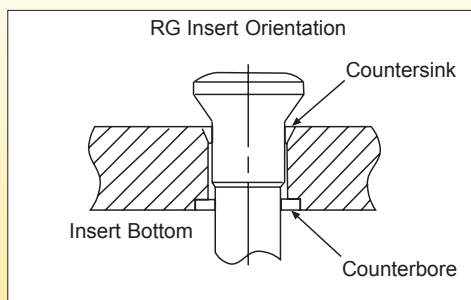
Average chip thickness: h_m

$$h_m = f_z \times \frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}$$

To find programmed feedrate: f_z

$$f_z = \frac{h_m}{\frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}}$$

Insert Assembly Information



Insert through hole has a countersink on one side and a counterbore on the other side. Assemble as shown to create proper pull back against the cutter pocket.



ROUND INSERT MILLING CUTTERS WITHOUT INDEXATION

The **7700VR** series is mainly for medium roughing and semi-finishing with low axial depth of cut as well as for finishing of Steel, Tool Steel, Stainless Steel, High Temperature Alloys and Aluminium Alloys.

This series is without an anti-rotation pocket, which allows a maximum number of insert indexing according to the axial depth of cut requirement. This is an advantage when the cutter is being used for semi-finishing and finishing.

7700VR

7700VR06:

Maximum a_p = 3mm
Diameter Range = 14mm to 20mm

7700VR08:

Maximum a_p = 4mm
Diameter Range = 16mm to 32mm

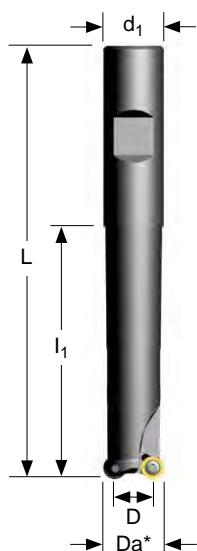
7700VR10:

Maximum a_p = 5mm
Diameter Range = 20mm to 32mm





Contour Mills



Weldon Shank



Modular Head

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D	L	l ₁	d ₁	a _p max	No. of teeth	EDP		EDP		Screw Tightening Nm
7700VR06 Weldon Shank													
021727	7700VR06WA016R067	16	10	115	67	16	3	2	015060	F2505T	018488	T7	0,80
021728	7700VR06WA016R102	16	10	150	102	16	3	2	015060	F2505T	018488	T7	0,80
021729	7700VR06WA020R060	20	14	110	60	20	3	3	015060	F2505T	018488	T7	0,80
021730	7700VR06WA020R090	20	14	140	90	20	3	3	015060	F2505T	018488	T7	0,80
021731	7700VR06WA020R120	20	14	170	120	20	3	3	015060	F2505T	018488	T7	0,80

D = Effective Diameter (Axis) from insert centreline to centreline.

Da* = Outside Diameter

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D	L	M	d ₁	a _p max	No. of teeth	EDP		EDP		Screw Tightening Nm
7700VR06 Modular Head													
033732	7700VR06SA014Z2R35	14	8	35	M10	10,50	3	2	015060	F2505T	018488	T7	0,80
033733	7700VR06SA016Z3R35	16	10	35	M10	10,50	3	3	015060	F2505T	018488	T7	0,80
033734	7700VR06SA020Z4R35	20	14	35	M10	10,50	3	4	015060	F2505T	018488	T7	0,80

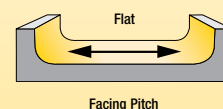
D = Effective Diameter (Axis) from insert centreline to centreline.

Da* = Outside Diameter

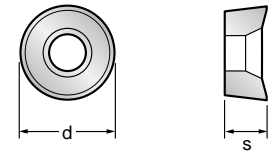
Note: For Cylindrical Shank extensions in high density alloy with through coolant refer to page A76.

7700VR06 Technical Information (mm)

Product		Dimensions						
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a _p max Helical / Linear	Max RPM	
021727	7700VR06WA016R067	10	9.3	22	30	2,00	124000	
021728	7700VR06WA016R102	10	9.3	22	30	2,00	110000	
021729	7700VR06WA020R060	14	5.4	30	38	2,00	90000	
021730	7700VR06WA020R090	14	5.4	30	38	2,00	90000	
021731	7700VR06WA020R120	14	5.4	30	38	2,00	90000	
033732	7700VR06SA014Z2R35	8	7.8	18	26	2,00	124000	
033733	7700VR06SA016Z3R35	10	9.3	22	30	2,00	110000	
033734	7700VR06SA020Z4R35	14	5.4	30	38	2,00	90000	



Depth of Cut (a_p)



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max	a _p min - max	a _p min - max					
034540	RPEX0602M0F-701	SP6519	-	●	◆◆◆◆◆	6,00	-	2,38	3,00	0,02
023313	RPEX0602M0F-701	GH2	-	◆	◆	6,00	-	2,38	3,00	0,02
034541	RPEX0602M0F-701	SP4019	-	■	◆◆◆◆◆	6,00	-	2,38	3,00	0,02
015219	RPMT0602M0E-41	X500	-	●◆◆◆◆	-	6,00	-	2,38	3,00	0,03
034542	RPMT0602M0E-41	SP6519	-	●◆◆◆◆	-	6,00	-	2,38	3,00	0,03
023327	RPMT0602M0E-41	MP91M	-	◆	-	6,00	-	2,38	3,00	0,03
024755	RPEW0602M0T	X500	-	◆◆	-	6,00	-	2,38	3,00	0,06

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.



Contour Mills

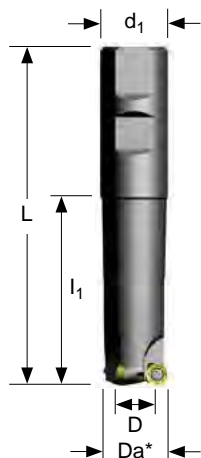
7700VR06 Feeds f _z (mm/tooth)																	
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
F-701	SP6519	Contouring	0,02 - 0,10	0,02 - 0,08	0,02 - 0,10	0,02 - 0,08	0,02 - 0,10	0,02 - 0,10	0,02 - 0,07	0,02 - 0,10	0,02 - 0,07	0,02 - 0,05	0,02 - 0,05	0,02 - 0,06	0,02 - 0,07	-	-
F-701	GH2	Contouring	-	-	-	-	-	-	-	0,02 - 0,10	0,02 - 0,07	-	-	-	-	-	-
F-701	SP4019	Contouring	0,02 - 0,08	0,02 - 0,06	0,02 - 0,08	0,02 - 0,06	0,02 - 0,08	0,02 - 0,08	0,02 - 0,05	0,02 - 0,10	0,02 - 0,07	0,02 - 0,04	0,02 - 0,04	0,02 - 0,05	0,02 - 0,06	-	-
E-41	X500	Contouring	0,03 - 0,12	0,03 - 0,10	0,03 - 0,12	0,03 - 0,10	0,03 - 0,12	0,03 - 0,12	0,03 - 0,10	-	-	0,03 - 0,06	0,03 - 0,05	0,02 - 0,05	0,03 - 0,07	-	-
E-41	SP6519	Contouring	0,03 - 0,12	0,03 - 0,10	0,03 - 0,12	0,03 - 0,10	0,03 - 0,12	0,03 - 0,12	0,03 - 0,10	-	-	0,03 - 0,06	0,03 - 0,05	0,02 - 0,05	0,03 - 0,07	-	-
E-41	MP91M	Contouring	-	-	-	-	0,03 - 0,12	0,03 - 0,12	0,03 - 0,10	-	-	-	-	-	-	-	-
T	X500	Contouring	0,10 - 0,13	0,10 - 0,12	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

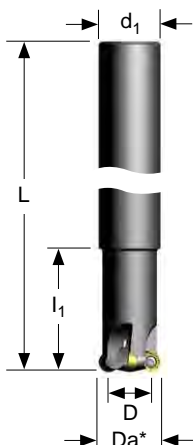
Note: Speed recommendations can be found on page A214.



Contour Mills



Weldon Shank



Cylindrical Shank



Modular Head



Depth of Cut (ap)

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D	L/H	l ₁	d ₁	ap max	No. of teeth	EDP		EDP		Screw Tightening Nm
7700VR08 Weldon Shank													
021732	7700VR08WA025R070-M3	25	17	126	70	25	4	3	015062	F3006T	013214	T9	1,40
021733	7700VR08WA025R124-M3	25	17	180	124	25	4	3	015062	F3006T	013214	T9	1,40
7700VR08 Cylindrical Shank - Medium and Fine Pitch													
031134	7700VR08CA020Z3R40	20	12	180	40	20	4	3	015062	F3006T	013214	T9	1,40
031135	7700VR08CA025Z3R50	25	17	200	50	25	4	3	015062	F3006T	013214	T9	1,40
031602	7700VR08CA025Z4R50	25	17	200	50	25	4	4	015062	F3006T	013214	T9	1,40
031137	7700VR08CA032Z4R70	32	24	250	70	32	4	4	015062	F3006T	013214	T9	1,40
031081	7700VR08CA032Z5R70	32	24	250	70	32	4	5	015062	F3006T	013214	T9	1,40

D = Effective Diameter (Axis) from insert centreline to centreline.

Da* = Outside Diameter

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D	L/H	M	d ₁	ap max	No. of teeth	EDP		EDP		Screw Tightening Nm
7700VR08 Modular Head - Medium and Fine Pitch													
031124	7700VR08SA016Z2R25	16	8	25	M8	8.5	4	2	015062	F3006T	013214	T9	1,40
031125	7700VR08SA020Z3R25	20	12	25	M10	10.5	4	3	015062	F3006T	013214	T9	1,40
031126	7700VR08SA025Z3R35	25	17	35	M12	12.5	4	3	015062	F3006T	013214	T9	1,40
031127	7700VR08SA025Z4R35	25	17	35	M12	12.5	4	4	015062	F3006T	013214	T9	1,40
031080	7700VR08SA032Z5R35	32	24	35	M16	17.0	4	5	015062	F3006T	013214	T9	1,40

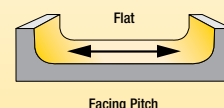
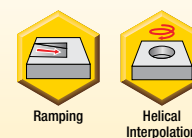
D = Effective Diameter (Axis) from insert centreline to centreline.

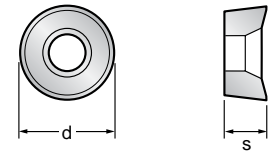
Da* = Outside Diameter

Note: For Cylindrical Shank extensions in high density alloy with through coolant refer to page A76.

7700VR08 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	Max RPM
021732	7700VR08WA025R070-M3	17	7.85	36	48	2,67	68000
021733	7700VR08WA025R124-M3	17	7.85	36	48	2,67	68000
031134	7700VR08CA020Z3R40	12	9.10	26	38	2,67	81000
031135	7700VR08CA025Z3R50	17	7.85	36	48	2,67	68000
031602	7700VR08CA025Z4R50	17	7.85	36	48	2,67	68000
031137	7700VR08CA032Z4R70	24	6.75	50	62	2,67	57000
031081	7700VR08CA032Z5R70	24	6.75	50	62	2,67	57000
031124	7700VR08SA016Z2R25	8	32.60	18	30	2,67	99000
031125	7700VR08SA020Z3R25	12	12.70	26	38	2,67	81000
031126	7700VR08SA025Z3R35	17	7.85	36	48	2,67	68000
031127	7700VR08SA025Z4R35	17	7.85	36	48	2,67	68000
031080	7700VR08SA032Z5R35	24	7.20	50	62	2,67	57000





Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
a _p max	a _p min - max	a _p min - max								
034544	RPEX0803M3F-701	SP4019	-	■	■	8,00	-	3,18	4,00	0,02
023315	RPEX0803M3F-701	GH1	-	◆	◆	8,00	-	3,18	4,00	0,02
031312	RPEX0803M3E-701	X500	-	●	-	8,00	-	3,18	4,00	0,02
034543	RPEX0803M3E-701	SP6519	-	-	◆◆◆	8,00	-	3,18	4,00	0,02
015220	RPMT0803M3E-41	X500	-	●●	-	8,00	-	3,18	4,00	0,02
031473	RPMT0803M3E-41	SP6519	-	■□●	■□●	8,00	-	3,18	4,00	0,02
017308	RPMT0803M3E-41	MP91M	-	■◆	■◆	8,00	-	3,18	4,00	0,02
031186	RPHT0803M3E-422	X500	-	■□◆	■	8,00	-	3,18	4,00	0,03
031187	RPHT0803M3E-422	SP6519	-	◆◆◆□	◆◆◆□	8,00	-	3,18	4,00	0,03

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.



Contour Mills

7700VR08 Feeds f_z (mm/tooth)

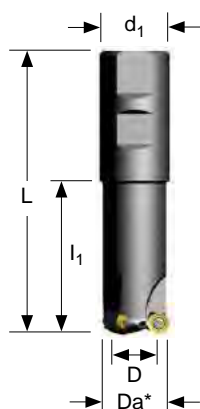
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
F-701	SP4019	Contouring	-	-	-	-	-	-	-	0,02 - 0,08	0,02 - 0,06	0,02 - 0,06	0,02 - 0,06	0,02 - 0,07	0,02 - 0,09	-	-
F-701	GH1	Contouring	-	-	-	-	-	-	-	0,02 - 0,08	0,02 - 0,06	-	-	-	-	-	-
E-701	X500	Contouring	-	-	-	-	-	-	-	-	-	0,02 - 0,06	0,02 - 0,06	0,02 - 0,07	0,02 - 0,09	-	-
E-701	SP6519	Contouring	-	-	0,02 - 0,10	0,02 - 0,08	-	-	-	-	-	0,02 - 0,06	0,02 - 0,06	0,02 - 0,07	0,02 - 0,09	-	-
E-41	X500	Contouring	-	-	0,03 - 0,12	0,03 - 0,10	-	-	-	-	-	-	-	-	-	-	-
E-41	SP6519	Contouring	0,03 - 0,14	0,03 - 0,12	0,03 - 0,12	0,03 - 0,10	0,03 - 0,14	0,03 - 0,14	0,03 - 0,12	-	-	-	-	-	-	-	-
E-41	MP91M	Contouring	0,03 - 0,13	-	-	-	0,03 - 0,13	0,03 - 0,13	0,03 - 0,11	-	-	-	-	-	-	-	-
E-422	X500	Contouring	-	0,03 - 0,12	0,03 - 0,14	0,03 - 0,11	-	-	-	-	-	0,03 - 0,08	0,03 - 0,08	0,03 - 0,09	0,03 - 0,11	-	-
E-422	SP6519	Contouring	0,03 - 0,14	0,03 - 0,12	0,03 - 0,14	0,03 - 0,11	0,03 - 0,14	0,03 - 0,14	0,03 - 0,12	-	-	0,03 - 0,08	0,03 - 0,08	0,03 - 0,09	0,03 - 0,11	-	-

Note: HTA = High Temperature Alloys

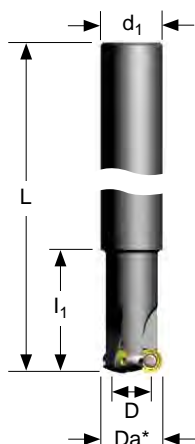
Note: Speed recommendations can be found on page A214.



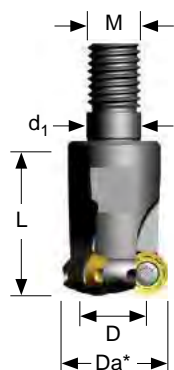
Contour Mills



Weldon Shank



Cylindrical Shank



Modular Head



Depth of Cut (ap)

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D	L/H	l ₁	d ₁	ap max	No. of teeth	EDP		EDP		Screw Tightening Nm
7700VR10 Weldon Shank - Medium and Fine Pitch													
021737	7700VR10WA032R070	32	22	130	70	32	5	3	015260	D4008T	015240	T15	3,10
027820	7700VR10WA032Z4R070	32	22	130	70	32	5	4	015260	D4008T	015240	T15	3,10
021738	7700VR10WA032R140	32	22	200	140	32	5	3	015260	D4008T	015240	T15	3,10
021739	7700VR10WA032R190	32	22	250	190	32	5	3	015260	D4008T	015240	T15	3,10
7700VR10 Cylindrical Shank - Medium and Fine Pitch													
031203	7700VR10CA020Z2R40	20	10	180	40	20	5	2	031223	D4007T	015240	T15	3,10
031204	7700VR10CA025Z3R50	25	15	200	50	25	5	3	031223	D4007T	015240	T15	3,10
031205	7700VR10CA032Z3R70	32	22	200	70	32	5	3	015260	D4008T	015240	T15	3,10
031206	7700VR10CA032Z4R70	32	22	250	70	32	5	4	015260	D4008T	015240	T15	3,10

D = Effective Diameter (Axis) from insert centreline to centreline.

Da* = Outside Diameter

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D	L/H	M	d ₁	ap max	No. of teeth	EDP		EDP		Screw Tightening Nm
7700VR10 Modular Head - Medium and Fine Pitch													
031210	7700VR10SA020Z2R25	20	10	25	M10	10.5	5	2	031223	D4007T	015240	T15	3,10
031211	7700VR10SA025Z3R35	25	15	35	M12	12.5	5	3	031223	D4007T	015240	T15	3,10
031212	7700VR10SA032Z3R35	32	22	35	M16	17.0	5	3	015260	D4008T	015240	T15	3,10
031213	7700VR10SA032Z4R35	32	22	35	M16	17.0	5	4	015260	D4008T	015240	T15	3,10

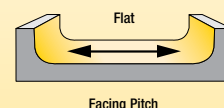
D = Effective Diameter (Axis) from insert centreline to centreline.

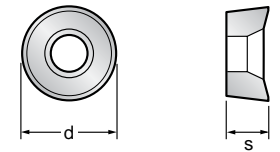
Da* = Outside Diameter

Note: For Cylindrical Shank extensions in high density alloy with through coolant refer to page A76.

7700VR10 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle°	Helical Hole min. - max.		ap max Helical / Linear	Max RPM
021737	7700VR10WA032R070	22	7.55	46	62	3.33	53000
027820	7700VR10WA032Z4R070	22	7.55	46	62	3.33	53000
021738	7700VR10WA032R140	22	7.55	46	62	3.33	53000
021739	7700VR10WA032R190	22	7.55	46	62	3.33	53000
031203	7700VR10CA020Z2R40	10	26.80	22	38	3.33	79000
031204	7700VR10CA025Z3R50	15	17.70	32	48	3.33	65000
031205	7700VR10CA032Z3R70	22	7.55	46	62	3.33	53000
031206	7700VR10CA032Z4R70	22	7.55	46	62	3.33	53000
031210	7700VR10SA020Z2R25	10	26.80	22	38	3.33	79000
031211	7700VR10SA025Z3R35	15	17.70	32	48	3.33	65000
031212	7700VR10SA032Z3R35	22	7.55	46	62	3.33	53000
031213	7700VR10SA032Z4R35	22	7.55	46	62	3.33	53000





Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max	a _p min - max	a _p min - max					
034546	RPEX10T3M0F-701-X4	SP4019	-	■	◆	10,00	-	3,97	5,00	0,02
030456	RPEX10T3M0F-701-X4	GH1	-	◆	◆	10,00	-	3,97	5,00	0,02
034545	RPEX10T3M0E-701-X4	SP6519	-	-	■	10,00	-	3,97	5,00	0,02
030449	RPHT10T3M0E-421-X4	X500	-	●	-	10,00	-	3,97	5,00	0,04
030410	RPHT10T3M0E-421-X4	X700	-	-	●	10,00	-	3,97	5,00	0,04
030452	RPMT10T3M0E-41-X4	X500	-	●	-	10,00	-	3,97	5,00	0,04
031539	RPMT10T3M0E-41-X4	SP6519	-	-	■ ◆ ●	10,00	-	3,97	5,00	0,04
030451	RPMT10T3M0E-41-X4	MP91M	-	■	◆ ●	10,00	-	3,97	5,00	0,04
030697	RPHT10T3M0E422-X4	X500	-	◆ ◆	●	10,00	-	3,97	5,00	0,03
030767	RPHT10T3M0E-422-X4	X700	-	●	◆ ◆	10,00	-	3,97	5,00	0,03
030862	RPHT10T3M0E-422-X4	SP6519	-	● ◆ ◆ ●	◆ ◆ ◆ ●	10,00	-	3,97	5,00	0,03
030329	RPHT10T3M0T-X4	X500	-	■ ■	-	10,00	-	3,97	5,00	0,08
031555	RPHT10T3M0T-X4	SP6519	-	◆ ◆ ◆	-	10,00	-	3,97	5,00	0,08
030454	RPMW10T3M0T-X4	X500	-	◆ ◆ ◆ ◆	-	10,00	-	3,97	5,00	0,13

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

RPMW10T3M0T-X4 X500 is recommended for materials with heavy scale.



Contour Mills

7700VR10 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
F-701-X4	SP4019	Contouring	-	-	-	-	-	-	-	0,02 - 0,10	0,02 - 0,08	0,02 - 0,07	0,02 - 0,07	0,03 - 0,08	0,03 - 0,09	-	-
F-701-X4	GH1	Contouring	-	-	-	-	-	-	-	0,02 - 0,10	0,02 - 0,08	-	-	-	-	-	-
E-701-X4	SP6519	Contouring	-	-	-	-	-	-	-	-	-	0,02 - 0,07	0,02 - 0,07	0,03 - 0,08	0,03 - 0,09	-	-
E-421-X4	X500	Contouring	-	-	-	-	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08	0,04 - 0,09	0,04 - 0,11	-	-
E-421-X4	X700	Contouring	-	-	-	-	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08	0,04 - 0,09	0,04 - 0,11	-	-
E-41-X4	X500	Contouring	-	-	0,04 - 0,18	-	-	-	-	-	-	-	-	-	-	-	-
E-41-X4	SP6519	Contouring	0,04 - 0,18	0,04 - 0,16	0,04 - 0,18	-	0,04 - 0,18	0,04 - 0,18	0,04 - 0,16	-	-	-	-	-	-	-	-
E-41-X4	MP91M	Contouring	0,04 - 0,18	0,04 - 0,16	-	-	0,04 - 0,16	0,04 - 0,16	0,04 - 0,14	-	-	-	-	-	-	-	-
E-422-X4	X500	Contouring	-	-	0,06 - 0,30	0,06 - 0,25	-	-	-	-	-	0,06 - 0,14	0,06 - 0,14	0,06 - 0,16	0,06 - 0,18	-	-
E-422-X4	X700	Contouring	-	-	0,06 - 0,28	0,06 - 0,22	-	-	-	-	-	-	-	-	-	-	-
E-422-X4	SP6519	Contouring	0,06 - 0,30	0,06 - 0,25	0,06 - 0,28	0,06 - 0,22	0,06 - 0,25	0,06 - 0,25	0,06 - 0,22	-	-	0,06 - 0,12	0,06 - 0,12	0,06 - 0,14	0,06 - 0,16	-	-
T-X4	X500	Contouring	0,15 - 0,33	0,15 - 0,28	-	-	-	-	-	-	-	-	-	-	-	-	-
T-X4	SP6519	Contouring	0,15 - 0,32	0,15 - 0,27	-	-	0,15 - 0,30	0,15 - 0,30	0,15 - 0,28	-	-	-	-	-	-	-	-
T-X4	X500	Contouring	0,22 - 0,35	0,22 - 0,33	0,22 - 0,35	0,22 - 0,30	-	-	-	-	-	0,13 - 0,18	0,13 - 0,18	0,13 - 0,20	0,13 - 0,22	-	-

Note: HTA = High Temperature Alloys

Note: Speed recommendations can be found on page A214.



Speed v_c (m/min)

7700VR Series

Wear Resistance



Speed min. - max.

Coolant Recommendation

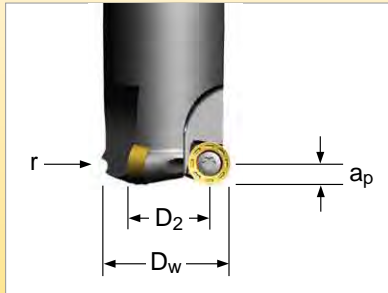
Recommended ● Possible ○

ISO	Materials	Rm and Hardness	CVD X Grade		PVD X Grade		PVD Standard		Uncoated Micrograin		PVD Standard		CVD Standard		Uncoated Micrograin	
			Water	Oil	Water	Oil	Water	Oil	Water	Oil	Water	Oil	Water	Oil	Water	Oil
P	Unalloyed Steel	<600 N/mm ² <180 HBN	○	●							●		●			
		<950 N/mm ² <280 HBN	○	●							●		●			
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○	●							●		●			
		950-1200 N/mm ² 280-355 HBN	○	●							●		●			
		1200-1400 N/mm ² 355-415 HBN	○	●						●		●				
M	Stainless Steel	Austenitic + Ferritic 300 series	○	●							○	●				
		Martensitic 400 series	○	●							○	●				
	PH Stainless	Refractory P.H.	○	●							○	●				
K	Cast Iron	Grey GG-Ft	○	●							○	●				
		Spheroidal-Ductile GGG-FGS	○	●							○	●				
		Malleable GTS - MNMP	○	●							○	●				
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN							●		●			●		
		Aluminium + Silicon > 16% Si 92 HBN								●		●			●	
S	High Temperature Alloys	Iron Based														
		Cobalt Based														
		Nickel Based														
		Titanium Based														
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN														
		Chilled Cast Iron >1400 N/mm ² > 400 HBN														

Contour Mills



7700VR Technical Information



Working Diameter:

$$D_w = D_2 + 2 \times \sqrt{r^2 - (r - a_p)^2}$$

- where:**
- D_w = Working Diameter
 - D₂ = Diameter of cutter insert centre to centre
 - r = Insert radius
 - a_p = Axial Depth of Cut



7710VR Technical Information

Formula to find programmed feed rate based on radial engagement and axial depth of cut.

$$f_z = \frac{h_m}{\frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}}$$

- where:**
- f_z = Feed per tooth
 - h_m = Average chip thickness
 - r = Insert radius
 - a_e = Radial Depth of Cut
 - a_p = Axial Depth of Cut

Formula to calculate the average chip thickness h_m in relation with radial engagement and depth of cut.

$$h_m = f_z \times \frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}$$

Simplified formulas to evaluate h_m and f_z based on radial engagement or depth of cut.

Calculation of the average chip thickness in relation with the D.O.C. (Axial)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_p}}$$

- h_m = Average chip thickness
- a_p = Depth of cut
- f_z = Feed per tooth
- d = Insert diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_p}{d}}$$

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

- h_m = Average chip thickness
- a_e = Radial engagement
- f_z = Feed per tooth
- d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$



With round inserts, the thickness of the chip varies depending on the axial depth of cut (a_p) and is related to the size of the cutting edge-preparation. For best tool life it is important to maintain the proper chip thickness as shown below.

Contour Mills

7700VR06 Inserts RP..0603..

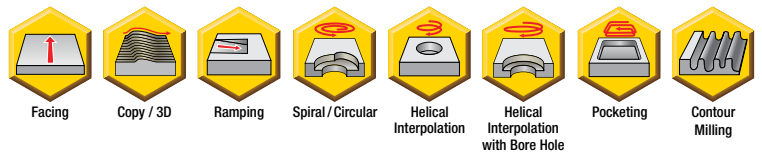
Dimensions (mm)						
Inserts Geometry	Insert Size	a_p Axial d.o.c.	h_m min.	h_m max.	f_z min.	f_z max.
F-701	6,00	0,25	0,02	0,05	0,10	0,24
	6,00	0,50	0,02	0,05	0,07	0,17
	6,00	0,75	0,02	0,05	0,06	0,14
	6,00	1,00	0,02	0,05	0,05	0,12
	6,00	1,25	0,02	0,05	0,04	0,11
	6,00	1,50	0,02	0,05	0,04	0,10
E-41	6,00	0,25	0,03	0,06	0,15	0,29
	6,00	0,50	0,03	0,06	0,10	0,21
	6,00	0,75	0,03	0,06	0,08	0,17
	6,00	1,00	0,03	0,06	0,07	0,15
	6,00	1,25	0,03	0,06	0,07	0,13
	6,00	1,50	0,03	0,06	0,06	0,12
T	6,00	0,25	0,05	0,08	0,24	0,39
	6,00	0,50	0,05	0,08	0,17	0,28
	6,00	0,75	0,05	0,08	0,14	0,23
	6,00	1,00	0,05	0,08	0,12	0,20
	6,00	1,25	0,05	0,08	0,11	0,18
	6,00	1,50	0,05	0,08	0,10	0,16

7700VR08 Inserts RP..0803..

Dimensions (mm)						
Inserts Geometry	Insert Size	a_p Axial d.o.c.	h_m min.	h_m max.	f_z min.	f_z max.
F-701	8,00	0,25	0,02	0,05	0,11	0,28
	8,00	0,50	0,02	0,05	0,08	0,20
	8,00	0,75	0,02	0,05	0,07	0,16
	8,00	1,00	0,02	0,05	0,06	0,14
	8,00	1,25	0,02	0,05	0,05	0,13
	8,00	1,50	0,02	0,05	0,05	0,12
E-701	8,00	0,25	0,02	0,05	0,11	0,28
	8,00	0,50	0,02	0,05	0,08	0,20
	8,00	0,75	0,02	0,05	0,07	0,16
	8,00	1,00	0,02	0,05	0,06	0,14
	8,00	1,25	0,02	0,05	0,05	0,13
	8,00	1,50	0,02	0,05	0,05	0,12
E-41	8,00	0,25	0,03	0,06	0,17	0,34
	8,00	0,50	0,03	0,06	0,12	0,24
	8,00	0,75	0,03	0,06	0,10	0,20
	8,00	1,00	0,03	0,06	0,08	0,17
	8,00	1,25	0,03	0,06	0,08	0,15
	8,00	1,50	0,03	0,06	0,07	0,14
E-422	8,00	0,25	0,03	0,07	0,17	0,40
	8,00	0,50	0,03	0,07	0,12	0,28
	8,00	0,75	0,03	0,07	0,10	0,23
	8,00	1,00	0,03	0,07	0,08	0,20
	8,00	1,25	0,03	0,07	0,08	0,18
	8,00	1,50	0,03	0,07	0,07	0,16

7700VR10 Inserts RP..10T3..

Dimensions (mm)						
Inserts Geometry	Insert Size	a_p Axial d.o.c.	h_m min.	h_m max.	f_z min.	f_z max.
F-701-X4	10,00	0,25	0,02	0,06	0,13	0,38
	10,00	0,50	0,02	0,06	0,09	0,27
	10,00	0,75	0,02	0,06	0,07	0,22
	10,00	1,00	0,02	0,06	0,06	0,19
	10,00	1,25	0,02	0,06	0,06	0,17
	10,00	1,50	0,02	0,06	0,05	0,15
	10,00	2,00	0,02	0,06	0,04	0,13
	10,00	0,25	0,03	0,07	0,19	0,44
	10,00	0,50	0,03	0,07	0,13	0,31
	10,00	0,75	0,03	0,07	0,11	0,26
E-701-X4	10,00	1,00	0,03	0,07	0,09	0,22
	10,00	1,25	0,03	0,07	0,08	0,20
	10,00	1,50	0,03	0,07	0,08	0,18
	10,00	2,00	0,03	0,07	0,07	0,16
	10,00	0,25	0,04	0,08	0,25	0,51
	10,00	0,50	0,04	0,08	0,18	0,36
	10,00	0,75	0,04	0,08	0,15	0,29
	10,00	1,00	0,04	0,08	0,13	0,25
	10,00	1,25	0,04	0,08	0,11	0,23
	10,00	1,50	0,04	0,08	0,10	0,21
E-421-X4	10,00	2,00	0,04	0,08	0,09	0,18
	10,00	0,25	0,04	0,08	0,25	0,51
	10,00	0,50	0,04	0,08	0,18	0,36
	10,00	0,75	0,04	0,08	0,15	0,29
	10,00	1,00	0,04	0,08	0,13	0,25
	10,00	1,25	0,04	0,08	0,11	0,23
	10,00	1,50	0,04	0,08	0,10	0,21
	10,00	2,00	0,04	0,08	0,09	0,18
	10,00	0,25	0,03	0,13	0,19	0,82
	10,00	0,50	0,03	0,13	0,13	0,58
E-422-X4	10,00	0,75	0,03	0,13	0,11	0,47
	10,00	1,00	0,03	0,13	0,09	0,41
	10,00	1,25	0,03	0,13	0,08	0,37
	10,00	1,50	0,03	0,13	0,08	0,34
	10,00	2,00	0,03	0,13	0,07	0,29
	10,00	0,25	0,07	0,14	0,44	0,89
	10,00	0,50	0,07	0,14	0,31	0,63
	10,00	0,75	0,07	0,14	0,26	0,51
	10,00	1,00	0,07	0,14	0,22	0,44
	10,00	1,25	0,07	0,14	0,20	0,40
RPHT_T-X4	10,00	1,50	0,07	0,14	0,18	0,36
	10,00	2,00	0,07	0,14	0,16	0,31
	10,00	0,25	0,10	0,16	0,63	1,01
	10,00	0,50	0,10	0,16	0,45	0,72
	10,00	0,75	0,10	0,16	0,37	0,58
	10,00	1,00	0,10	0,16	0,32	0,51
	10,00	1,25	0,10	0,16	0,28	0,45
	10,00	1,50	0,10	0,16	0,26	0,41
	10,00	2,00	0,10	0,16	0,22	0,36
	10,00	0,25	0,10	0,16	0,26	0,41
RPMW_T-X4	10,00	0,50	0,10	0,16	0,26	0,41
	10,00	0,75	0,10	0,16	0,26	0,41
	10,00	1,00	0,10	0,16	0,26	0,41
	10,00	1,25	0,10	0,16	0,26	0,41
	10,00	1,50	0,10	0,16	0,26	0,41
	10,00	2,00	0,10	0,16	0,22	0,36
	10,00	0,25	0,10	0,16	0,26	0,41
	10,00	0,50	0,10	0,16	0,26	0,41
	10,00	0,75	0,10	0,16	0,26	0,41
	10,00	1,00	0,10	0,16	0,26	0,41



ROUND INSERT MILLING CUTTERS WITH AND WITHOUT INDEXATION

The **77.2VRD** series is specifically designed for the Die & Mould industry. This cutter family is especially qualified for medium-roughing, semi-finishing and finishing of Steel, Alloy Steel, Tool Steel and Aluminium Alloys, as well as for Hardened Steel.

The cutter series **7702VRD** is without an anti-rotation pocket, which allows a maximum number of insert indexing according to the axial depth of cut (a_p) requirement. This is an advantage when this cutter is used for semi-finishing and finishing with low axial depth of cut (a_p).

The series **7712VRD** is ideal for roughing, semi-finishing and finishing of Steel, Alloyed Steel, Tool Steel and Aluminium as well as for Hardened Steel. This cutter series has an anti-rotation design which ensures a precise number of indexes per insert.

This unique patented pocket design prevents the inserts from rotating in the pocket, during heavy feed machining and unstable conditions.

The insert for the **7712VRD12** cutter is six times indexable and the insert for the **7712VRD16** cutter is eight times indexable. This gives a maximum possible usage of the available edges for roughing applications.

Also, the axial negative rake cutting angle greatly reduces the vibration when using long extensions.

This robust design provides savings within the production process, under unstable conditions.

7702VRD

7702VRD07:

Maximum a_p = 3,5mm
Diameter Range = 15mm to 20mm

7702VRD10:

Maximum a_p = 5mm
Diameter Range = 20mm to 35mm

7702VRD12 and 7712VRD12:

Maximum a_p = 6mm
Diameter Range = 25mm to 80mm

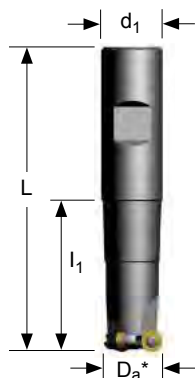
7702VRD16 and 7712VRD16:

Maximum a_p = 8mm
Diameter Range = 32mm to 100mm

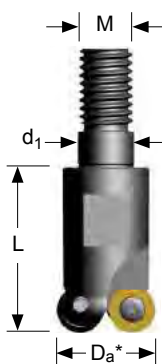




Contour Mills



Weldon Shank



Modular Head

Product		Dimensions (mm)						Spares				
EDP	Item Description	Da*	L	l1	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7702VRD07 Weldon Shank												
025691	7702VRD07WA016R50	16	98	50	16	3,5	2	015060	F2505T	018488	T7	0,80
025693	7702VRD07WA020R50	20	100	50	20	3,5	3	015060	F2505T	018488	T7	0,80

Da* = Outside Diameter

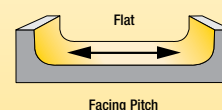
Product		Dimensions (mm)						Spares				
EDP	Item Description	Da*	L	M	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7702VRD07 Modular Head												
030863	7702VRD07SA015R25	15	25	M8	8,5	3,5	2	015060	F2505T	018488	T7	0,80

Note: For Cylindrical shanks extensions in high density alloy with through coolant refer to page A76.

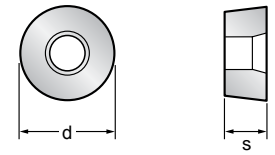
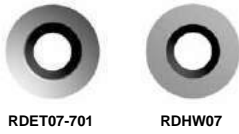
Da* = Outside Diameter

7702VR07 Technical Information (mm)

Product		Dimensions					Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	
025691	7702VRD07WA016R50	9	13.0	20	30	2,33	99000
025693	7702VRD07WA020R50	13	14.5	28	38	2,33	82500
030863	7702VRD07SA015R25	8	25.7	18	28	2,33	105000



Depth of Cut (ap)



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max	a _p min - max	a _p min - max					
034556	RDET0702M0E-701	SP4019	-	-	◆◆◆◆◆	7,00	-	2,38	3,50	0,03
034557	RDHW0702M0T	SP4019	-	◆◆◆◆◆	◆◆◆◆◆	7,00	-	2,38	3,50	0,07

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.



Contour Mills

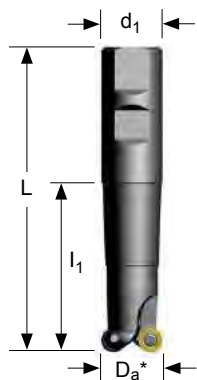
7702VRD07 Feeds f _z (mm/tooth)																	
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
E-701	SP4019	Contouring	0,05 - 0,12	0,05 - 0,10	-	-	0,05 - 0,12	0,05 - 0,12	0,05 - 0,10	0,03 - 0,10	0,03 - 0,08	-	-	-	-	0,03 - 0,05	0,03 - 0,05
T	SP4019	Contouring	0,12 - 0,20	0,12 - 0,18	-	-	0,12 - 0,20	0,12 - 0,20	0,12 - 0,18	-	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A226.



Contour Mills



Weldon Shank



Modular Head

Product		Dimensions (mm)						Spares				
EDP	Item Description	Da*	L	l1	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7702VRD10 Weldon Shank												
025697	7702VRD10WA020R70	20	120	70	20	5	2	022056	F3507T	015240	T15	2,10
025699	7702VRD10WA025R70	25	126	70	25	5	2	015269	F3508T	015240	T15	2,10

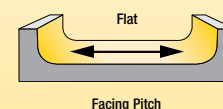
Product		Dimensions (mm)						Spares				
EDP	Item Description	Da*	L	M	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7702VRD10 Modular Head												
031238	7702VRD10SA020R30	20	30	M10	10,5	5	2	022056	F3507T	015240	T15	2,10
031290	7702VRD10SA025R35	25	35	M12	12,5	5	3	015269	F3508T	015240	T15	2,10
031222	7702VRD10SA030R35	30	35	M16	17,0	5	4	015269	F3508T	015240	T15	2,10
031440	7702VRD10SA032R35	32	35	M16	17,0	5	4	015269	F3508T	015240	T15	2,10
031289	7702VRD10SA035R35	35	35	M16	17,0	5	5	015269	F3508T	015240	T15	2,10

Note: For Cylindrical shanks extensions in high density alloy with through coolant refer to page A76.

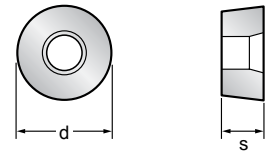
Da* = Outside Diameter

7702VRD10 Technical Information (mm)

Product		Dimensions					Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	
025697	7702VRD10WA020R70	10	17.5	22	38	3,33	74500
025699	7702VRD10WA025R70	15	10.7	32	48	3,33	60500
031238	7702VRD10SA020R30	10	17.5	22	38	3,33	74500
031290	7702VRD10SA025R35	15	10.7	32	48	3,33	60500
031222	7702VRD10SA030R35	20	15.5	42	58	3,33	52500
031440	7702VRD10SA032R35	22	14.0	46	62	3,33	50000
031289	7702VRD10SA035R35	25	10.7	52	68	3,33	47000



Depth of Cut (ap)



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max 2,50*	a _p min - max 0,40 - 2,00	a _p min - max 0,10 - 0,80					
034558	RDET1003M0E-701	SP4019	-	-	◆◆◆◆◆	10,00	-	3,18	5,00	0,05
034559	RDHW1003M0T	SP4019	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆	10,00	-	3,18	5,00	0,12

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Max. recommended a_p = 2,5mm (depending on the application)



Contour Mills

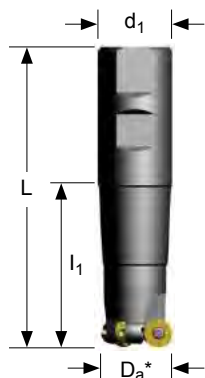
7702VRD10 Feeds f _z (mm/tooth)																	
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 HV/mm ² >415 HBN	Chilled Cast Iron >1400 HV/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
E-701	SP4019	Contouring	0,07 - 0,15	0,07 - 0,12	-	-	0,07 - 0,15	0,07 - 0,15	0,12 - 0,10	0,05 - 0,12	0,05 - 0,10	-	-	-	-	0,04 - 0,07	0,04 - 0,07
T	SP4019	Contouring	0,18 - 0,28	0,18 - 0,25	-	-	0,18 - 0,28	0,18 - 0,28	0,18 - 0,25	-	-	-	-	-	-	0,06 - 0,10	0,06 - 0,10

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A226.



Contour Mills



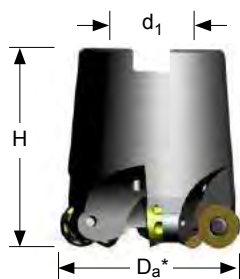
Weldon Shank

Product		Dimensions (mm)						Spares				
EDP	Item Description	Da*	L	l1	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7702VRD12 Weldon Shank												
025703	7702VRD12WA025R70	25	126	70	25	6	2	015269	F3508T	015240	T15	2,10
025705	7702VRD12WA032R70	32	130	70	32	6	3	015269	F3508T	015240	T15	2,10
7712VRD12 Shell Mill Fixation												
029054	7712VRD12-A052R	52	55	-	22	6	5	015269	F3508T	015240	T15	2,10
029055	7712VRD12-A066R	66	55	-	27	6	6	015269	F3508T	015240	T15	2,10
029056	7712VRD12-A080R	80	55	-	27	6	7	015269	F3508T	015240	T15	2,10

Da* = Outside Diameter

The cutter series 7702VRD is without an anti-rotation pocket, which allows a maximum number of insert indexing according to the axial depth of cut (a_p) requirement.

This is an advantage when the cutter is used for semi-finishing and finishing with low axial depth of cut (a_p).



Shell Mill Fixation

Product		Dimensions (mm)						Spares				
EDP	Item Description	Da*	L	M	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7712VRD12 Modular Head												
031383	7712VRD12SA035R35	35	35	M16	17,0	6	3	022056	F3507T	015240	T15	2,10

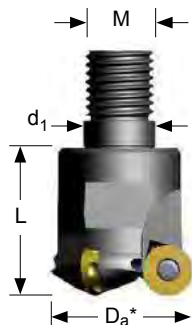
Note: For Cylindrical shank extensions in high density alloy with through coolant refer to page A76.

Da* = Outside Diameter

The 7712VRD series with anti-rotation pocket ensures a precise number indexes per insert.

This unique patented pocket design prevents the inserts from rotating in the pocket during heavy feed machining and unstable conditions.

The insert for the 7712VRD12 cutter is 6 times indexable.



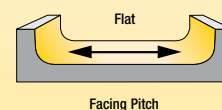
Modular Head



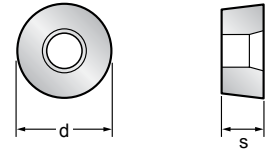
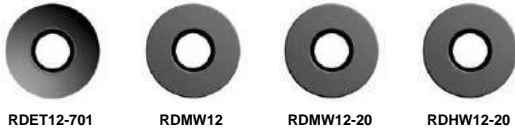
Depth of Cut (a_p)

7702VRD12 & 7712VRD12 Technical Information (mm)

Product		Dimensions					Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle*	Helical Hole min. - max.		ap max Helical / Linear	
025703	7702VRD12WA025R70	13	16,50	28	48	4,00	50000
025705	7702VRD12WA032R70	20	12,00	42	62	4,00	40000
029054	7712VRD12-A052R	40	5,00	82	102	4,00	28500
029055	7712VRD12-A066R	54	3,70	110	130	4,00	24500
029056	7712VRD12-A080R	68	2,80	138	158	4,00	21500
031383	7712VRD12SA035R35	23	18,60	48	68	4,00	37500



Facing Pitch



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			a _p max 3,50*	a _p min - max 0,50 - 2,50	a _p min - max 0,10 - 0,80					
034560	RDET12T3M0E-701-X6	SP4019	-	-	◆◆◆◆◆	12,00	-	3,97	6,00	0,05
031524	RDMW12T3M0T-X6	SP5419	-	■	-	12,00	-	3,97	6,00	0,15
034562	RDHW12T3M0T-X6	SP4019	-	◆◆◆◆◆	■◆◆◆◆	12,00	-	3,97	6,00	0,15
031523	RDMW12T3M0T-20-X6	SP5419	●	■	-	12,00	-	3,97	6,00	0,20
031519	RDHW12T3M0T-20-X6	SP5419	■◆	-	-	12,00	-	3,97	6,00	0,20
034561	RDHW12T3M0T-20-X6	SP4019	◆◆◆◆◆	-	-	12,00	-	3,97	6,00	0,20

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Max. recommended a_p = 3,5mm (depending on the application)

RDMW12T3M0T-20-X6 and RDHW12T3M0T-20-X6 are for heavy roughing applications.



Contour Mills

7702VRD12 & 7712VRD12 Feeds f_z (mm/tooth)

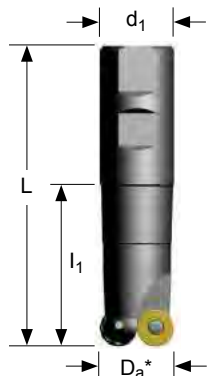
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Grey Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% SI T16 HBN	Aluminum & Silicon >16% SI 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
E-701-X6	SP4019	Contouring	0,07 - 0,20	0,07 - 0,18	-	-	0,07 - 0,20	0,07 - 0,20	0,07 - 0,18	0,05 - 0,14	0,05 - 0,12	-	-	-	-	0,04 - 0,08	0,04 - 0,08
RDMW...T-X6	SP5419	Contouring	0,20 - 0,32	0,20 - 0,30	-	-	-	-	-	-	-	-	-	-	-	-	-
RDHW...T-X6	SP4019	Contouring	0,20 - 0,30	0,20 - 0,28	-	-	0,20 - 0,30	0,20 - 0,30	0,20 - 0,25	-	-	-	-	-	-	0,10 - 0,12	0,10 - 0,12
RDMW...T-20-X6	SP5419	Contouring	0,30 - 0,45	0,30 - 0,42	-	-	-	-	-	-	-	-	-	-	-	-	-
RDHW...T-20-X6	SP5419	Contouring	0,30 - 0,45	0,30 - 0,42	-	-	-	-	-	-	-	-	-	-	-	-	-
RDHW...T-20-X6	SP4019	Contouring	0,30 - 0,42	0,30 - 0,40	-	-	0,30 - 0,45	0,30 - 0,45	0,30 - 0,42	-	-	-	-	-	-	0,10 - 0,14	0,10 - 0,14

Note: HTA = High Temperature Alloys

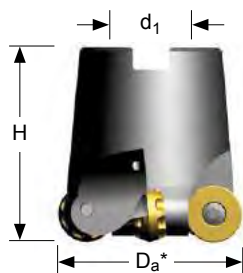
Note: Speed recommendations can be found on page A226.



Contour Mills



Weldon Shank



Shell Mill Fixation



Modular Head



Depth of Cut (a_p)

Product		Dimensions (mm)						Spares				
EDP	Item Description	D_a^*	L	l_1	d_1	a_p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7702VRD16 Weldon Shank												
025709	7702VRD16WA032R70	32	130	70	32	8	2	015270	F4011T	015241	T20	3,10
7712VRD16 Shell Mill Fixation												
029057	7712VRD16-A052R	52	55	-	22	8	4	015270	F4011T	015241	T20	3,10
029058	7712VRD16-A066R	66	55	-	27	8	5	015270	F4011T	015241	T20	3,10
029059	7712VRD16-A080R	80	55	-	27	8	6	015270	F4011T	015241	T20	3,10
029060	7712VRD16-A100R	100	55	-	32	8	7	015270	F4011T	015241	T20	3,10

D_a^* = Outside Diameter

The cutter series 7702VRD is without an anti-rotation pocket, which allows a maximum number of insert indexing according to the axial depth of cut (a_p) requirement.

This is an advantage when the cutter is used for semi-finishing and finishing with low axial depth of cut (a_p).

Product		Dimensions (mm)						Spares				
EDP	Item Description	D_a^*	L	M	d_1	a_p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7712VRD16 Modular Head												
031300	7712VRD16SA032R43	32	43	M16	17,0	8	2	015270	F4011T	015241	T20	3,10

Note: For Cylindrical shank extensions in high density alloy with through coolant refer to page A76.

D_a^* = Outside Diameter

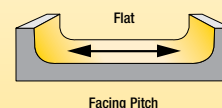
The 7712VRD series with anti-rotation pocket ensures a precise number indexes per insert.

This unique patented pocket design prevents the inserts from rotating in the pocket during heavy feed machining and unstable conditions.

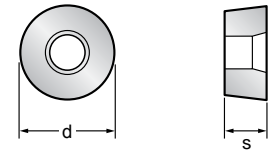
The insert for the 7712VRD16 cutter is 8 times indexable.

7702VRD16 & 7712VRD16 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a_p max Helical / Linear	Max RPM
025709	7702VRD16WA032R70	16	17.50	34	62	5,33	34000
029057	7712VRD16-A052R	36	5.20	74	102	5,33	22500
029058	7712VRD16-A066R	50	4.10	102	130	5,33	19000
029059	7712VRD16-A080R	64	3.35	130	158	5,33	17000
029060	7712VRD16-A100R	84	2.65	170	198	5,33	14500
031300	7712VRD16SA032R43	16	10.85	34	62	5,33	34000



Facing Pitch



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max 5,00*	a _p min - max 0,50 - 2,50	a _p min - max 0,10 - 0,80					
034563	RDET1604M0E-701-X8	SP4019	-	-	◆◆◆◆◆	16,00	-	4,76	8,00	0,05
031521	RDMW1604M0T-X8	SP5419	-	●●	-	16,00	-	4,76	8,00	0,15
031653	RDHW1604M0T-X8	SP5419	-	■	-	16,00	-	4,76	8,00	0,15
034565	RDHW1604M0T-X8	SP4019	-	◆◆◆◆◆	■◆◆◆◆	16,00	-	4,76	8,00	0,15
031522	RDMW1604M0T-30-X8	SP5419	◆◆	-	-	16,00	-	4,76	8,00	0,30
031520	RDHW1604M0T-30-X8	SP5419	■	-	-	16,00	-	4,76	8,00	0,30
034564	RDHW1604M0T-30-X8	SP4019	●◆◆	-	-	16,00	-	4,76	8,00	0,30


Contour Mills

 Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

 * Max. recommended a_p = 5mm (depending on the application)

RDMW1604MOT-30-X8 and RDHW1604MOT-30-X8 are for heavy roughing applications.

7702VRD16 & 7712VRD16 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
E-701-X8	SP4019	Contouring	0,07 - 0,22	0,07 - 0,20	-	-	0,07 - 0,22	0,07 - 0,22	0,07 - 0,20	0,05 - 0,20	0,05 - 0,18	-	-	-	-	0,04 - 0,08	0,04 - 0,08
RDMW...T-X8	SP5419	Contouring	0,25 - 0,45	0,25 - 0,42	-	-	-	-	-	-	-	-	-	-	-	-	-
RDHW...T-X8	SP5419	Contouring	0,25 - 0,45	0,25 - 0,42	-	-	-	-	-	-	-	-	-	-	-	-	-
RDHW...T-X8	SP4019	Contouring	0,25 - 0,40	0,25 - 0,38	-	-	0,25 - 0,42	0,25 - 0,42	0,25 - 0,38	-	-	-	-	-	-	0,10 - 0,15	0,10 - 0,15
RDMW...T-30-X8	SP5419	Contouring	0,45 - 0,70	0,42 - 0,60	-	-	-	-	-	-	-	-	-	-	-	-	-
RDHW...T-30-X8	SP5419	Contouring	0,45 - 0,70	0,42 - 0,60	-	-	-	-	-	-	-	-	-	-	-	-	-
RDHW...T-30-X8	SP4019	Contouring	0,42 - 0,55	0,40 - 0,50	-	-	0,45 - 0,60	0,45 - 0,60	0,42 - 0,55	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Note: Speed recommendations can be found on page A226.

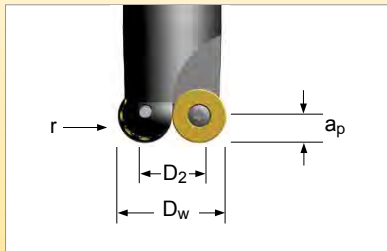


Contour Mills

Speed v_c (m/min)								
7702VRD & 7712VRD Series			Wear Resistance					
			- ← → +					
Coolant Recommendation			Speed min. - max.					
Recommended ● Possible ☉			PVD Standard		PVD Standard			
ISO	Materials	Rm and Hardness	☉	●	SP5419	☉	●	SP4019
P	Unalloyed Steel	<600 N/mm ² <180 HBN	☉	●	115 - 205		●	140 - 315
		<950 N/mm ² <280 HBN			105 - 185			120 - 275
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	☉	●	90 - 160		●	105 - 245
		950-1200 N/mm ² 280-355 HBN			70 - 120			80 - 190
		1200-1400 N/mm ² 355-415 HBN		●	45 - 80		●	50 - 120
M	Stainless Steel	Austenitic + Ferritic 300 series						
		Martensitic 400 series						
	PH Stainless	Refractory P.H.						
K	Cast Iron	Grey GG-Ft						145 - 330
		Spheroidal-Ductile GGG-FGS					●	115 - 255
		Malleable GTS - MN/MP						105 - 235
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si T16 HBN				●		400 - 2895
		Aluminium + Silicon > 16% Si 92 HBN						295 - 2320
S	High Temperature Alloys	Iron Based						
		Cobalt Based						
		Nickel Based						
		Titanium Based						
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN					●	50 - 100
		Chilled Cast Iron >1400 N/mm ² > 400 HBN						40 - 90



7702VRD & 7712VRD Technical Information



Working Diameter:

Formula to evaluate the correct working diameter based on axial depth of cut (a_p).

$$D_w = D_2 + 2 \times \sqrt{r^2 - (r - a_p)^2}$$

where: D_w = Working Diameter
 D_2 = Diameter of cutter insert centre to centre
 r = Insert radius
 a_p = Axial Depth of Cut

7702VRD & 7712VRD Technical Information

Formula to find programmed feed rate based on radial engagement and axial depth of cut.

$$f_z = \frac{h_m}{\frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}}$$

where:
 f_z = Feed per tooth
 h_m = Average chip thickness
 r = Insert radius
 a_e = Radial Depth of Cut
 a_p = Axial Depth of Cut

Formula to calculate the average chip thickness h_m in relation with radial engagement and depth of cut.

$$h_m = f_z \times \frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}$$

Simplified formulas to evaluate h_m and f_z based on radial engagement or depth of cut.

Calculation of the average chip thickness in relation with the D.O.C. (Axial)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_p}}$$

h_m = Average chip thickness
 a_p = Depth of cut
 f_z = Feed per tooth
 d = Insert diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_p}{d}}$$

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
 a_e = Radial engagement
 f_z = Feed per tooth
 d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$



With round inserts, the thickness of the chip varies depending on the axial depth of cut.
For best tool-life it is important to maintain the proper chip thickness as shown below.

Inserts RD..0702...

Dimensions (mm)						
Inserts Geometry	Insert Size	ap Axial d.o.c.	hm min.	hm max.	fz min.	fz max.
E-701	7,00	0,10	0,02	0,06	0,17	0,50
	7,00	0,25	0,02	0,06	0,11	0,32
	7,00	0,50	0,02	0,06	0,07	0,22
	7,00	0,75	0,02	0,06	0,06	0,18
	7,00	1,00	0,02	0,06	0,05	0,16
	7,00	1,25	0,02	0,06	0,05	0,14
T	7,00	1,30	0,02	0,06	0,05	0,14
	7,00	0,10	0,05	0,08	0,42	0,67
	7,00	0,25	0,05	0,08	0,26	0,42
	7,00	0,50	0,05	0,08	0,19	0,30
	7,00	0,75	0,05	0,08	0,15	0,24
	7,00	1,00	0,05	0,08	0,13	0,21
T	7,00	1,25	0,05	0,08	0,12	0,19
	7,00	1,30	0,05	0,08	0,12	0,19

With round inserts, the thickness of the chip varies depending on the axial depth of cut.
For best tool-life it is important to maintain the proper chip thickness as shown below.

Inserts RD..1003..

Dimensions (mm)						
Inserts Geometry	Insert Size	ap Axial d.o.c.	hm min.	hm max.	fz min.	fz max.
E-701	10,00	0,10	0,04	0,07	0,40	0,70
	10,00	0,25	0,04	0,07	0,25	0,44
	10,00	0,50	0,04	0,07	0,18	0,31
	10,00	0,75	0,04	0,07	0,15	0,26
	10,00	1,00	0,04	0,07	0,13	0,22
	10,00	1,25	0,04	0,07	0,11	0,20
	10,00	1,50	0,04	0,07	0,10	0,18
	10,00	1,75	0,04	0,07	0,10	0,17
	10,00	2,00	0,04	0,07	0,09	0,16
	10,00	2,25	0,04	0,07	0,08	0,15
	10,00	2,50	0,04	0,07	0,08	0,14
	T	10,00	0,10	0,10	0,15	1,00
10,00		0,25	0,10	0,15	0,63	0,95
10,00		0,50	0,10	0,15	0,45	0,67
10,00		0,75	0,10	0,15	0,37	0,55
10,00		1,00	0,10	0,15	0,32	0,47
10,00		1,25	0,10	0,15	0,28	0,42
10,00		1,50	0,10	0,15	0,26	0,39
10,00		1,75	0,10	0,15	0,24	0,36
10,00		2,00	0,10	0,15	0,22	0,34
10,00		2,25	0,10	0,15	0,21	0,32
10,00		2,50	0,10	0,15	0,20	0,30



With round inserts, the thickness of the chip varies depending on the axial depth of cut.
For best tool-life it is important to maintain the proper chip thickness as shown below.

Inserts RD..12T3..

Dimensions (mm)						
Inserts Geometry	Insert Size	a_p Axial d.o.c.	h_m min.	h_m max.	f_z min.	f_z max.
E-701-X6	12,00	0,25	0,04	0,09	0,28	0,62
	12,00	0,50	0,04	0,09	0,20	0,44
	12,00	0,75	0,04	0,09	0,16	0,36
	12,00	1,00	0,04	0,09	0,14	0,31
	12,00	1,25	0,04	0,09	0,12	0,28
	12,00	1,50	0,04	0,09	0,11	0,25
	12,00	1,75	0,04	0,09	0,10	0,24
	12,00	2,00	0,04	0,09	0,10	0,22
	12,00	2,50	0,04	0,09	0,09	0,20
	12,00	3,00	0,04	0,09	0,08	0,18
	12,00	3,50	0,04	0,09	0,07	0,17
T-X6	12,00	0,25	0,13	0,18	0,90	1,25
	12,00	0,50	0,13	0,18	0,64	0,88
	12,00	0,75	0,13	0,18	0,52	0,72
	12,00	1,00	0,13	0,18	0,45	0,62
	12,00	1,25	0,13	0,18	0,40	0,56
	12,00	1,50	0,13	0,18	0,37	0,51
	12,00	1,75	0,13	0,18	0,34	0,47
	12,00	2,00	0,13	0,18	0,32	0,44
	12,00	2,50	0,13	0,18	0,28	0,39
	12,00	3,00	0,13	0,18	0,26	0,36
	12,00	3,50	0,13	0,18	0,24	0,33
T-20-X6	12,00	0,25	0,18	0,22	1,25	1,52
	12,00	0,50	0,18	0,22	0,88	1,08
	12,00	0,75	0,18	0,22	0,72	0,88
	12,00	1,00	0,18	0,22	0,62	0,76
	12,00	1,25	0,18	0,22	0,56	0,68
	12,00	1,50	0,18	0,22	0,51	0,62
	12,00	1,75	0,18	0,22	0,47	0,58
	12,00	2,00	0,18	0,22	0,44	0,54
	12,00	2,50	0,18	0,22	0,39	0,48
	12,00	3,00	0,18	0,22	0,36	0,44
	12,00	3,50	0,18	0,22	0,33	0,41





With round inserts, the thickness of the chip varies depending on the axial depth of cut.
For best tool-life it is important to maintain the proper chip thickness as shown below.

Inserts RD..1604..

Dimensions (mm)						
Inserts Geometry	Insert Size	ap Axial d.o.c.	hm min.	hm max.	fz min.	fz max.
E-701-X8	16,00	0,25	0,04	0,10	0,32	0,80
	16,00	0,50	0,04	0,10	0,23	0,57
	16,00	0,75	0,04	0,10	0,18	0,46
	16,00	1,00	0,04	0,10	0,16	0,40
	16,00	1,25	0,04	0,10	0,14	0,36
	16,00	1,50	0,04	0,10	0,13	0,33
	16,00	1,75	0,04	0,10	0,12	0,30
	16,00	2,00	0,04	0,10	0,11	0,28
	16,00	2,50	0,04	0,10	0,10	0,25
	16,00	3,00	0,04	0,10	0,09	0,23
	16,00	3,50	0,04	0,10	0,09	0,21
	16,00	4,00	0,04	0,10	0,08	0,20
	16,00	4,50	0,04	0,10	0,08	0,19
	16,00	5,00	0,04	0,10	0,07	0,18
T-X8	16,00	0,25	0,14	0,20	1,12	1,60
	16,00	0,50	0,14	0,20	0,79	1,13
	16,00	0,75	0,14	0,20	0,65	0,92
	16,00	1,00	0,14	0,20	0,56	0,80
	16,00	1,25	0,14	0,20	0,50	0,72
	16,00	1,50	0,14	0,20	0,46	0,65
	16,00	1,75	0,14	0,20	0,42	0,60
	16,00	2,00	0,14	0,20	0,40	0,57
	16,00	2,50	0,14	0,20	0,35	0,51
	16,00	3,00	0,14	0,20	0,32	0,46
	16,00	3,50	0,14	0,20	0,30	0,43
	16,00	4,00	0,14	0,20	0,28	0,40
	16,00	4,50	0,14	0,20	0,26	0,38
	16,00	5,00	0,14	0,20	0,25	0,36
T-30-X8	16,00	0,25	0,25	0,30	2,00	2,40
	16,00	0,50	0,25	0,30	1,41	1,70
	16,00	0,75	0,25	0,30	1,15	1,39
	16,00	1,00	0,25	0,30	1,00	1,20
	16,00	1,25	0,25	0,30	0,89	1,07
	16,00	1,50	0,25	0,30	0,82	0,98
	16,00	1,75	0,25	0,30	0,76	0,91
	16,00	2,00	0,25	0,30	0,71	0,85
	16,00	2,50	0,25	0,30	0,63	0,76
	16,00	3,00	0,25	0,30	0,58	0,69
	16,00	3,50	0,25	0,30	0,53	0,64
	16,00	4,00	0,25	0,30	0,50	0,60
	16,00	4,50	0,25	0,30	0,47	0,57
	16,00	5,00	0,25	0,30	0,45	0,54

Contour Mills



ROUND INSERT MILLING CUTTERS WITH INDEXATION

The **7710VRD** cutter series is excellent for heavy roughing and semi-finishing of all materials. Specifically for Stainless Steels, High Temperature Alloys as well as for Unalloyed Steel, Alloyed Steel and Cast Iron.

This cutter design is perfectly suited for face milling forgings where material allowance is unpredictable.

The 7710VRD cutter series with anti-rotation ensures a precise number of indexes per insert.

This unique patented pocket design prevents the inserts from rotating in the pocket, during heavy feed machining and unstable conditions.

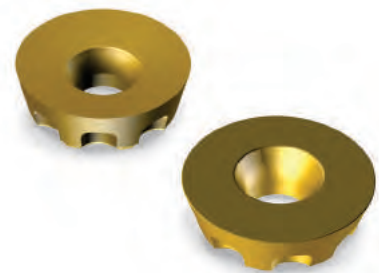
This 20mm insert size is 8 times indexable that gives a maximum possible usage of the available edges.

7710VRD20

7710VRD20:

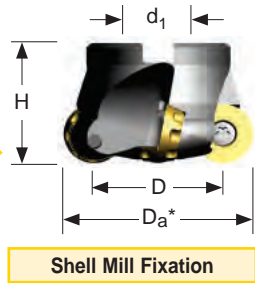
Maximum a_p = 10mm
Diameter Range = 63 to 160mm

Note: Larger diameter Shell Mill Fixation cutters with interchangeable cartridges are available. Please see page A156.





Contour Mills



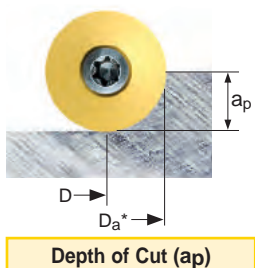
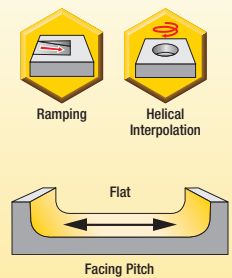
Product		Dimensions (mm)							Spares					
EDP	Item Description	Da*	D Effective Cutting Diameter	H	l1	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm	
7710VRD20 Shell Mill Fixation														
031443	7710VRD20-A063Z4R	63	43	40	40	22	10	4	029640		D6014T	015241	T20	10,50
031444	7710VRD20-A080Z5R	80	60	50	50	27	10	5						
031445	7710VRD20-A100Z6R	100	80	50	50	32	10	6						
031446	7710VRD20-A125Z7R	125	105	63	63	40	10	7						
031447	7710VRD20-160Z08R	160	140	63	63	40	10	8						

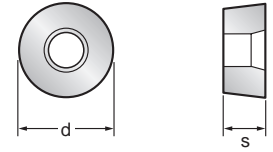
D = Effective Diameter (Axis) from Insert centreline to centreline

Da* = Outside Diameter

7710VRD20 Technical Information (mm)

Product		Dimensions					ap max Helical / Linear	Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.				
031443	7710VRD20-A063Z4R	43	8.30	88	124	6.60	14850	
031444	7710VRD20-A080Z5R	60	5.40	122	158	6.60	18500	
031445	7710VRD20-A100Z6R	80	3.80	162	198	6.60	16000	
031446	7710VRD20-A125Z7R	105	2.80	212	248	6.60	14000	
031447	7710VRD20-160Z08R	140	2.20	282	318	6.60	12100	





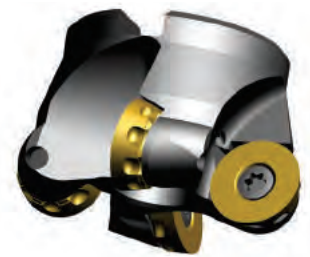
Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _p max 10,0*	a _p min. - max. 1,0 - 3,0	a _p min. - max. 0,2 - 1,0					
029310	RDHT2006M0E-42-X8	X500	■ ◆	◆ ◆	-	20,00	-	6,35	10,00	0,08
031533	RDHT2006M0E-42-X8	SP6519	◆ ◆	◆ ◆	-	20,00	-	6,35	10,00	0,08
029309	RDHW2006M0E-X8	X500	-	● ● ● ● ◆	-	20,00	-	6,35	10,00	0,10
031661	RDHW2006M0S-X8	X500	● ● ◆	■ ■ ■	-	20,00	-	6,35	10,00	0,15
031662	RDHW2006M0S-X8	SP6519	■ ■ ■	◆ ◆ ◆	-	20,00	-	6,35	10,00	0,15
031660	RDHW2006M0S-25-X8	X500	● ● ●	-	-	20,00	-	6,35	10,00	0,25
031576	RDHW2006M0S-25-X8	SP6519	◆ ◆ ◆	-	-	20,00	-	6,35	10,00	0,25

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Max. recommended a_p = 7,5mm (depending on the application)

INSERT APPLICATION NOTES:

RDHW2006M0E-X8 X500 should be your first choice for medium roughing application when machining Titanium without heavy scale.
 RDHW2006M0S-X8 SP6519 should be used when machining Stainless Steel with heavy scale.
 RDHW2006M0S-X8 X500 should be used when machining High Temperature Alloys with heavy scale.
 RDHT2006M0E-42-X8 should be used when the machine tool has low power available and when the conditions are stable.
 RDHW2006M0S-25-X8 should be used for heavy duty applications.



Contour Mills

7710VRD20 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
E-42-X8	X500	Facing	-	-	0,15 - 0,35	0,15 - 0,30	-	-	-	-	-	0,12 - 0,25	0,12 - 0,25	0,12 - 0,25	0,12 - 0,30	-	-
E-42-X8	SP6519	Facing	-	-	0,15 - 0,35	0,15 - 0,28	-	-	-	-	-	0,12 - 0,25	0,12 - 0,25	0,12 - 0,25	0,12 - 0,30	-	-
E-X8	X500	Facing	0,20 - 0,30	0,18 - 0,28	0,20 - 0,40	0,20 - 0,30	0,20 - 0,35	0,20 - 0,35	0,20 - 0,30	-	-	0,20 - 0,28	0,20 - 0,28	0,20 - 0,28	0,20 - 0,32	-	-
S-X8	X500	Facing	0,25 - 0,45	0,25 - 0,35	0,25 - 0,45	0,25 - 0,32	0,25 - 0,45	0,25 - 0,45	0,25 - 0,40	-	-	0,25 - 0,32	0,25 - 0,32	0,25 - 0,32	0,25 - 0,35	-	-
S-X8	SP6519	Facing	0,25 - 0,45	0,25 - 0,35	-	-	0,25 - 0,45	0,25 - 0,45	0,25 - 0,40	-	-	-	-	-	-	-	-
S-25-X8	X500	Facing	0,35 - 0,60	0,35 - 0,50	-	-	0,35 - 0,60	0,35 - 0,55	0,35 - 0,45	-	-	-	-	-	-	-	-
S-25-X8	SP6519	Facing	0,35 - 0,55	0,35 - 0,45	-	-	0,35 - 0,55	0,35 - 0,50	0,35 - 0,40	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Note: Speed recommendations can be found on page A234.

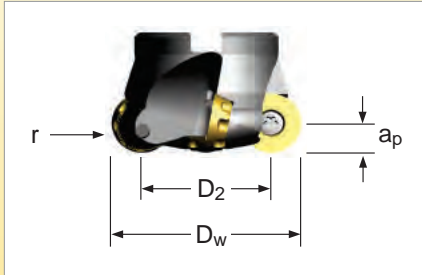


Contour Mills

Speed v_c (m/min)							
7710VRD20 Series			Wear Resistance - ← → +				
Coolant Recommendation			Speed min. - max.				
Recommended ● Possible ○			CVD X Grade		PVD Standard		
ISO	Materials	Rm and Hardness	☹	☹	X500	☹	☹
P	Unalloyed Steel	<600 N/mm ² <180 HBN	○	●	130 - 270	○	●
		<950 N/mm ² <280 HBN	○	●	115 - 240	○	●
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○	●	100 - 210	○	●
		950-1200 N/mm ² 280-355 HBN	○	●	75 - 160	○	●
		1200-1400 N/mm ² 355-415 HBN	○	●	50 - 100	○	●
M	Stainless Steel	Austenitic + Ferritic 300 series	○	●	115 - 250	○	●
		Martensitic 400 series	○	●	100 - 220	○	●
	PH Stainless	Refractory P.H.	●	○	50 - 110	●	○
K	Cast Iron	Grey GG-Ft	○	●	120 - 280	○	●
		Spheroidal-Ductile GGG-FGS	○	●	105 - 205	○	●
		Malleable GTS - MNMP	○	●	95 - 170	○	●
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN	○	○		○	○
		Aluminium + Silicon > 16% Si 92 HBN	○	○		○	○
S	High Temperature Alloys	Iron Based	○	○	23 - 48	○	○
		Cobalt Based	○	○	21 - 44	○	○
		Nickel Based	○	○	24 - 51	○	○
		Titanium Based	○	○	35 - 73	○	○
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	○	○		○	○
		Chilled Cast Iron >1400 N/mm ² > 400 HBN	○	○		○	○



7710VRD20 Technical Information



Working Diameter:

Formula to evaluate the correct working diameter based on axial depth of cut (a_p).

$$D_w = D_2 + 2 \times \sqrt{r^2 - (r - a_p)^2}$$

where: D_w = Working Diameter
 D_2 = Diameter of cutter insert centre to centre
 r = Insert radius
 a_p = Axial Depth of Cut

7710VRD20 Technical Information

Formula to find programmed feed rate based on radial engagement and axial depth of cut.

$$f_z = \frac{h_m}{\frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}}$$

where:
 f_z = Feed per tooth
 h_m = Average chip thickness
 r = Insert radius
 a_e = Radial Depth of Cut
 a_p = Axial Depth of Cut

Formula to calculate the average chip thickness h_m in relation with radial engagement and depth of cut.

$$h_m = f_z \times \frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}$$





Simplified formulas to evaluate h_m and f_z based on axial depth of cut (a_p) or radial engagement (a_e).

Calculation of the average chip thickness in relation with the D.O.C. (Axial)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_p}}$$

h_m = Average chip thickness

a_p = Depth of cut

f_z = Feed per tooth

d = Insert diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_p}{d}}$$

Contour Mills

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness

a_e = Radial engagement

f_z = Feed per tooth

d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

With round inserts, the thickness of the chip varies depending on the axial depth of cut (a_p) and is related to the size of the cutting edge-preparation. For best tool life it is important to maintain the proper chip thickness as shown below. This chart calculates in relation with axial depth of cut (a_p) only and not radial cut (a_e).

RD..2006..insert

Insert	Insert size (mm)	a_p d.o.c. (mm)	h_m (mm)		f_z (mm/Z)	
			min.	max.	min.	max.
RDHT2006M0E-42-X8	20,00	1,00	0,08	0,18	0,36	0,80
	20,00	2,00	0,08	0,18	0,25	0,57
	20,00	3,00	0,08	0,18	0,21	0,46
	20,00	4,00	0,08	0,18	0,18	0,40
	20,00	5,00	0,08	0,18	0,16	0,36
	20,00	6,00	0,08	0,18	0,15	0,33
	20,00	8,00	0,08	0,18	0,13	0,28
	20,00	10,00	0,08	0,18	0,11	0,25
RDHW2006M0E-X8	20,00	1,00	0,10	0,20	0,45	0,89
	20,00	2,00	0,10	0,20	0,32	0,63
	20,00	3,00	0,10	0,20	0,26	0,52
	20,00	4,00	0,10	0,20	0,22	0,45
	20,00	5,00	0,10	0,20	0,20	0,40
	20,00	6,00	0,10	0,20	0,18	0,37
	20,00	8,00	0,10	0,20	0,16	0,32
	20,00	10,00	0,10	0,20	0,14	0,28
RDHW2006M0S-X8	20,00	2,00	0,15	0,25	0,47	0,79
	20,00	3,00	0,15	0,25	0,39	0,65
	20,00	4,00	0,15	0,25	0,34	0,56
	20,00	5,00	0,15	0,25	0,30	0,50
	20,00	6,00	0,15	0,25	0,27	0,46
	20,00	8,00	0,15	0,25	0,24	0,40
	20,00	10,00	0,15	0,25	0,21	0,35
RDHW2006M0S-25-X8	20,00	4,00	0,25	0,30	0,56	0,67
	20,00	5,00	0,25	0,30	0,50	0,60
	20,00	6,00	0,25	0,30	0,46	0,55
	20,00	8,00	0,25	0,30	0,40	0,47
	20,00	10,00	0,25	0,30	0,35	0,42



ROUND INSERT MILLING CUTTER WITH INDEXATION

The **7713VR** is our newest round insert cutter series. Designed with a new nickel plated surface treatment that reduces the body degradation during high performance applications and enhances the body tool life.

This cutter series has an anti-rotation design which ensures a precise number of indexes per insert. This gives a maximum possible usage of the available edges for roughing applications.

This unique patented pocket system prevents the inserts from rotating in the pocket, during heavy feed machining and unstable conditions.

This 7713VR cutter is excellent for roughing and semi-finishing of all materials, specifically for Stainless Steel and High Temperature Alloys as well as for Steel, Tool Steel and Aluminium Alloys.

7713VR

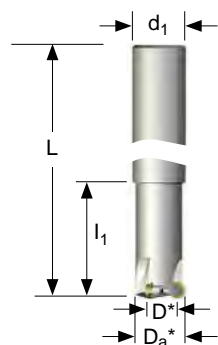
7713VR10:
Maximum $a_p = 5\text{mm}$
Diameter Range = 20 to 63mm

7713VR12:
Maximum $a_p = 6\text{mm}$
Diameter Range = 25 to 80mm

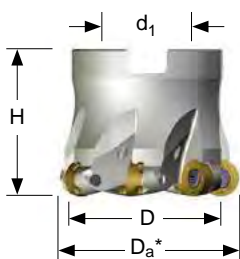




Contour Mills



Cylindrical Shank



Shell Mill Fixation



Modular Head



Depth of Cut (ap)

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D Effective Diameter	L/H	l1	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7713VR10 Cylindrical Shank - Medium and Fine Pitch													
033100	7713VR10CA020Z2R40	20	10	180	40	20	5	2	031233	D4007T	031654	TB15	3,10
033101	7713VR10CA025Z3R50	25	15	200	50	25	5	3	031233	D4007T	031654	TB15	3,10
033102	7713VR10CA032Z3R70	32	22	250	70	32	5	3	015260	D4008T	031654	TB15	3,10
033103	7713VR10CA032Z4R70	32	22	250	70	32	5	4	015260	D4008T	031654	TB15	3,10
7713VR10 Shell Mill Fixation - Medium and Fine Pitch													
033104	7713VR10-A040Z05R	40	30	40	-	16	5	5	015260	D4008T	031654	TB15	3,10
033105	7713VR10-A042Z06R	42	32	40	-	16	5	6	018481	D4006T	031654	TB15	3,10
033106	7713VR10-A050Z06R	50	40	40	-	22	5	6	015260	D4008T	031654	TB15	3,10
033107	7713VR10-A050Z07R	50	40	40	-	22	5	7	015260	D4008T	031654	TB15	3,10
033108	7713VR10-A063Z08R	63	53	40	-	22	5	8	015260	D4008T	031654	TB15	3,10

D = Effective Diameter (Axis) from Insert centreline to centreline

Da* = Outside Diameter

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D Effective Diameter	L	M	d1	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7713VR10 Modular Head - Medium and Fine Pitch													
033109	7713VR10SA020Z2R25	20	10	25	M10	10.5	5	2	031233	D4007T	031654	TB15	3,10
033110	7713VR10SA025Z2R35	25	15	35	M12	12.5	5	2	031233	D4007T	031654	TB15	3,10
033111	7713VR10SA025Z3R35	25	15	35	M12	12.5	5	3	031233	D4007T	031654	TB15	3,10
033112	7713VR10SA032Z3R35	32	22	35	M16	17.0	5	3	015260	D4008T	031654	TB15	3,10
033113	7713VR10SA032Z4R35	32	22	35	M16	17.0	5	4	015260	D4008T	031654	TB15	3,10
033114	7713VR10SA035Z5R35	35	25	35	M16	17.00	5	5	031233	D4007T	031654	TB15	3,10

D = Effective Diameter (Axis) from Insert centreline to centreline

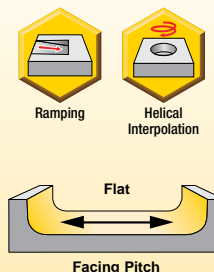
Da* = Outside Diameter

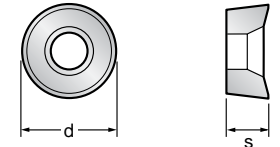
Note: For cylindrical shank extensions in high density alloy with through coolant refer to page A76. The 7713VR10 series with anti-rotation pocket ensures a precise number of indexes per insert.

This unique patented pocket design prevents the inserts from rotating in the pocket during heavy feed machining and unstable conditions.

7713VR10 Technical Information (mm)

Product		Dimensions						
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	Max RPM	
033100	7713VR10CA020Z2R40	10	1.89	22	38	3,33	64500	
033101	7713VR10CA025Z3R50	15	5.22	32	48	3,33	53500	
033102	7713VR10CA032Z3R70	22	8.64	46	62	3,33	53500	
033103	7713VR10CA032Z4R70	22	8.64	46	62	3,33	53500	
033104	7713VR10-A040Z05R	30	7.28	62	78	3,33	47000	
033105	7713VR10-A042Z06R	32	6.71	66	82	3,33	39500	
033106	7713VR10-A050Z06R	40	5.22	82	98	3,33	39500	
033107	7713VR10-A050Z07R	40	5.31	82	98	3,33	39500	
033108	7713VR10-A063Z08R	53	3.79	108	124	3,33	34000	
033109	7713VR10SA020Z2R25	10	1.89	22	38	3,33	64000	
033110	7713VR10SA025Z2R35	15	5.22	32	48	3,33	64000	
033111	7713VR10SA025Z3R35	15	5.22	32	48	3,33	64000	
033112	7713VR10SA032Z3R35	22	8.64	46	62	3,33	64000	
033113	7713VR10SA032Z4R35	22	8.64	46	62	3,33	53500	
033114	7713VR10SA035Z5R35	25	7.20	52	68	3,33	53500	





Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			ap max 5,00*	ap min. - max. 1,00 - 2,0	ap min. - max. 0,20 - 1,00					
034546	RPEX10T3M0F-701-X4	SP4019	■	■	■	10,00	-	3,97	5,00	0,02
030456	RPEX10T3M0F-701-X4	GH1	◆	◆	◆	10,00	-	3,97	5,00	0,02
034545	RPEX10T3M0E-701-X4	SP6519	-	-	■	10,00	-	3,97	5,00	0,02
030449	RPHT10T3M0E-421-X4	X500	-	●	-	10,00	-	3,97	5,00	0,04
030410	RPHT10T3M0E-421-X4	X700	-	-	●	10,00	-	3,97	5,00	0,04
030452	RPMT10T3M0E-41-X4	X500	-	●	-	10,00	-	3,97	5,00	0,04
031539	RPMT10T3M0E-41-X4	SP6519	-	-	■	10,00	-	3,97	5,00	0,04
030451	RPMT10T3M0E-41-X4	MP91M	-	■	◆	10,00	-	3,97	5,00	0,04
030697	RPHT10T3M0E422-X4	X500	■	■	●	10,00	-	3,97	5,00	0,03
030767	RPHT10T3M0E-422-X4	X700	●	●	◆	10,00	-	3,97	5,00	0,03
030862	RPHT10T3M0E-422-X4	SP6519	●	■	◆	10,00	-	3,97	5,00	0,03
030329	RPHT10T3M0T-X4	X500	■	■	-	10,00	-	3,97	5,00	0,08
031555	RPHT10T3M0T-X4	SP6519	◆	◆	-	10,00	-	3,97	5,00	0,08
030454	RPMW10T3M0T-X4	X500	◆	◆	-	10,00	-	3,97	5,00	0,13



Contour Mills

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

RPMW10T3M0T-X4 X500 is recommended for materials with heavy scale.

*Max. recommended ap = 2,5mm (depending on the application)

7713VR10 Feeds f_z (mm/tooth)

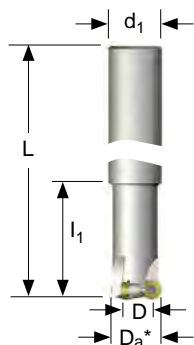
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
F-701-X4	SP4019	Contouring	-	-	-	-	-	-	-	0,02 - 0,10	0,02 - 0,08	0,02 - 0,07	0,02 - 0,07	0,03 - 0,08	0,03 - 0,09	-	-
F-701-X4	GH1	Contouring	-	-	-	-	-	-	-	0,02 - 0,10	0,02 - 0,08	-	-	-	-	-	-
E-701-X4	SP6519	Contouring	-	-	-	-	-	-	-	-	-	0,02 - 0,07	0,02 - 0,07	0,03 - 0,08	0,03 - 0,09	-	-
E-421-X4	X500	Contouring	-	-	-	-	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08	0,04 - 0,09	0,04 - 0,11	-	-
E-421-X4	X700	Contouring	-	-	-	-	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08	0,04 - 0,09	0,04 - 0,11	-	-
E-41-X4	X500	Contouring	-	-	0,04 - 0,18	-	-	-	-	-	-	-	-	-	-	-	-
E-41-X4	SP6519	Contouring	0,04 - 0,18	0,04 - 0,16	0,04 - 0,18	-	0,04 - 0,18	0,04 - 0,18	0,04 - 0,16	-	-	-	-	-	-	-	-
E-41-X4	MP91M	Contouring	0,04 - 0,18	0,04 - 0,16	-	-	0,04 - 0,16	0,04 - 0,16	0,04 - 0,14	-	-	-	-	-	-	-	-
E-422-X4	X500	Contouring	-	-	0,06 - 0,30	0,06 - 0,25	-	-	-	-	-	0,06 - 0,14	0,06 - 0,14	0,06 - 0,16	0,06 - 0,18	-	-
E-422-X4	X700	Contouring	-	-	0,06 - 0,28	0,06 - 0,22	-	-	-	-	-	0,06 - 0,12	0,06 - 0,12	0,06 - 0,14	0,06 - 0,16	-	-
E-422-X4	SP6519	Contouring	0,06 - 0,30	0,06 - 0,25	0,06 - 0,28	0,03 - 0,22	0,06 - 0,25	0,06 - 0,25	0,06 - 0,22	-	-	0,06 - 0,12	0,06 - 0,12	0,06 - 0,14	0,06 - 0,16	-	-
T-X4	X500	Contouring	0,08 - 0,33	0,08 - 0,28	-	-	-	-	-	-	-	-	-	-	-	-	-
T-X4	SP6519	Contouring	0,08 - 0,32	0,08 - 0,27	-	-	0,08 - 0,30	0,08 - 0,30	0,08 - 0,28	-	-	-	-	-	-	-	-
T-X4	X500	Contouring	0,13 - 0,35	0,13 - 0,33	0,13 - 0,35	0,13 - 0,30	-	-	-	-	-	0,13 - 0,18	0,13 - 0,18	0,13 - 0,20	0,13 - 0,22	-	-

Note: HTA = High Temperature Alloys

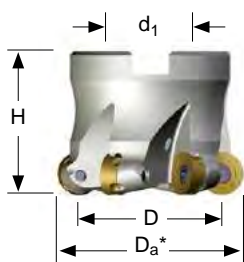
Speed recommendations can be found on page A243.



Contour Mills



Cylindrical Shank



Shell Mill Fixation



Modular Head



Depth of Cut (ap)

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D Effective Diameter	L/H	l ₁	d ₁	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7713VR12 Cylindrical Shank													
033126	7713VR12CA025Z2R50	25	13	200	50	25	6	2	015260	D4008T	015240	T15	3,10
033127	7713VR12CA032Z3R70	32	20	250	70	32	6	3	015260	D4008T	015240	T15	3,10
7713VR12 Shell Mill Fixation - Medium and Fine Pitch													
033115	7713VR12-A040Z04R	40	28	40	-	16	6	4	015262	D4010T	015240	T15	3,10
033116	7713VR12-A040Z05R	40	28	40	-	16	6	5	015262	D4010T	015240	T15	3,10
033117	7713VR12-A050Z05R	50	38	40	-	22	6	5	015262	D4010T	015240	T15	3,10
033118	7713VR12-A050Z06R	50	38	40	-	22	6	6	015262	D4010T	015240	T15	3,10
033119	7713VR12-A052Z05R	52	40	40	-	22	6	5	015262	D4010T	015240	T15	3,10
033120	7713VR12-A052Z06R	52	40	40	-	22	6	6	015262	D4010T	015240	T15	3,10
033121	7713VR12-A063Z06R	63	51	50	-	22	6	6	015262	D4010T	015240	T15	3,10
033122	7713VR12-A063Z07R	63	51	50	-	22	6	7	015262	D4010T	015240	T15	3,10
033123	7713VR12-A066Z06R	66	54	50	-	27	6	6	015262	D4010T	015240	T15	3,10
033124	7713VR12-A066Z07R	66	54	50	-	27	6	7	015262	D4010T	015240	T15	3,10
033125	7713VR12-A080Z08R	80	68	50	-	27	6	8	015262	D4010T	015240	T15	3,10

D = Effective Diameter (Axis) from Insert centreline to centreline

Da* = Outside Diameter

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D Effective Diameter	L	M	d ₁	ap max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7713VR12 Modular Head - Medium and Fine Pitch													
033128	7713VR12SA025Z2R35	25	13	35	M12	12,50	6	2	015260	D4008T	015240	T15	3,10
033129	7713VR12SA032Z3R35	32	20	35	M16	17,00	6	3	015260	D4008T	015240	T15	3,10
033130	7713VR12SA040Z4R43	40	28	43	M16	17,00	6	4	015260	D4008T	015240	T15	3,10
033131	7713VR12SA040Z5R43	40	28	43	M16	17,00	6	5	015260	D4008T	015240	T15	3,10

D = Effective Diameter (Axis) from Insert centreline to centreline

Da* = Outside Diameter

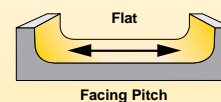
Note: For cylindrical shank extensions in high density alloy with through coolant refer to page A76.

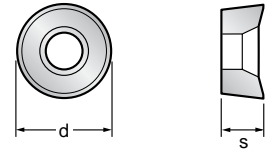
The 7713VR12 series with anti-rotation pocket ensures a precise number of indexes per insert.

This unique patented pocket design prevents the inserts from rotating in the pocket during heavy feed machining and unstable conditions.

7713VR12 Technical Information (mm)

Product		Dimensions						Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear		
033126	7713VR12CA025Z2R50	13	11.20	28	48	4,00	50000	
033127	7713VR12CA032Z3R70	20	10.80	42	62	4,00	40000	
033115	7713VR12-A040Z04R	28	7.90	58	78	4,00	34000	
033116	7713VR12-A040Z05R	28	7.90	58	78	4,00	34000	
033117	7713VR12-A050Z05R	38	5.50	78	98	4,00	29000	
033118	7713VR12-A050Z06R	38	5.50	78	98	4,00	29000	
033119	7713VR12-A052Z05R	40	5.15	82	102	4,00	28500	
033120	7713VR12-A052Z06R	40	5.15	82	102	4,00	28500	
033121	7713VR12-A063Z06R	51	3.85	104	124	4,00	25000	
033122	7713VR12-A063Z07R	51	3.85	104	124	4,00	25000	
033123	7713VR12-A066Z06R	54	3.60	110	130	4,00	24500	
033124	7713VR12-A066Z07R	54	3.60	110	130	4,00	24500	
033125	7713VR12-A080Z08R	68	2.75	138	158	4,00	21500	
033128	7713VR12SA025Z2R35	13	11.20	28	48	4,00	50000	
033129	7713VR12SA032Z3R35	20	10.80	42	62	4,00	40000	
033130	7713VR12SA040Z4R43	28	7.90	58	78	4,00	34000	
033131	7713VR12SA040Z5R43	28	7.90	58	78	4,00	34000	





Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			ap max 6,00*	ap min. - max. 1,00 - 2,50	ap min. - max. 0,20 - 1,00					
029284	RPEX1204M0F-701-X4	GH1	◆	◆	◆	12,00	-	4,76	6,00	0,02
029282	RPEX1204M0E-701-X4	X500	-	-	●	12,00	-	4,76	6,00	0,03
029286	RPHT1204M0E-421-X4	X500	-	●	■	12,00	-	4,76	6,00	0,04
029700	RPHT1204M0E-421-X4	X700	-	-	◆◆◆	12,00	-	4,76	6,00	0,04
029272	RPMT1204M0E-41-X4	X500	●	●	-	12,00	-	4,76	6,00	0,05
031517	RPMT1204M0E-41-X4	SP6519	-	■ ■ ■ ●	● ● ● ●	12,00	-	4,76	6,00	0,05
029291	RPMT1204M0E-41-X4	MP91M	-	■	● ● ■	12,00	-	4,76	6,00	0,05
032129	RPHT1204M0E-442-X4	X500	◆◆	◆◆	-	12,00	-	4,76	6,00	0,04
032130	RPHT1204M0E-442-X4	X700	●	● ●	● ●	12,00	-	4,76	6,00	0,04
032128	RPHT1204M0E-442-X4	SP6519	◆ ◆ ■	◆ ◆ ◆ ■ ■	◆ ◆ ◆ ■ ■	12,00	-	4,76	6,00	0,04
029034	RPHT1204M0T-X4	X500	●	-	-	12,00	-	4,76	6,00	0,10
029699	RPHT1204M0T-X4	X700	●	-	-	12,00	-	4,76	6,00	0,10
031516	RPHT1204M0T-X4	SP6519	● ■ ■	-	-	12,00	-	4,76	6,0	0,10
029295	RPMW1204M0T-X4	X500	◆◆◆	-	-	12,00	-	4,76	6,00	0,13
031518	RPMW1204M0T-X4	SP6519	■ ◆ ■	-	-	12,00	-	4,76	6,00	0,13
029294	RPMW1204M0T-X4	MP91M	◆ ◆	-	◆	12,00	-	4,76	6,00	0,13

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

RPMW1204M0T-X4 should be used for materials with heavy scale

* Max. recommended ap = 3,5mm (depending on the application)

Note: Feed recommendations can be found on page 250. Speed recommendations can be found on page A243.



Contour Mills



Contour Mills

7713VR12 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si P2 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
F-701-X4	GH1	Contouring	-	-	-	-	-	-	-	0,03 - 0,12	0,03 - 0,10	-	-	-	-	-	-
E-701-X4	X500	Contouring	-	-	-	-	-	-	-	-	-	0,03 - 0,08	0,03 - 0,08	0,03 - 0,10	0,03 - 0,11	-	-
E-421-X4	X500	Contouring	-	-	-	-	-	-	-	-	-	0,04 - 0,20	0,04 - 0,20	0,04 - 0,22	0,04 - 0,24	-	-
E-421-X4	X700	Contouring	-	-	0,05 - 0,25	0,04 - 0,12	-	-	-	-	-	0,04 - 0,20	0,04 - 0,20	0,04 - 0,21	0,04 - 0,23	-	-
E-41-X4	X500	Contouring	-	0,05 - 0,22	0,05 - 0,25	-	-	-	-	-	-	-	-	-	-	-	-
E-41-X4	SP6519	Contouring	0,05 - 0,25	0,05 - 0,22	-	-	0,05 - 0,25	0,05 - 0,25	0,05 - 0,20	-	-	-	-	-	-	-	-
E-41-X4	MP91M	Contouring	0,05 - 0,25	0,05 - 0,22	-	-	0,05 - 0,25	0,05 - 0,25	0,05 - 0,20	-	-	-	-	-	-	-	-
E-442-X4	X500	Contouring	-	-	0,06 - 0,40	0,06 - 0,33	-	-	-	-	-	0,06 - 0,24	0,06 - 0,24	0,06 - 0,24	0,06 - 0,26	-	-
E-442-X4	X700	Contouring	-	-	0,06 - 0,38	0,06 - 0,31	-	-	-	-	-	0,06 - 0,23	0,06 - 0,23	0,06 - 0,23	0,06 - 0,25	-	-
E-442-X4	SP6519	Contouring	0,06 - 0,45	0,06 - 0,38	0,06 - 0,38	0,06 - 0,31	0,06 - 0,40	0,06 - 0,40	0,06 - 0,35	-	-	0,06 - 0,23	0,06 - 0,23	0,06 - 0,23	0,06 - 0,25	-	-
RPHT-T-X4	X500	Contouring	-	0,15 - 0,40	-	-	-	-	-	-	-	-	-	-	-	-	-
RPHT-T-X4	X700	Contouring	-	-	-	0,15 - 0,35	-	-	-	-	-	-	-	-	-	-	-
RPHT-T-X4	SP6519	Contouring	0,15 - 0,45	0,15 - 0,40	-	-	0,15 - 0,45	0,15 - 0,45	0,15 - 0,40	-	-	-	-	-	-	-	-
RPMW-T-X4	X500	Contouring	-	-	0,13 - 0,35	0,13 - 0,30	-	-	-	-	-	0,13 - 0,25	0,13 - 0,25	0,13 - 0,27	0,13 - 0,29	-	-
RPMW-T-X4	SP6519	Contouring	0,13 - 0,45	0,13 - 0,40	-	-	0,13 - 0,45	0,13 - 0,45	0,13 - 0,40	-	-	-	-	-	-	-	-
RPMW-T-X4	MP91M	Contouring	0,13 - 0,42	-	-	-	0,13 - 0,42	0,13 - 0,42	0,13 - 0,35	-	-	-	-	-	-	0,09 - 0,15	0,09 - 0,15

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A243.

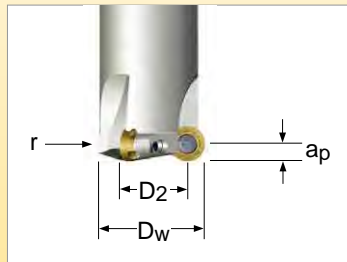


Speed v_c (m/min)																
7713VR Series			Wear Resistance													
			- ← → +													
Coolant Recommendation			Speed min. - max.													
Recommended ● Possible ○			CVD X Grade		PVD X Grade		PVD Standard		PVD Standard		CVD Standard		Uncoated Micrograin			
ISO	Materials	Rm and Hardness	ⓘ	Ⓢ	ⓘ	Ⓢ	ⓘ	Ⓢ	ⓘ	Ⓢ	ⓘ	Ⓢ	ⓘ			
			X500	X700	SP6519	SP4019	MP91M	GH1								
P	Unalloyed Steel	<600 N/mm ² <180 HBN	○	●	130 - 270			○	●	130 - 295			●	140 - 345		
		<950 N/mm ² <280 HBN	○	●	115 - 240			○	●	115 - 260			●	120 - 305		
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○	●	100 - 210			○	●	100 - 230			●	105 - 270		
		950-1200 N/mm ² 280-355 HBN	○	●	75 - 160			○	●	75 - 175			●	80 - 205		
		1200-1400 N/mm ² 355-415 HBN		●	50 - 100			●	50 - 110			●	50 - 130			
M	Stainless Steel	Austenitic + Ferritic 300 series	○	●	115 - 250	○	●	115 - 260	○	●	115 - 270					
		Martensitic 400 series	○	●	100 - 220			○	●	105 - 230						
	PH Stainless	Refractory P.H.	●		50 - 110	●		50 - 115	●		50 - 120					
K	Cast Iron	Grey GG-Ft												140 - 295		145 - 365
		Spheroidal-Ductile GGG-FGS						○	●	110 - 240			●	115 - 285		
		Malleable GTS - MN/MP								100 - 220				105 - 260		
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN									●		400 - 2895			400 - 3050
		Aluminium + Silicon > 16% Si 92 HBN										●		295 - 2320		
S	High Temperature Alloys	Iron Based			23 - 48			23 - 52			23 - 55			24 - 63		
		Cobalt Based	●		21 - 44	●		22 - 46	●		22 - 48	●		23 - 52		
		Nickel Based			24 - 51			25 - 53			25 - 55			26 - 59		
		Titanium Based			35 - 73			36 - 75			36 - 79			37 - 84		
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN												50 - 105		
		Chilled Cast Iron >1400 N/mm ² > 400 HBN											●	40 - 95		

Contour Mills



7713VR Technical Information



Working Diameter:

Formula to evaluate the correct working diameter based on axial depth of cut (a_p).

$$D_w = D_2 + 2 \times \sqrt{r^2 - (r - a_p)^2}$$

where: D_w = Working Diameter
 D_2 = Diameter of cutter insert centre to centre
 r = Insert radius
 a_p = Axial Depth of Cut

7713VR Technical Information

Formula to find programmed feed rate based on radial engagement and axial depth of cut.

$$f_z = \frac{h_m}{\frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}}$$

where:
 f_z = Feed per tooth
 h_m = Average chip thickness
 r = Insert radius
 a_e = Radial Depth of Cut
 a_p = Axial Depth of Cut

Formula to calculate the average chip thickness h_m in relation with radial engagement and depth of cut.

$$h_m = f_z \times \frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}$$

Simplified formulas to evaluate h_m and f_z based on axial depth of cut or radial engagement.

Calculation of the average chip thickness in relation with the D.O.C. (Axial)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_p}}$$

h_m = Average chip thickness
 a_p = Depth of cut
 f_z = Feed per tooth
 d = Insert diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_p}{d}}$$

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
 a_e = Radial engagement
 f_z = Feed per tooth
 d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$



With round inserts, the thickness of the chip varies depending on the axial depth of cut and is related to the size of the cutting edge preparation. For best tool-life it is important to maintain the proper chip thickness as shown below.

Inserts RP..10T3..

Dimensions (mm)						
Inserts Geometry	Insert Size	ap Axial d.o.c.	hm min.	hm max.	fz min.	fz max.
F-701-X4	10,00	0,25	0,02	0,08	0,13	0,51
	10,00	0,50	0,02	0,08	0,09	0,36
	10,00	0,75	0,02	0,08	0,07	0,29
	10,00	1,00	0,02	0,08	0,06	0,25
	10,00	1,25	0,02	0,08	0,06	0,23
	10,00	1,50	0,02	0,08	0,05	0,21
	10,00	2,00	0,02	0,08	0,04	0,18
10,00	2,50	0,02	0,08	0,04	0,16	
E-701-X4	10,00	0,25	0,03	0,09	0,19	0,57
	10,00	0,50	0,03	0,09	0,13	0,40
	10,00	0,75	0,03	0,09	0,11	0,33
	10,00	1,00	0,03	0,09	0,09	0,28
	10,00	1,25	0,03	0,09	0,08	0,25
	10,00	1,50	0,03	0,09	0,08	0,23
	10,00	2,00	0,03	0,09	0,07	0,20
10,00	2,50	0,03	0,09	0,06	0,18	
E-421-X4	10,00	0,25	0,04	0,10	0,25	0,63
	10,00	0,50	0,04	0,10	0,18	0,45
	10,00	0,75	0,04	0,10	0,15	0,37
	10,00	1,00	0,04	0,10	0,13	0,32
	10,00	1,25	0,04	0,10	0,11	0,28
	10,00	1,50	0,04	0,10	0,10	0,26
	10,00	2,00	0,04	0,10	0,09	0,22
10,00	2,50	0,04	0,10	0,08	0,20	
E-41-X4	10,00	0,25	0,04	0,12	0,25	0,76
	10,00	0,50	0,04	0,12	0,18	0,54
	10,00	0,75	0,04	0,12	0,15	0,44
	10,00	1,00	0,04	0,12	0,13	0,38
	10,00	1,25	0,04	0,12	0,11	0,34
	10,00	1,50	0,04	0,12	0,10	0,31
	10,00	2,00	0,04	0,12	0,09	0,27
10,00	2,50	0,04	0,12	0,08	0,24	
E-422-X4	10,00	0,25	0,04	0,16	0,25	1,01
	10,00	0,50	0,04	0,16	0,18	0,72
	10,00	0,75	0,04	0,16	0,15	0,58
	10,00	1,00	0,04	0,16	0,13	0,51
	10,00	1,25	0,04	0,16	0,11	0,45
	10,00	1,50	0,04	0,16	0,10	0,41
	10,00	2,00	0,04	0,16	0,09	0,36
10,00	2,50	0,04	0,16	0,08	0,32	
RPHT-T-X4	10,00	0,25	0,08	0,18	0,51	1,14
	10,00	0,50	0,08	0,18	0,36	0,80
	10,00	0,75	0,08	0,18	0,29	0,66
	10,00	1,00	0,08	0,18	0,25	0,57
	10,00	1,25	0,08	0,18	0,23	0,51
	10,00	1,50	0,08	0,18	0,21	0,46
	10,00	2,00	0,08	0,18	0,18	0,40
10,00	2,50	0,08	0,18	0,16	0,36	
RPMW-T-X4	10,00	0,25	0,13	0,19	0,82	1,20
	10,00	0,50	0,13	0,19	0,58	0,85
	10,00	0,75	0,13	0,19	0,47	0,69
	10,00	1,00	0,13	0,19	0,41	0,60
	10,00	1,25	0,13	0,19	0,37	0,54
	10,00	1,50	0,13	0,19	0,34	0,49
	10,00	2,00	0,13	0,19	0,29	0,42
10,00	2,50	0,13	0,19	0,26	0,38	



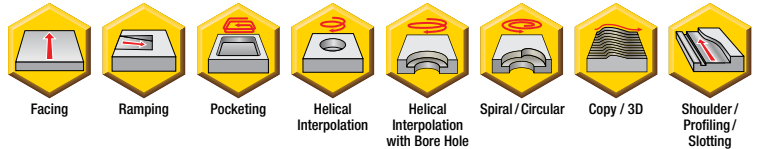


With round inserts, the thickness of the chip varies depending on the axial depth of cut and is related to the size of the cutting edge preparation. For best tool-life it is important to maintain the proper chip thickness as shown below.

Inserts RP..1204..

Dimensions (mm)						
Inserts Geometry	Insert Size	ap Axial d.o.c.	hm min.	hm max.	fz min.	fz max.
F-701-X4	12,00	0,25	0,02	0,11	0,14	0,76
	12,00	0,50	0,02	0,11	0,10	0,54
	12,00	1,00	0,02	0,11	0,07	0,38
	12,00	1,50	0,02	0,11	0,06	0,31
	12,00	2,00	0,02	0,11	0,05	0,27
	12,00	2,50	0,02	0,11	0,04	0,24
	12,00	3,00	0,02	0,11	0,04	0,22
E-701-X4	12,00	3,50	0,02	0,11	0,04	0,20
	12,00	0,25	0,03	0,12	0,21	0,83
	12,00	0,50	0,03	0,12	0,15	0,59
	12,00	1,00	0,03	0,12	0,10	0,42
	12,00	1,50	0,03	0,12	0,08	0,34
	12,00	2,00	0,03	0,12	0,07	0,29
	12,00	2,50	0,03	0,12	0,07	0,26
E-421-X4	12,00	3,00	0,03	0,12	0,06	0,24
	12,00	3,50	0,03	0,12	0,06	0,22
	12,00	0,25	0,04	0,14	0,28	0,97
	12,00	0,50	0,04	0,14	0,20	0,69
	12,00	1,00	0,04	0,14	0,14	0,48
	12,00	1,50	0,04	0,14	0,11	0,40
	12,00	2,00	0,04	0,14	0,10	0,34
E-41-X4	12,00	2,50	0,04	0,14	0,09	0,31
	12,00	3,00	0,04	0,14	0,08	0,28
	12,00	3,50	0,04	0,14	0,07	0,26
	12,00	0,25	0,05	0,16	0,35	1,11
	12,00	0,50	0,05	0,16	0,24	0,78
	12,00	1,00	0,05	0,16	0,00	0,55
	12,00	1,50	0,05	0,16	0,14	0,45
E-442-X4	12,00	2,00	0,05	0,16	0,12	0,39
	12,00	2,50	0,05	0,16	0,11	0,35
	12,00	3,00	0,05	0,16	0,10	0,32
	12,00	3,50	0,05	0,16	0,09	0,30
	12,00	0,25	0,06	0,20	0,42	1,39
	12,00	0,50	0,06	0,20	0,29	0,98
	12,00	1,00	0,06	0,20	0,21	0,69
RPHT-T-X4	12,00	1,50	0,06	0,20	0,17	0,57
	12,00	2,00	0,06	0,20	0,15	0,49
	12,00	2,50	0,06	0,20	0,13	0,44
	12,00	3,00	0,06	0,20	0,12	0,40
	12,00	3,50	0,06	0,20	0,11	0,37
	12,00	0,25	0,10	0,21	0,69	1,45
	12,00	0,50	0,10	0,21	0,49	1,03
RPMW-T-X4	12,00	1,00	0,10	0,21	0,35	0,73
	12,00	1,50	0,10	0,21	0,28	0,59
	12,00	2,00	0,10	0,21	0,24	0,51
	12,00	2,50	0,10	0,21	0,22	0,46
	12,00	3,00	0,10	0,21	0,20	0,42
	12,00	3,50	0,10	0,21	0,19	0,39
	12,00	0,25	0,13	0,22	0,90	1,52
RPMW-T-X4	12,00	0,50	0,13	0,22	0,64	1,08
	12,00	1,00	0,13	0,22	0,45	0,76
	12,00	1,50	0,13	0,22	0,37	0,62
	12,00	2,00	0,13	0,22	0,32	0,54
	12,00	2,50	0,13	0,22	0,28	0,48
	12,00	3,00	0,13	0,22	0,26	0,44
	12,00	3,50	0,13	0,22	0,24	0,41

Contour Mills



ALUMINUM HIGH SPEED MILLING CUTTERS

Stellram's **5702VZD14** cutter is designed, manufactured and tested in accordance with EN ISO 15641:2001 to ensure maximum stability in high speed applications. The tool is capable of 43,000 RPM.

This cutter is specially designed for machining pockets and profiles on Aluminium and Aluminium alloys. This cutter design also performs contouring operations (finishing) in composite materials and titanium alloys, due to the fully ground 701 geometry.

Stellram's **5720VZ16** cutters are our latest design for high metal removal in Aluminium applications. This tool is designed manufactured and tested in accordance with EN ISO 15641:2001 for maximum stability in high speed applications. The tools are capable of 51,000 RPM depending on the cutter diameter.

This new patented design allows each body to hold all inserts with different radii without losing any gauge height of the cutter length.

Features and Benefits of the 5702VZD and 5720VZ:

All Stellram profile and pocketing cutters feature through-tool coolant allowing better chip evacuation and higher feed rates.

Cylindrical Shank and special HSK Integral Shanks on any 5702VZD14 and 5720VZ16 are designed and balanced to G6.3 at 30,000 rpm for diameters 50mm and below. Diameters larger than 50mm are balanced to G6.3 at 24,000 rpm.

The pockets are reinforced to allow for heavy feed, safe ramping and more line contact when utilising a larger radius insert for more stability during machining. These features increase tool life and productivity.

These unique ZDCX14...FR-701 and ZDET16...FR-721 insert designs allow machining in thin-walled applications due to very low cutting pressure.

For the 5702VZD: 5 different radii are available. For the 5720VZ: 12 different radii are available, each with the same cutting depth capacity of 16mm.

Standard radii are available from facet to 4,00mm, for the 5702VZD14 and facet to 6,00mm for the 5720VZ16.

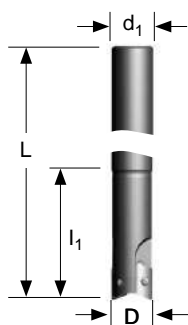
HSK specials are available upon request with specific shank and reach lengths

57_VZ.

5702VZD14:
Maximum a_p = 12mm
Diameter Range = 20mm only

5720VZ16:
Maximum a_p = 16mm
Diameter Range = 25mm - 80mm

Note: Shell mill and modular head cutters are not balanced. It is recommended to balance the cutter and adapter as an assembly for high speed machining at 8,000 rpm or above. See detailed notes on the following product pages.



Cylindrical Shank

Product		Dimensions (mm)							Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	a _p max	No. of Teeth	Insert radius range	EDP		EDP		Screw Tightening Nm*
5702VZD14 Cylindrical Shank													
028998	5702VZD14CA020R58-2	20	108	58	20	12	2	< 2,00	015060	F2505T	018488	T7	0,80
028999	5702VZD14CA020R58-4	20	108	58	20	12	2	2,50 to 4,00	015060	F2505T	018488	T7	0,80

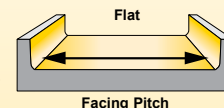
* It is important to change the screw each time the insert is changed to ensure the highest security. A dynamometric key and the right torque value are important. See above for the correct torque information.

Profiling & Pocketing Mills

5702VZD Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a _p max Helical / Linear	Max RPM
028998	5702VZD14CA020R58-2	20	11.0°	26,8	38,0	3,00	43000
028999	5702VZD14CA020R58-4	20	11.0°	26,8	38,0	3,00	43000

* Max. ramping angle for insert is calculated with facet



Find the different ramping angles for all available insert radii on technical information page A254.

Radial depth of cut 0,20mm up to full cutter diameter.

These tools have been designed, manufactured and tested in accordance with EN ISO standard 15641:2001.

These tools are stocked without an electronic chip.

Note: If using a insert with radius, then the facing pitch for the 5702VZD cutter is equal to the cutting diameter (D) minus 2 x chosen radius.

Cylindrical Shanks or Special HSK Integral Shanks are designed and balanced to G6.3 at 30,000 RPM for diameters 50mm and below. Diameters larger then 50mm are balanced to G6.3 at 24,000 rpm.

Cylindrical Shank tools mounted in a shrink fit holder or any other mill chuck holder + inserts + screws must be re-inspected for balance as an assembly by the end user when at or exceeding 8,000 rpm. End user must balance the assembly to a G6.3 value minimum.

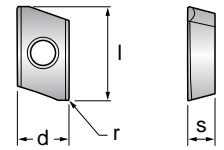
Additional Balancing and Torque values can be found in the technical section pages A256.



Depth of Cut (a_p)



ZDCX14-701



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			a _p max. 12*	a _p min. - max. 1,00 - 4,00	a _p min. - max. 0,20 - 1,00					
029027	ZDCX1403PDFR-701	GH1	◆	◆	◆	7,59	16,83	3,18	Facet	0,02
029028	ZDCX140320FR-701	GH1	◆	◆	◆	7,59	16,83	3,18	2,0	0,02
026019	ZDCX140325FR-701	GH1	◆	◆	◆	7,59	16,83	3,18	2,5	0,02
029029	ZDCX140330FR-701	GH1	◆	◆	◆	7,59	16,83	3,18	3,0	0,02
026020	ZDCX140340FR-701	GH1	◆	◆	◆	7,59	16,83	3,18	4,0	0,02

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Max. possible a_p of 12mm and a_e the full diameter (depending on the application).

* For Slotting applications with 5702VZD14 series the maximum a_p is 6mm.



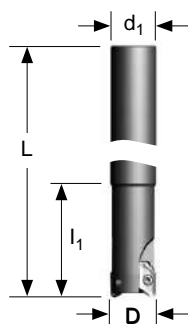
Profiling & Pocketing Mills

5702VZD Feeds f _z (mm/tooth)					
Size	Geometry	Grade	Operation	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN
				Min. - Max.	Min. - Max.
14mm	FR-701	GH1	Profile/ Pocketing	0,02 - 0,25	0,02 - 0,20

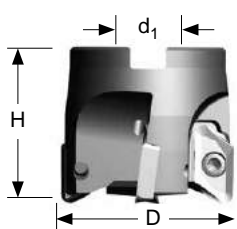
Speed v _c (m/min)					
5702VZD Series				K10-K20/C3 - C2 ISO / ANSI	
Speed min. - max.					
Coolant Recommendation				Uncoated Micrograin	
Recommended ● Possible ○				GH1	
ISO	Materials	Rm and Hardness			
N	Aluminium & Alloys < 16% Si 116 HBN	●	400 - 3050		
	Aluminium + Silicon > 16% Si 92 HBN	○	295 - 2440		



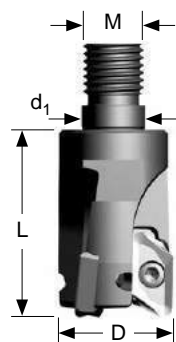
Profiling & Pocketing Mills



Cylindrical Shank



Shell Mill Fixation



Modular Head

Product		Dimensions (mm)							Spares				
EDP	Item Description	D	L/H	l ₁	d ₁	ap max	No. of Teeth	Insert radius range	EDP		EDP		Screw Tightening Nm*
5720VZ16 Cylindrical Shank - Coarse and Medium Pitch													
034614	5720VZ16CA025Z2R75	25	131	75	25	16	2	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
034617	5720VZ16CA032Z2R75	32	135	75	32	16	2	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
034640	5720VZ16CA032Z3R75	32	135	75	32	16	3	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
5720VZ16 Shell Mill Fixation - Coarse and Medium Pitch													
034619	5720VZ16-A040Z03R	40	45	-	16	16	3	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031325	5720VZ16-A050Z03R	50	45	-	22	16	3	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031326	5720VZ16-A050Z04R	50	45	-	22	16	4	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031328	5720VZ16-A063Z05R	63	45	-	22	16	4	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031327	5720VZ16-A063Z04R	63	45	-	22	16	5	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031329	5720VZ16-A080Z04R	80	50	-	27	16	4	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031330	5720VZ16-A080Z05R	80	50	-	27	16	5	Facet to 6,00	030820	DP5009A	030819	TP20	6,00

* It is important to change the screw each time the insert is changed to ensure the highest security. A dynamometric key and the right torque value are important. See above for the correct torque information.

Product		Dimensions (mm)							Spares				
EDP	Item Description	D	L/H	M	d ₁	ap max	No. of Teeth	Insert radius range	EDP		EDP		Screw Tightening Nm*
5720VZ16 Modular Head - Coarse and Medium Pitch													
034616	5720VZ16SA025Z2R50	25	50	M12	12,50	16	2	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
034618	5720VZ16SA032Z2R50	32	50	M16	17	16	2	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031639	5720VZ16SA032Z3R50	32	50	M16	17	16	3	Facet to 6,00	030820	DP5009A	030819	TP20	6,00

* It is important to change the screw each time the insert is changed to ensure the highest security. A dynamometric key and the right torque value are important. See above for the correct torque information.

Note: For cylindrical shank extensions in high density alloy with through coolant refer to page A76.

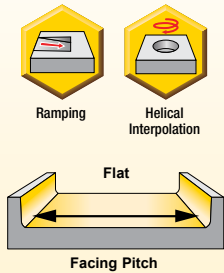


Depth of Cut (ap)



5720VZ Technical Information (mm)

Product		Dimensions					Max RPM
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	
034614	5720VZ16CA025Z2R75	25	14.5*	29,5	48,0	4,00	50000
034617	5720VZ16CA032Z2R75	32	11.4*	43,5	62,0	4,00	41500
034640	5720VZ16CA032Z3R75	32	11.4*	43,5	62,0	4,00	41500
034619	5720VZ16-A040Z3R	40	7.6*	59,5	78,0	4,00	36500
031325	5720VZ16-A050Z03R	50	7.9*	79,5	98,0	4,00	30000
031326	5720VZ16-A050Z4R	50	7.9*	79,5	98,0	4,00	30000
031328	5720VZ16-A063Z05R	63	5.9*	105,5	124,0	4,00	26000
031327	5720VZ16-A063Z4R	63	5.9*	105,5	124,0	4,00	26000
031329	5720VZ16-A080Z04R	80	4.4*	139,5	158,0	4,00	23000
031330	5720VZ16-A080Z05R	80	4.4*	139,5	158,0	4,00	23000
034616	5720VZ16SA025Z2R50	25	14.5*	29,5	48,0	4,00	50000
034618	5720VZ16SA032Z2R50	32	11.4*	43,5	62,0	4,00	41500
031639	5720VZ16SA032Z3R50	32	11.4*	43,5	62,0	4,00	41500



Profiling & Pocketing Mills

* Max. ramping angle for insert is calculated with facet

Find the different ramping angles for all available insert radii on technical information page A254

Radial depth of cut 0,20mm up to full cutter diameter.

These tools have been designed, manufactured and tested in accordance with EN ISO standard 15641:2001.

These tools are stocked without an electronic chip.

Note: If using a insert with radius, then the facing pitch for the 5702VZ cutter is equal to the cutting diameter (D) minus 2 x chosen radius.

Cylindrical Shanks or Special HSK Integral Shanks are designed and balanced to G6.3 at 30,000 RPM for diameters 50mm and below. Diameters larger then 50mm are balanced to G6.3 at 24,000 rpm.

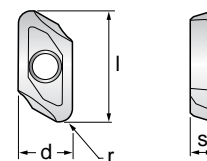
Cylindrical Shank tools mounted in a shrink fit holder or any other mill chuck holder + inserts + screws must be re-inspected for balance as an assembly by the end user when at or exceeding 8,000 rpm. End user must balance the assembly to a G6.3 value minimum.

Shell Mills and Modular Heads are not balanced. These tools must be re-inspected for balance as an assembly, cutter + adapter + inserts + screws by the end user when at or exceeding 8,000 rpm. End user must balance the assembly to a G6.3 value minimum.

Additional Balancing and Torque values can be found in the technical section pages A256.



ZDET16-721



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			ap max. 16*	ap min. - max. 1,00 - 5,00	ap min. - max. 0,20 - 1,00					
030927	ZDET16M5PDFR-721	GH1	◆	◆	◆	11,30	22,92	5,00	Facet	0,02
031384	ZDET16M504FR-721	GH1	◆	◆	◆	11,30	22,92	5,00	0,40	0,02
030928	ZDET16M508FR-721	GH1	◆	◆	◆	11,30	22,92	5,00	0,80	0,02
031385	ZDET16M512FR-721	GH1	◆	◆	◆	11,30	22,92	5,00	1,20	0,02
030929	ZDET16M516FR-721	GH1	◆	◆	◆	11,30	22,92	5,00	1,60	0,02
030930	ZDET16M520FR-721	GH1	◆	◆	◆	11,30	22,92	5,00	2,00	0,02
030931	ZDET16M525FR-721	GH1	◆	◆	◆	11,30	22,92	5,00	2,50	0,02
030932	ZDET16M530FR-721	GH1	◆	◆	◆	11,30	22,92	5,00	3,00	0,02
030933	ZDET16M532FR-721	GH1	◆	◆	◆	11,30	22,92	5,00	3,20	0,02
030934	ZDET16M540FR-721	GH1	◆	◆	◆	11,30	22,92	5,00	4,00	0,02
030935	ZDET16M550FR-721	GH1	◆	◆	◆	11,30	22,92	5,00	5,00	0,02
030936	ZDET16M560FR-721	GH1	◆	◆	◆	11,30	22,92	5,00	6,00	0,02

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Max. possible ap of 16mm and ae the full diameter (depending on the application).

* For Slotting applications with 5720VZ16 series please see recommendations for maximum ap on page A254 .



Profiling & Pocketing Mills

5720VZ Feeds f _z (mm/tooth)					
Size	Geometry	Grade	Operation	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN
				Min. - Max.	Min. - Max.
14mm	FR-721	GH1	Profile/ Pocketing	0,02 - 0,25	0,02 - 0,20

Speed v _c (m/min)					
5720VZ Series			K10-K20/C3 - C2 ISO / ANSI		
			Speed min. - max.		
Coolant Recommendation				Uncoated Micrograin	
Recommended ● Possible ○				GH1	
ISO	Materials	Rm and Hardness		GH1	
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN		●	400 - 3050
		Aluminium + Silicon > 16% Si 92 HBN	295 - 2440		



Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness

a_e = Radial engagement

f_z = Feed per tooth

d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

5702VZD14 Ramp Angle °					
Insert ZDCX1403...FR-701 (Radius mm)					
Cutter dia.	Facet	2,0mm	2,50mm	3,00mm	4,00mm
20mm	11.0	9.8	9.0	8.0	6.3

*For Slotting applications with 5702VZD14 series the maximum a_p is 6mm.

These tools are designed, manufactured, tested and balanced in accordance with EN ISO 15641:2001 for maximum stability in high speed applications.

Metal Removal		
Calculated with 24000 RPM		
Cutter	Z	Qmax - cm ³ /min
20	2	720

The chart above shows total metal removal capacity (based on 24,000 RPM) by cutter diameter and number of teeth (2).

The maximum RPM is engraved on all cutter bodies.



Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness

a_e = Radial engagement

f_z = Feed per tooth

d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

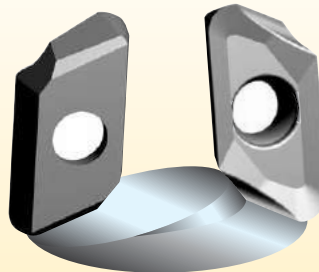
5720VZ16 Ramp Angle °

Cutter Dia. (mm)	Insert ZDET16M5...FR-721 (Radius mm)								
	PDFR to R1,20	R1,60	R2,00	R2,50	R3,00	R3,20	R4,00	R5,00	R6,00
25,0	14.50	17.30	9.40	9.60	18.80	18.90	9.00	11.20	7.30
32,0	11.40	11.90	11.90	12.20	12.40	12.40	13.10	13.80	13.40
40,0	7.60	7.80	7.80	8.00	8.10	8.10	8.50	8.80	9.10
50,0	7.90	7.20	7.30	7.90	7.60	7.60	8.90	9.00	9.25
63,0	5.90	5.40	5.50	5.80	5.60	5.60	6.90	6.60	6.65
80,0	4.40	4.00	4.10	4.30	4.20	4.20	5.10	4.80	4.90

Possible Max. a_p Slotting

Chart for maximum a_p when slotting with 5720VZ16 series

Diameter (mm)	No. of Inserts	a_p max (mm)
25	2	7,50
32	2	11,00
32	3	6,00
40	3	9,00
50	3	11,00
50	4	9,00
63	4	11,00
63	5	9,00
80	4	11,00
80	5	11,00



Possible Metal Removal

Calculated with 24000 RPM

Cutter dia.	Z	Qcm ³ /min
25	2	1560
32	2	3226
32	3	2056
40	3	5184
50	3	7921
50	4	8641
63	4	13307
63	5	13609
80	4	16898
80	5	21123

a_p max in connection with: The cutter diameter, rigidity of the cutter, rigidity of the machine and the size of the flute.

The chart above shows total metal removal capacity (based on 24,000 RPM) by cutter diameter and number of teeth.

The maximum RPM is engraved on all cutter bodies.


Machinability by Materials (Aluminium)

Alloy Group	Alloy Designation	CHEMICAL COMPOSITION LIMITS (WT%)												Typical Temper	Rm (Mpa)	Machinability Chip formation	Machinability	Typical Applications	v _c m/min min. - max.	f _z mm/Z max.	
		Cu	Si	Fe	Mn	Mg	Zn	Cr	Ti	Pb	Bi	Al	Others								
Al	1050	0.05	0.25	0.4	0.5	0.05	0.05	-	-	-	-	99.50min	-	H14	105	D	A	Chemical equipment Sheet metal work Coiled tube	600 - 3000	0.2	
	1100	0.05-0.20	Si+Fe1.0max		0.05	-	0.1	-	-	-	-	99.00min	-	H14	90	D	A				
Al-Cu	2011	50.-60.	0.4	0.7	-	-	0.3	-	-	0.2	0.6	remaining	-	T3	310	A	A	Screw machine products. Tuck frame. Aircraft structure. Jet engine impellers. Aircraft engine cylinder heads.	400 - 2500	0,25	
	2014	3.9-5.0	0.5-1.2	0.7	0.4-1.2	0.2-0.8	0.25	0.1	0.15	-	-	remaining	-	T6	430	B	A				
	2017	3.5-4.5	0.2-0.8	0.7	0.4-1.0	0.4-0.8	0.25	0.1	0.15	-	-	remaining	-	T4	390	B	A				
	2024	3.8-4.9	0.5	0.5	0.3-0.9	1.2-1.8	0.25	0.1	0.15	-	-	remaining	-	T4	465	B	A				
	2218	3.5-4.5	0.9	1	0.2	1.2-1.8	0.25	0.1	-	-	-	remaining	Ni1.7-2.3	T72	331	B	B				
2224	3.8-4.4	0.12	0.15	0.30-0.9	1.2-1.8	0.25	0.1	0.15	-	-	remaining	-			A	A					
Al-Mn	3003	0.05-0.20	0.6	0.7	1.0-1.5	-	0.1	-	-	-	-	remaining	-	H14	140	D	B	Cooking utensils. Chemical equipment.	200 - 2500	0.2	
Al-Si	4032	0.5-1.3	11.0-13.5	1	-	0.8-1.3	0.25	0.1	-	-	-	remaining	Ni0.5-1.3	T6	379	B	D	Pistons.	200 - 1000	0,18	
Al-Mg	5052	0.1	0.25	0.4	0.1	2.2-2.8	0.1	0.15-0.35	-	-	-	remaining	-	H14	260	C	A	Architectural. Cable Sheeting. Welded pressure vessels. Hydraulic tubes.	400 - 3000	0,25	
	5056	0.1	0.3	0.4	0.05-0.20	4.5-5.6	0.1	0.05-0.20	-	-	-	remaining	H34	H12	300	C	A				
	5083	0.1	0.4	0.4	0.4-1.0	4.0-4.9	0.25	0.05-0.25	0.15	-	-	remaining	-	H112	335	C	A				
	5086	0.1	0.4	0.5	0.20-0.7	3.5-4.5	0.25	0.05-0.25	0.15	-	-	remaining	-	H32	300	C	A				
													H116								
Al-Mg-Si	6061	0.15-0.40	0.4-0.8	0.7	0.15	0.8-1.2	0.25	0.04-0.35	0.15	-	-	remaining	-	T6	300	C	B	Heavy duty structure. Furniture. Architectural. Heavy duty welded structure. Pipeline. Heat Sink.	400 - 2500	0.2	
	6063	0.1	0.2-0.6	0.35	0.1	0.45-0.9	0.1	0.1	0.1	-	-	remaining	-	T5	200	C	B				
	6070	0.15-0.40	1.0-1.7	0.5	0.40-1.0	0.50-1.2	0.25	0.1	0.15	-	-	remaining	-	T6	379	C	C				
	6151	0.35	0.6-1.2	1	0.2	0.45-0.8	0.25	0.15-0.35	0.15	-	-	remaining	-	T6		C	C				
	6262	0.15-0.40	0.4-0.8	0.7	0.15	0.8-1.2	0.25	0.04-0.14	0.15	0.4	0.7	remaining	-	T9	400	B	B				
	6351	0.1	0.7-1.3	0.5	0.4-0.8	0.40-0.8	0.2	-	0.2	-	-	remaining	-	T6	310	D	C				
6463	0.2	0.20-0.6	0.15	0.05	0.45-0.9	0.05	-	-	-	-	remaining	-	T6	241	C	B					
Al-Zn	7001	1.6-2.6	0.35	0.4	0.2	2.6-3.4	6.8-8.0	0.18-0.35	0.2	-	-	remaining	-	O		B	A	High strength structure. Aircraft structure. Bat.	400 - 3000	0,25	
	7003	0.2	0.3	0.35	0.3	0.50-1.0	5.0-6.5	0.2	0.2	-	-	remaining	Zr0.05-0.25	T5	400	B	A				
	7050	2.0-2.6	0.12	0.15	0.1	1.9-2.6	5.7-6.7	0.04	0.06	-	-	remaining	Zr0.08-0.15	T73	530	B	A				
	7075	1.2-2.0	0.4	0.5	0.3	2.1-2.9	5.1-6.1	0.18-0.28	0.2	-	-	remaining	-	T6	570	B	A				
	7178	1.6-2.4	0.4	0.5	0.3	2.4-3.1	6.3-7.3	0.18-0.35	0.2	-	-	remaining	-	T6	600	B	A				
	7475	1.2-1.9	0.1	0.12	0.06	1.9-2.6	5.2-6.2	0.18-0.25	0.06	-	-	remaining	-	T61	565	B	A				


Machinability

- A** EXCELLENT
- B** GOOD-TO-EXCELLENT
- C** GOOD
- D** NOT GOOD

$$V_c = \pi \times D \times n / 1000 \quad \text{m/min} = \text{mm} \times \text{RPM}$$

D: Tool diameter, N: RPM, V_c: Cutting speed, π = 3.1416

Choose a cutting speed in the range of values, compatible with the cutter max rotation capacity (engraved on the body) and your spindle stability.



Recommendations for High Speed Machining at 8,000 rpm or above.

Profiling & Pocketing Mills

- Check spindle condition:
 - Runout
 - Balancing
 - Clamping of the attachment in traction
 - Marking and cleanliness
- Check that the tool is suitable for the required use.
- Inserts must be locked positively in the pocket and secured using the torx screw provided. The screw must be torqued to the correct value as indicated in our charts on the steel product pages A248 & A250 . For security use a new screw each time.
- Check the balancing of the – assembled tool – cutter body, inserts and attachment.
- Before start up, note the maximum RPM engraved on the tool or in our technical documents. The maximum RPM is linked to a precise balancing value.
- Ensure that the field of application of the tool shown in our technical documents and technological parameters is observed:

a_e (mm)	width of cut, lateral engagement (radial)
a_p (mm)	Axial depth of cut
f_z (mm/tooth)	Feed per tooth
n (rpm)	RPM

Stellram cannot accept responsibility for misuse of this product:

- Non observance of the above instructions
- Machine without casing
- Incorrect clamping of workpieces
- No safety device on the machine
- Any misuse or incorrect clamping

The optimum rotation must be determined by condition of the spindle. The spindle must be rigid to run at these higher RPMs.

Under no circumstances must any attempt be made to repair this tool. The only permitted maintenance is the indexing or replacement of the inserts. Use a new screw for each insert replacement.

When assembling the cutter to a shrink fit holder, the maximum protrusion can not exceed 10% of the reach of tool.

The Cutter Nomenclature Code:

Example: 5702VZD14CA020R58-2

5702	=	Stellram Product Family
V	=	Screw fixation
Z	=	Insert shape (parallelogram)
D	=	ISO insert clearance ($D = 15^\circ$)
14	=	Insert edge length (mm)
C	=	Plain straight shank (No flats)
A	=	Through the tool coolant
020	=	Cutting diameter (mm)
R	=	Right hand tool
58	=	Reach of tool in mm
-2	=	Maximum value of the insert radius in 1/10mm increments

This tool must only be used for the following applications: Face milling, shoulder milling, slotting and pocketing.

Cylindrical shanks & HSK shanks (special): 5702VZD14 and 5720VZ16 are designed and balanced to G6.3 at 30,000 rpm for diameters 50mm and below. Diameters larger than 50mm are balanced to G6.3 at 24,000 rpm. Cylindrical shank tools mounted in a shrink fit holder or any other mill chuck holder + inserts + screws must be re-inspected for balance by the end user when exceeding 8,000 rpm. End user must balance the assembly to a G6.3 value minimum.

Shell Mills and Modular Heads: 5720VZ16 Shell Mills and Modular Heads are not balanced. These tools must be re-inspected for balance as an assembly, cutter + adapter + inserts + screws by the end user when at or exceeding 8,000 rpm. End user must balance the assembly to a G6.3 value minimum.

Balancing requires removing some material by drilling or milling operations. To avoid making modular heads weaker, limit these operations by avoiding high rpm.

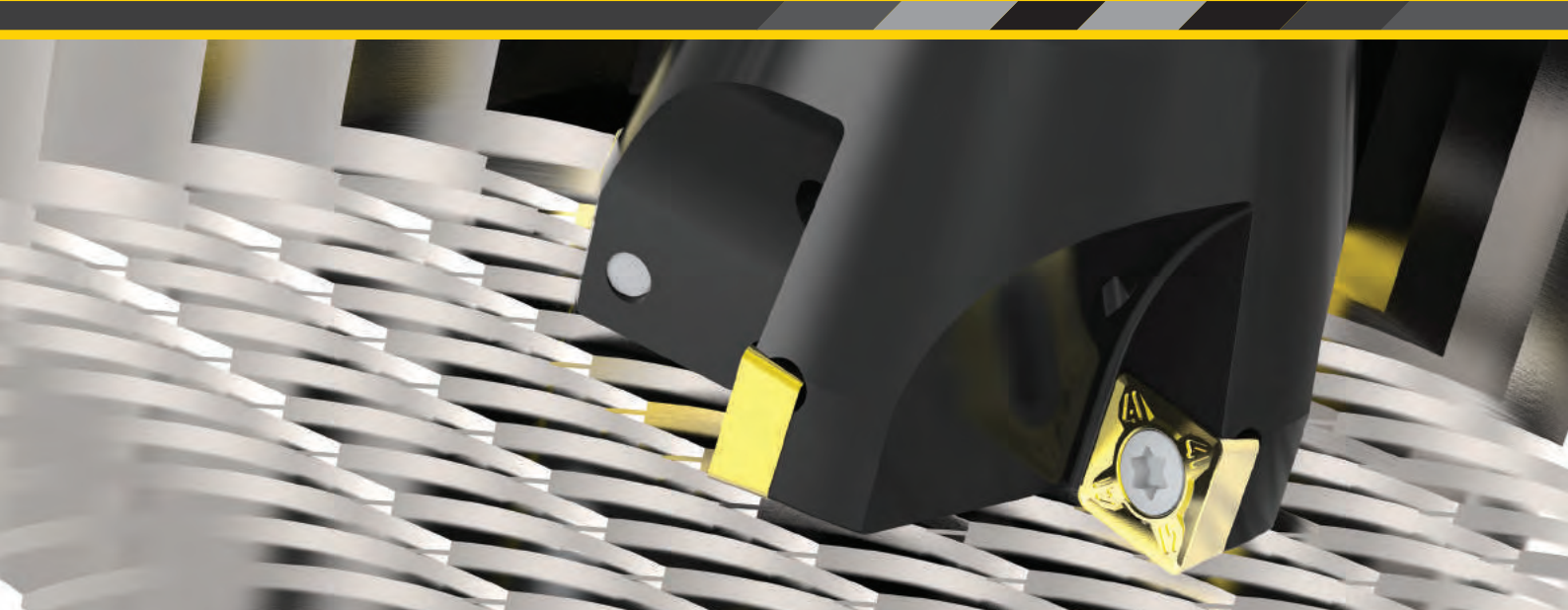
For each new modular head added to the same extension, re-balance the assembly. For each new Shell Mill installed on the same toolholder, re-balance the assembly.

Tighten the Modular Head to the Extension, with lubricant, apply the torque value of:

Thread sizes (mm)	Torque Values Nm
M6	10
M8	30
M10	50
M12	80
M16	110

Tighten the bolt between the shell mill and tool holder, with lubricant apply the torque value of:

Thread sizes (mm)	Cutter Bore Size (mm)	Torque Values Nm
M6	13	10
M8	16	30
M10	22	50
M12	27	80
M16	32	110
M20	40	120



HIGH PERFORMANCE LONG EDGE MILLING CUTTERS

The **7791VS** cutters are designed for high metal removal rates particularly for rough machining. A wide range of indexable inserts and plunge milling cutters are available.

These robust plunge milling cutters are ideal for machining a variety of materials such as Steel, Alloyed Steel, Stainless Steel, Cast Iron, High Temperature Alloys and Aluminium Alloys.

Utilising plunge milling techniques may increase productivity 2 to 5 times over traditional profiling operations.

Strellram's 7791VS family utilises square inserts with 4 cutting edges. The available insert range takes either a 8mm or 11mm maximum possible radial cut.

The capability of this cutter design allows plunging vertically, horizontally down a slope or a profile.

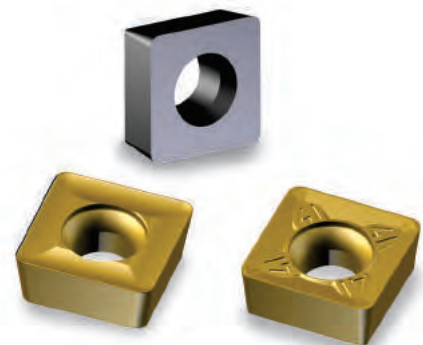
7791VS

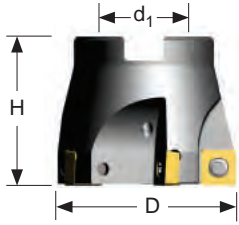
7791VS09:

Maximum $a_e = 8\text{mm}$
Diameter Range = 25mm - 50mm

7791VS12:

Maximum $a_e = 11\text{mm}$
Diameter Range = 63mm - 80mm





Shell Mill Fixation

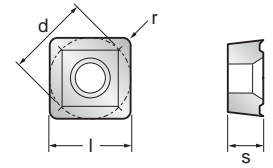


Modular Head

Product		Dimensions (mm)						Spares					
EDP	Item Description	D	L/H	l ₁	d ₁	a _e max plunging	No. of Teeth	EDP		EDP		Screw Tightening Nm	Max RPM
7791VS09 Shell Mill Fixation													
029092	7791VS09-A040Z04R	40	32	-	16	8	4	015262	D4010T	015240	T15	3,10	41100
029101	7791VS09-A050Z05R	50	40	-	22	8	5	015262	D4010T	015240	T15	3,10	35600
7791VS12 Shell Mill Fixation													
029102	7791VS12-A063Z05R	63	40	-	22	11	5	015270	F4011T	015240	T20	3,10	31000
029103	7791VS12-A080Z06R	80	50	-	27	11	6	015270	F4011T	015240	T20	3,10	27000

Product		Dimensions (mm)						Spares					
EDP	Item Description	D	L/H	l ₁	d ₁	a _e max plunging	No. of Teeth	EDP		EDP		Screw Tightening Nm	Max RPM
7791VS09 Modular Head													
031350	7791VS09SA025Z2R35	25	35	M12	12,5	8	2	015262	D4008T	015240	T15	3,10	57700
031405	7791VS09SA032Z3R43	32	43	M16	17	8	3	015262	D4008T	015240	T15	3,10	47800

Note: For Cylindrical Shank extensions in high density alloy with through coolant refer to page A76.



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing ▽	Semi-Finishing ▽▽	Finishing ▽▽▽	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _e max. 8,00	a _e min. - max. 1,00 - 3,00	a _e min. - max. -					
7791VS09 Milling Inserts										
018186	SCMT09T308E	GH1	●	●●	-	9,52	9,52	3,97	0,8	0,12
015147	SCMT09T308EN-41	X500	◆◆	◆◆◆◆	-	9,52	9,52	3,97	0,8	0,04
031474	SCMT09T308EN-41	SP6519	●●◆◆	◆◆◆◆◆◆	-	9,52	9,52	3,97	0,8	0,04
017315	SCMT09T308EN-41	MP91M	-	◆◆◆◆	-	9,52	9,52	3,97	0,8	0,04
034550	SCMT09T308T	X400	◆◆	◆	-	9,52	9,52	3,97	0,8	0,12
031568	SCMT09T308T	SP6519	◆◆◆◆	-	-	9,52	9,52	3,97	0,8	0,12
034551	SCMT09T308T	SP4019	●●◆◆	◆	-	9,52	9,52	3,97	0,8	0,12

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

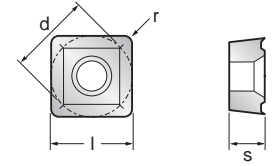
SCMT09T308E GH1 has limited usage for Aluminium Alloys.

SCMT09T308T SP4019 is for Stainless Steel with heavy scale.

Note: Feed recommendations can be found on page A261. Speed recommendations can be found on page A262.



Plunging Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼	d (IC)	l	s	r	h _m min
			Depth of Cut (mm)							
			a _e max. 11,00	a _e min. - max. 1,00 - 4,00	a _e min. - max. -					
7791VS12 Milling Inserts										
030671	SCHT12M512EN-422	X700	-	◆◆◆	-	12,70	12,70	5,00	1,20	0,08
015226	SCMT12M512EN-41	X500	◆◆	●●●■	-	12,70	12,70	5,00	1,20	0,05
031475	SCMT12M512EN-41	SP6519	◆■	◆◆●■◆●	-	12,70	12,70	5,00	1,20	0,05
017317	SCMT12M512EN-41	MP91M	-	■●■	-	12,70	12,70	5,00	1,20	0,05
034554	SCMT12M512T	X400	■◆	◆	-	12,70	12,70	5,00	1,20	0,12
024129	SCMT12M512T	X500	●■	-	-	12,70	12,70	5,00	1,20	0,12
034555	SCMT12M512T	SP6519	◆●●	-	-	12,70	12,70	5,00	1,20	0,12
034553	SCMT12M512T	SP4019	●●■	■	-	12,70	12,70	5,00	1,20	0,12
017316	SCMT12M512T	MP91M	◆	●	-	12,70	12,70	5,00	1,20	0,12



Plunging Mills

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

SCMT12M512T SP4019 is for Stainless Steel with heavy scale.

Note: Feed recommendations can be found on page A261. Speed recommendations can be found on page A262.


7791VS Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si P2 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
7791VS09 Insert Size																	
E	GH1	Plunging	-	-	-	-	0,12 - 0,25	0,12 - 0,25	0,12 - 0,20	0,12 - 0,25	-	-	-	-	-	-	-
EN-41	X500	Plunging	0,05 - 0,33	0,05 - 0,30	0,05 - 0,28	0,05 - 0,25	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,13	0,05 - 0,15	-	-
EN-41	SP6519	Plunging	0,05 - 0,33	0,05 - 0,30	0,05 - 0,28	0,05 - 0,25	0,05 - 0,30	0,05 - 0,30	0,05 - 0,25	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,13	0,05 - 0,15	-	-
EN-41	MP91M	Plunging	0,05 - 0,30	0,12 - 0,28	-	-	0,05 - 0,30	0,05 - 0,30	0,05 - 0,22	-	-	-	-	-	-	0,04 - 0,10	0,04 - 0,10
T	X400	Plunging	0,12 - 0,35	0,12 - 0,33	-	-	-	-	-	-	-	-	-	-	-	0,08 - 0,14	0,08 - 0,14
T	SP6519	Plunging	0,10 - 0,35	0,12 - 0,33	-	-	0,12 - 0,35	0,12 - 0,35	0,12 - 0,30	-	-	-	-	-	-	-	-
T	SP4019	Plunging	-	-	0,15 - 0,30	0,15 - 0,28	0,12 - 0,35	0,12 - 0,35	0,12 - 0,30	-	-	-	-	-	-	0,08 - 0,14	0,08 - 0,14
7791VS12 Insert Size																	
EN-422	X700	Plunging	-	-	0,08 - 0,28	0,08 - 0,25	-	-	-	-	-	0,07 - 0,10	0,07 - 0,10	0,07 - 0,13	0,07 - 0,15	-	-
EN-41	X500	Plunging	0,06 - 0,40	0,06 - 0,35	0,06 - 0,33	0,06 - 0,30	-	-	-	-	-	0,06 - 0,10	0,06 - 0,10	0,06 - 0,13	0,06 - 0,15	-	-
EN-41	SP6519	Plunging	0,06 - 0,40	0,06 - 0,36	0,06 - 0,33	0,06 - 0,30	0,06 - 0,40	0,06 - 0,40	0,06 - 0,30	-	-	0,06 - 0,10	0,06 - 0,10	0,06 - 0,13	0,06 - 0,15	-	-
EN-41	MP91M	Plunging	0,06 - 0,36	0,06 - 0,30	-	-	0,06 - 0,40	0,06 - 0,40	0,06 - 0,30	-	-	-	-	-	-	-	-
T	X400	Plunging	0,12 - 0,45	0,12 - 0,40	-	-	-	-	-	-	-	-	-	-	-	0,10 - 0,15	0,10 - 0,15
T	X500	Plunging	0,12 - 0,45	0,12 - 0,40	-	-	-	-	-	-	-	-	-	-	-	-	-
T	SP6519	Plunging	0,12 - 0,45	0,12 - 0,40	-	-	0,12 - 0,45	0,12 - 0,45	0,12 - 0,40	-	-	-	-	-	-	-	-
T	SP4019	Plunging	-	-	0,12 - 0,35	0,12 - 0,30	0,12 - 0,45	0,12 - 0,45	0,12 - 0,40	-	-	-	-	-	-	0,10 - 0,15	0,10 - 0,15
T	MP91M	Plunging	-	-	-	-	0,12 - 0,45	0,12 - 0,45	0,12 - 0,40	-	-	-	-	-	-	0,10 - 0,15	0,10 - 0,15

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A262.



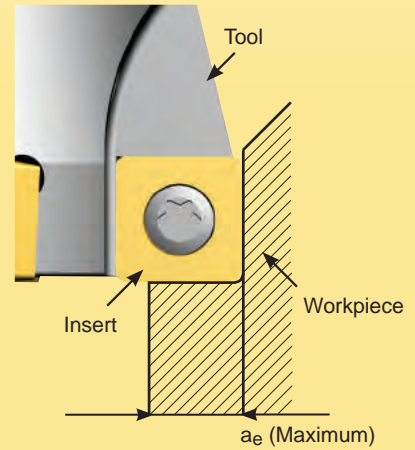
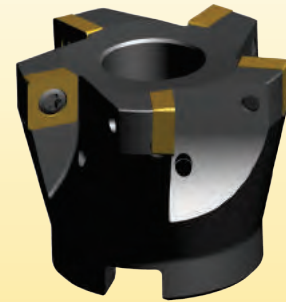
		Speed v_c (m/min)																					
7791VS Series		Wear Resistance - ← → +																					
Coolant Recommendation		Speed min. - max.																					
Recommended ● Possible ◎																							
ISO	Materials	Rm and Hardness	PVD X Grade		PVD X Grade		PVD X Grade		PVD Standard		PVD Standard		CVD Standard		Uncoated Micrograin								
			Water	No Water	Water	No Water	Water	No Water	Water	No Water	Water	No Water	Water	No Water									
P	Unalloyed Steel	<600 N/mm ² <180 HBN	◎	●	120 - 260	◎	●	130 - 270			◎	●	130 - 295			●	140 - 345						
		<950 N/mm ² <280 HBN			105 - 230			115 - 240										120 - 305					
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	◎	●	95 - 200	◎	●	100 - 210			◎	●	100 - 230				●	105 - 270					
		950-1200 N/mm ² 280-355 HBN			70 - 150			75 - 160										80 - 205					
		1200-1400 N/mm ² 355-415 HBN		●	45 - 95		●	50 - 100				●	50 - 110			●	50 - 130						
M	Stainless Steel	Austenitic + Ferritic 300 series				◎	●	115 - 250	◎	●	115 - 260	◎	●	115 - 270	◎	●	120 - 280						
		Martensitic 400 series						100 - 220			105 - 230			105 - 235			110 - 250						
	PH Stainless	Refractory P.H.				●		50 - 110	●		50 - 115	●		50 - 120	●		50 - 130						
K	Cast Iron	Grey GG-Ft															145 - 330		145 - 365		135 - 290		
		Spheroidal-Ductile GGG-FGS										◎	●	110 - 240		●	115 - 255		●	115 - 285	◎	●	120 - 245
		Malleable GTS - MN/MP												100 - 220			105 - 235			105 - 260			115 - 200
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN																			●	400 - 3050	
		Aluminium + Silicon > 16% Si 92 HBN																					295 - 2440
S	High Temperature Alloys	Iron Based						23 - 48			23 - 52			23 - 55									
		Cobalt Based		●			21 - 44		●		22 - 46		●		22 - 48								
		Nickel Based					24 - 51				25 - 53			25 - 55									
		Titanium Based					35 - 73				36 - 75			36 - 79									
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN		●	45 - 95											●	50 - 100		●	50 - 105			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			35 - 80												●	40 - 90		●	40 - 95		

Plunging Mills

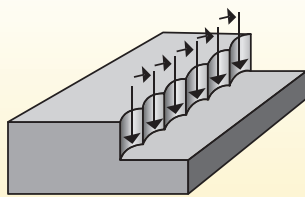


Tool Definition

Scallop height and step over - Dimensions (mm)				
Diameter	25	32	40	50
Insert size	9	9	9	9
a_e max	8,00	8,00	8,00	8,00
Scallop height	Step over (mm)			
0,25	4,97	5,63	6,30	7,05
0,50	7,00	7,94	8,89	9,95
0,75	8,53	9,68	10,85	12,16
1,00	9,80	11,14	12,49	14,00
2,00	13,56	15,49	17,44	19,60
3,00	16,25	18,65	21,07	23,75
4,00	18,33	21,17	24,00	27,13
5,00	20,00	23,24	26,46	30,00
6,00	21,35	24,98	28,57	32,50
7,00	-	-	30,40	34,70
8,00	-	-	32,00	36,66

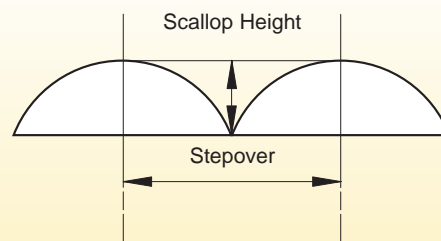


The scallop height is calculated in relation with the step over.



The maximum radial engagement is directly in relation with insert cutting edge length.

For insert type: SC...09 the a_e , max is 8mm.



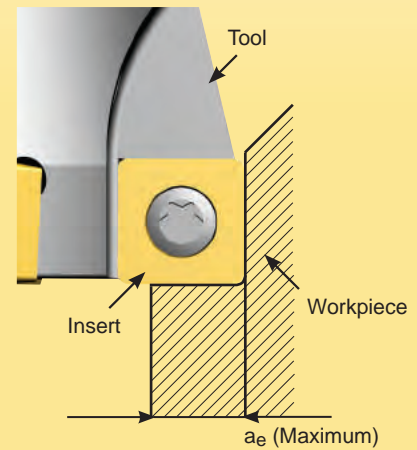
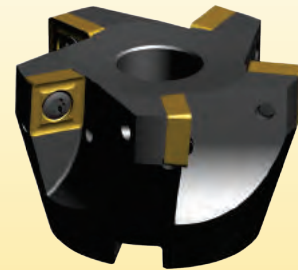
The cutting edge should not be in contact with the material face after machining to maintain the cutting edge quality.

Plunging Mills

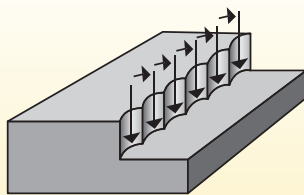


Tool Definition

Scallop height and step over - Dimensions (mm)		
Diameter	63	80
Insert size	12	12
a_e max	11,00	11,00
Scallop height	Step over (mm)	
0,25	7,92	8,93
0,50	11,18	12,61
0,75	13,67	15,42
1,00	15,75	17,78
2,00	22,09	24,98
3,00	26,83	30,40
4,00	30,72	34,87
5,00	34,06	38,73
6,00	36,99	42,14
7,00	39,60	45,21
8,00	41,95	48,00
9,00	44,09	50,56
10,00	46,04	52,92
11,00	47,83	55,10

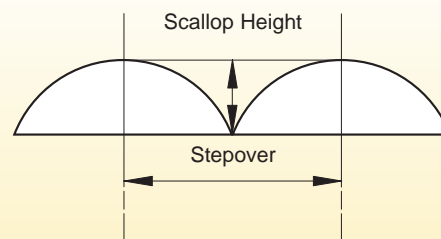


The scallop height is calculated in relation with the step over.

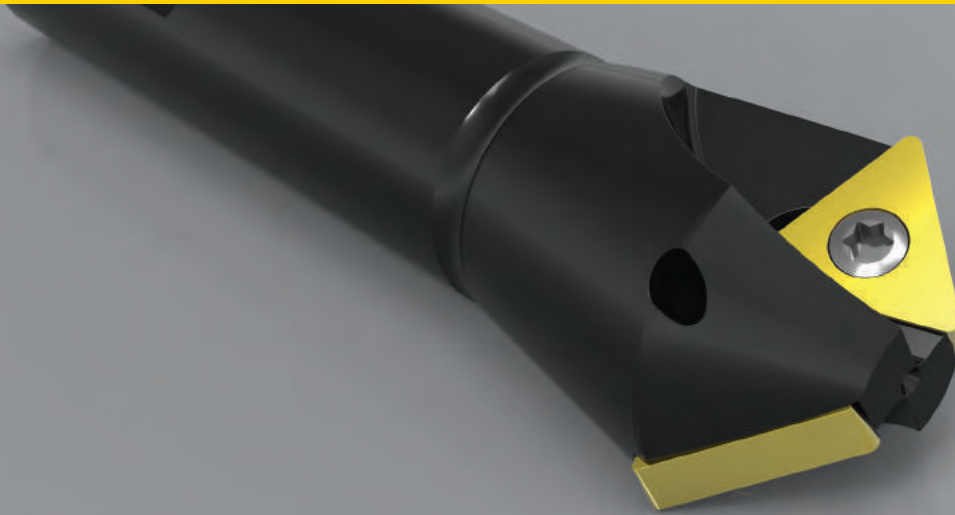


The maximum radial engagement is directly in relation with insert cutting edge length.

For insert type: SC...12 the a_e , max is 11mm.



The cutting edge should not be in contact with the material face after machining to maintain the cutting edge quality.



7745VT & 7760VT CHAMFER MILLING CUTTER

The cutter **7745VT11** is designed for removing heavy burrs and for machining small 45 degree chamfers.

The cutter series **7745VT16** contains two different cutter versions. One version utilises two inserts for machining heavy chamfers. The other version utilises one insert and is particularly qualified for spot drilling as well as for machining of small chamfers.

The cutter series **7760VT** contains two diameters, both for 60 degree chamfer milling.

Due to a wide range of available geometries and grades all these cutters are suitable for machining all materials.



Chamfering

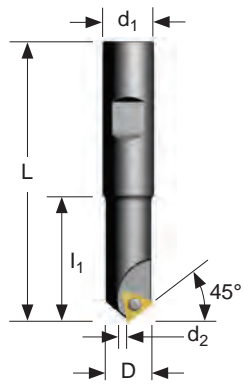
7745VT & 7760VT

7745VT11:
Diameter Range = 16mm

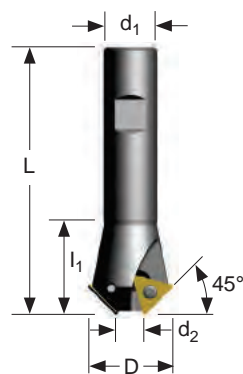
7745VT16:
Diameter Range = 20mm to 30mm

7760VT:
Diameter Range = 16mm to 25mm

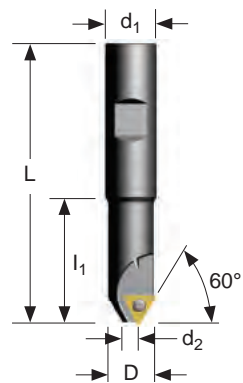




45° VT11 Weldon Shank



45° VT16 Weldon Shank



60° VT11 Weldon Shank



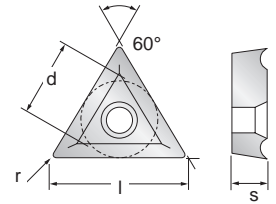
Depth of Cut (a_p)

Product		Dimensions (mm)						
EDP	Item Description	D	L/H	l_1	d_1	d_2	a_p max	No. of Teeth
45° Degrees Cutter - Weldon Shank								
023065	7745VT11WA016R	16	88	38	16	4,00	7,70	1
023066	7745VT16WA020R*	20	110	50	20	0,00	6,00	1
023067	7745VT16WA030R	30	100	32	20	12,00	11,30	2
60° Degrees Cutter - Weldon Shank								
023068	7760VT11WA016R	16	88	38	16	7,00	9,50	1
023069	7760VT11WA025R	24,5	90	40	20	15,00	9,50	2

* Denotes the cutter for spot drilling. For Spot Drilling the a_p max. is 6,00mm and for linear movement the a_p max. is 11,00mm.

7745VT & 7760VT Spares & Max RPM

Product		Dimensions (mm)					
EDP	Item Description	EDP		EDP		Screw Tightening Nm	Max RPM
023065	7745VT11WA016R	015060	F2505T	015069	T7F	0,80	107000
023066	7745VT16WA020R*	015260	D4008T	015240	T15	3,10	84000
023067	7745VT16WA030R	015260	D4008T	015240	T15	3,10	55500
023068	7760VT11WA016R	015060	F2505T	015069	T7F	0,80	107000
023069	7760VT11WA025R	015060	F2505T	015069	T7F	0,80	75000



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			ap max. 9,00	ap min. - max. 1,00 - 7,00	ap min. - max. 0,50 - 3,00m					
Insert size 11mm for Chamfering only										
024947	TPMT110204E-M	X500	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	-	6,35	11,00	2,38	0,40	0,03
032277	TPMT110204E-M	SP4019	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	-	6,35	11,00	2,38	0,40	0,03
024948	TPMT110204E-M	GH1	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	6,35	11,00	2,38	0,40	0,03
Insert size 16mm for Spot Drilling and Chamfering										
034535	TCMX16T308E-ZR*	SP4019	-	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	9,52	16,50	3,97	0,80	0,05
Insert size 16mm for Chamfering only										
034536	TCMT16T308E	X400	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	-	9,52	16,50	3,97	0,80	0,05
024140	TCMT16T308E	X500	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	-	9,52	16,50	3,97	0,80	0,05
031569	TCMT16T308E	SP6519	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	-	9,52	16,50	3,97	0,80	0,05
024139	TCMT16T308E	MP91M	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	-	9,52	16,50	3,97	0,80	0,05
034538	TCMT16T308T	X400	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	9,52	16,50	3,97	0,80	0,15
034539	TCMT16T308T	SP6519	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	9,52	16,50	3,97	0,80	0,15
034537	TCMT16T308T	SP4019	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	-	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	9,52	16,50	3,97	0,80	0,15
023393	TCMW16T308E	GH1	-	●	-	9,52	16,50	3,97	0,80	0,15

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* TCMX16T308E-ZR SP4019 has to be used for spot drilling and can also be used for chamfer milling.

Note: The feed for spot drilling needs to be reduced by 50%.

Note: Feed recommendations can be found on page A268. Speed recommendations can be found on page A269.



Chamfering Mills



7745VT & 7760VT Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
Insert size 11mm for Chamfering only																	
E-M	X500	Chamfering	0,03 - 0,20	0,03 - 0,15	0,03 - 0,15	0,03 - 0,12	0,03 - 0,20	0,03 - 0,20	0,03 - 0,20	-	-	0,03 - 0,10	0,03 - 0,10	0,03 - 0,10	0,03 - 0,12	-	-
E-M	SP4019	Chamfering	0,03 - 0,20	0,03 - 0,15	0,03 - 0,15	0,03 - 0,12	0,03 - 0,20	0,03 - 0,20	0,03 - 0,20	0,03 - 0,20	0,02 - 0,15	0,03 - 0,10	0,03 - 0,10	0,03 - 0,10	0,03 - 0,12	-	-
E-M	GH1	Chamfering	-	-	-	-	-	-	-	0,03 - 0,20	0,02 - 0,15	-	-	-	-	-	-
Insert size 16mm for Spot Drilling and Chamfering																	
E-ZR	SP4019	Spot drilling / Chamfering	0,03 - 0,20	0,03 - 0,15	0,03 - 0,15	0,03 - 0,10	0,03 - 0,15	0,03 - 0,12	0,03 - 0,10	0,03 - 0,20	0,03 - 0,15	0,03 - 0,10	0,03 - 0,10	0,03 - 0,10	0,03 - 0,12	-	-
Insert size 16mm for Chamfering only																	
E	X400	Chamfering	0,03 - 0,20	0,03 - 0,15	-	-	-	-	-	-	-	-	-	-	-	-	-
E	X500	Chamfering	-	-	0,03 - 0,15	0,03 - 0,12	-	-	-	-	-	0,03 - 0,10	0,03 - 0,10	0,03 - 0,10	0,03 - 0,12	-	-
E	SP6519	Chamfering	0,03 - 0,20	0,03 - 0,15	0,03 - 0,15	0,03 - 0,12	0,03 - 0,15	0,03 - 0,15	0,03 - 0,15	-	-	0,03 - 0,10	0,03 - 0,10	0,03 - 0,10	0,03 - 0,12	-	-
E	MP91M	Chamfering	0,03 - 0,18	0,03 - 0,12	-	-	0,03 - 0,15	0,03 - 0,15	0,03 - 0,15	-	-	-	-	-	-	-	-
T	X400	Chamfering	0,03 - 0,20	0,03 - 0,15	-	-	-	-	-	-	-	-	-	-	-	0,03 - 0,10	0,03 - 0,10
T	SP6519	Chamfering	0,03 - 0,20	0,03 - 0,15	0,03 - 0,15	0,03 - 0,12	0,03 - 0,20	0,03 - 0,20	0,03 - 0,18	-	-	0,03 - 0,10	0,03 - 0,10	0,03 - 0,10	0,03 - 0,12	-	-
T	SP4019	Chamfering	0,04 - 0,20	0,04 - 0,14	0,03 - 0,15	0,03 - 0,12	0,03 - 0,20	0,03 - 0,20	0,03 - 0,18	-	-	0,03 - 0,10	0,03 - 0,10	0,03 - 0,10	0,03 - 0,12	0,03 - 0,10	0,03 - 0,10
E	GH1	Chamfering	-	-	-	-	0,03 - 0,20	0,03 - 0,20	0,03 - 0,18	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A269.

Chamfering Mills



Speed v_c (m/min)													
7745VT & 7760VT Series			Wear Resistance										
			Speed min. - max.										
Coolant Recommendation			PVD X Grade		CVD X Grade		PVD Standard		PVD Standard		CVD Standard		Uncoated Micrograin
ISO	Materials	Rm and Hardness	Recommended ● Possible ○	Water Spray	Water Spray	Water Spray	Water Spray	Water Spray	Water Spray	Water Spray	Water Spray	Water Spray	Water Spray
				X400	X500	SP6519	SP4019	MP91M	GH1				
P	Unalloyed Steel	<600 N/mm ² <180 HBN	○ ●	120 - 260	○ ●	130 - 270	○ ●	130 - 295	●	140 - 315	●	140 - 345	
		<950 N/mm ² <280 HBN	○ ●	105 - 230	○ ●	115 - 240	○ ●	115 - 260	●	120 - 275	●	120 - 305	
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○ ●	95 - 200	○ ●	100 - 210	○ ●	100 - 230	●	105 - 245	●	105 - 270	
		950-1200 N/mm ² 280-355 HBN	○ ●	70 - 150	○ ●	75 - 160	○ ●	75 - 175	●	80 - 190	●	80 - 205	
		1200-1400 N/mm ² 355-415 HBN	○ ●	45 - 95	○ ●	50 - 100	○ ●	50 - 110	●	50 - 120	●	50 - 130	
M	Stainless Steel	Austenitic + Ferritic 300 series	○ ●		○ ●	115 - 250	○ ●	115 - 270	○ ●	120 - 280			
		Martensitic 400 series	○ ●		○ ●	100 - 220	○ ●	105 - 235	○ ●	110 - 250			
	PH Stainless	Refractory P.H.	○ ●		○ ●	50 - 110	○ ●	50 - 120	○ ●	50 - 130			
K	Cast Iron	Grey GG-Ft	○ ●		○ ●	120 - 280	○ ●	140 - 295	○ ●	145 - 330	○ ●	145 - 365	○ ●
		Spheroidal-Ductile GGG-FGS	○ ●		○ ●	105 - 205	○ ●	110 - 240	○ ●	115 - 255	○ ●	115 - 285	○ ●
		Malleable GTS - MN/MP	○ ●		○ ●	95 - 170	○ ●	100 - 220	○ ●	105 - 235	○ ●	105 - 260	○ ●
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN	○ ●						●	400 - 2895			●
		Aluminium + Silicon > 16% Si 92 HBN	○ ●							295 - 2320			
S	High Temperature Alloys	Iron Based	○ ●			23 - 48		23 - 55		24 - 63			
		Cobalt Based	○ ●			21 - 44		22 - 48		23 - 52			
		Nickel Based	○ ●			24 - 51		25 - 55		26 - 59			
		Titanium Based	○ ●			35 - 73		36 - 79		37 - 84			
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	○ ●	45 - 95					●	50 - 100			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN	○ ●	35 - 80					●	40 - 90			

Chamfering Mills



Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
 a_e = Radial engagement
 f_z = Feed per tooth
 d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

7745VT16 Technical Information

Feed rate compensation: For 45° cutting, divide the h_m value by the sine of the approach angle (the sine of 45° = 0,707)

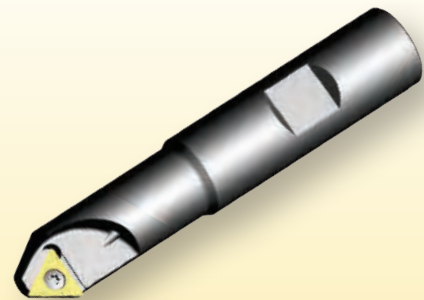
i.e.: $\frac{h_m}{0,707}$ or $\frac{0,08\text{mm}}{0,707} = 0,11\text{mm}$ programmed feed rate



7760VT11 Technical Information

Feed rate compensation: For 60° cutting, divide the h_m value by the sine of the approach angle (the sine of 60° = 0,866)

i.e.: $\frac{h_m}{0,866}$ or $\frac{0,08\text{mm}}{0,866} = 0,092\text{mm}$ programmed feed rate





T-SLOT MILLING CUTTERS

The **5400VM** cutter is specifically designed for producing T-slots after machining the tenon slot. This particular design places two inserts slightly higher on the body to machine the top of the slot while the other two machine the bottom of the slot.

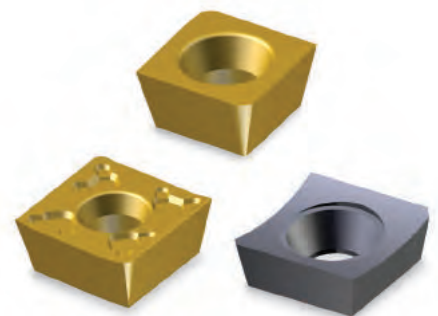
The unique design with reinforced insert support and shallow machined chip flutes, allows this cutter design to run at higher feed rates.

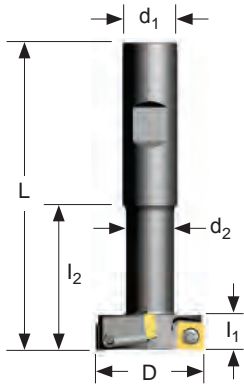
The design allows chips to evacuate through the slot already machined. When possible the tool shank passage should be only 1mm below the top of the T-slot, allowing the chips to evacuate through the slot produced by this cutter.



5400VM

5400VM:
Diameter Range = 18mm to 40mm



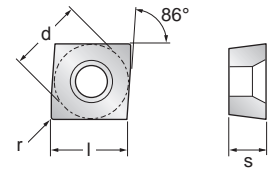


Weldon Shank

Product		Dimensions (mm)								
EDP	Item Description	D	L	Slot Height l ₁	l ₂	d ₁	d ₂	No of Teeth (right/left)	Insert Type	Insert Size
5400VM Weldon Shank										
021662	5400VM04WA018R	18	70	8	25	12	8	2R + 2L	MP	04 R/L
021663	5400VM04WA021R	21	75	9	30	12	10	2R + 2L	MP	04 R/L
021664	5400VM06WA025R	25	83	11	35	16	12	2R + 2L	MP	06 R/L
018313	5400VM08WA032R	32	91	14	43	16	15	2R + 2L	MP	08 R/L
021665	5400VM11WA040R	40	106	18	50	25	19	2R + 2L	MP	11 R/L

Product		Spares					
EDP	Item Description	EDP		EDP		Screw Tightening Nm	Max RPM
5400VM Weldon Shank							
021662	5400VM04WA018R	015059	F2004T	018487	T6	0,40	10000
021663	5400VM04WA021R	015059	F2004T	018487	T6	0,40	10000
021664	5400VM06WA025R	015060	F2505T	018488	T7	0,80	10000
018313	5400VM08WA032R	015063	F3008T	013214	T9	1,40	10000
021665	5400VM11WA040R	015062	D4010T	015240	T15	3,10	10000

T-Slot Mills



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			a _e / a _p max. *	a _e min. - max.	a _e min. - max.					
Insert Size 04										
017667	MPHW0402PPTL	X500	■◆●	-	-	4,76	4,76	2,38	Facet	0,07
017666	MPHW0402PPTR	X500	■◆●	-	-	4,76	4,76	2,38	Facet	0,07
031508	MPFW0402PPTL	SP6519	◆■●	-	-	4,76	4,76	2,38	Facet	0,07
031507	MPFW0402PPTR	SP6519	◆■●	-	-	4,76	4,76	2,38	Facet	0,07
034523	MPFW0402PPTL	SP4019	●■◆	-	-	4,76	4,76	2,38	Facet	0,07
034524	MPFW0402PPTR	SP4019	●■◆	-	-	4,76	4,76	2,38	Facet	0,07
Insert Size 06										
024926	MPEX0602PPFL-701	GH1	◆	-	-	6,35	6,35	2,38	Facet	0,02
024927	MPEX0602PPFR-701	GH1	◆	-	-	6,35	6,35	2,38	Facet	0,02
017669	MPHW0602PPTL	X500	■◆●	-	-	6,35	6,35	2,38	Facet	0,07
017668	MPHW0602PPTR	X500	■◆●	-	-	6,35	6,35	2,38	Facet	0,07
031571	MPFW0602PPTL	SP6519	◆■●	-	-	6,35	6,35	2,38	Facet	0,07
031570	MPFW0602PPTR	SP6519	◆■●	-	-	6,35	6,35	2,38	Facet	0,07
034525	MPFW0602PPTL	SP4019	●■◆	-	-	4,76	4,76	2,38	Facet	0,07
034526	MPFW0602PPTR	SP4019	●■◆	-	-	4,76	4,76	2,38	Facet	0,07

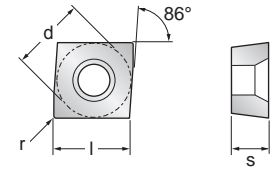


T-Slot Mills

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Max a_p and a_e is determined by selection of the cutter.

Note: Feed recommendations can be found on page A275. Speed recommendations can be found on page A276.



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			a _e / a _p max.*	a _e min. - max.	a _e min. - max.					
Insert Size 08										
034527	MPEX0803PPFL-701	SP4019	●■	-	-	7,94	7,94	3,18	Facet	0,02
034528	MPEX0803PPFR-701	SP4019	●■	-	-	7,94	7,94	3,18	Facet	0,02
024928	MPEX0803PPFL-701	GH1	◆	-	-	7,94	7,94	3,18	Facet	0,02
017642	MPEX0803PPFR-701	GH1	◆	-	-	4,76	4,76	2,38	Facet	0,02
Insert Size 08										
015138	MPHT0803PPTL-42	X500	■◆	-	-	7,94	7,94	3,18	Facet	0,10
015140	MPHT0803PPTR-42	X500	■◆	-	-	7,94	7,94	3,18	Facet	0,10
031510	MPHT0803PPTL-42	SP6519	◆■□	-	-	7,94	7,94	3,18	Facet	0,10
031509	MPHT0803PPTR-42	SP6519	◆■□	-	-	7,94	7,94	3,18	Facet	0,10
017296	MPHT0803PPTL-42	MP91M	●■◆	-	-	7,94	7,94	3,18	Facet	0,10
017297	MPHT0803PPTR-42	MP91M	●■◆	-	-	7,94	7,94	3,18	Facet	0,10
Insert Size 08										
034532	MPFW0803PPTL	X400	■◆	-	-	7,94	7,94	3,18	Facet	0,10
034531	MPFW0803PPTR	X400	■◆	-	-	7,94	7,94	3,18	Facet	0,10
Insert Size 08										
034529	MPFW0803PPTL	SP4019	◆	-	-	7,94	7,94	3,18	Facet	0,10
034530	MPFW0803PPTR	SP4019	◆	-	-	7,94	7,94	3,18	Facet	0,10
017658	MPFW0803PPTL	GH1	●	-	-	7,94	7,94	3,18	Facet	0,10
017655	MPFW0803PPTR	GH1	●	-	-	7,94	7,94	3,18	Facet	0,10
Insert Size 11										
017644	MPEX1104PPFL-701	GH1	◆	-	-	11,11	11,11	4,76	Facet	0,02
017643	MPEX1104PPFR-701	GH1	◆	-	-	11,11	11,11	4,76	Facet	0,02
Insert Size 11										
015141	MPHT1104PPTL-42	X500	■◆	-	-	11,11	11,11	4,76	Facet	0,10
015142	MPHT1104PPTR-42	X500	■◆	-	-	11,11	11,11	4,76	Facet	0,10
031512	MPHT1104PPTL-42	SP6519	◆■□	-	-	11,11	11,11	4,76	Facet	0,10
031511	MPHT1104PPTR-42	SP6519	◆■□	-	-	11,11	11,11	4,76	Facet	0,10
017298	MPHT1104PPTL-42	MP91M	●■◆	-	-	11,11	11,11	4,76	Facet	0,10
017299	MPHT1104PPTR-42	MP91M	●■◆	-	-	11,11	11,11	4,76	Facet	0,10
Insert Size 11										
034533	MPFW1104PPTL	SP4019	◆	-	-	11,11	11,11	4,76	Facet	0,15
034534	MPFW1104PPTR	SP4019	◆	-	-	11,11	11,11	4,76	Facet	0,15
017439	MPFW1104PPTL	GH1	●	-	-	11,11	11,11	4,76	Facet	0,15
017440	MPFW1104PPTR	GH1	●	-	-	11,11	11,11	4,76	Facet	0,15



T-Slot Mills

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Max a_p and a_e is determined by selection of the cutter.

Note: Feed recommendations can be found on page A275. Speed recommendations can be found on page A276.



5400VM Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si T16 HBN	Aluminum & Silicon >16% Si P2 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
Insert Size 04																	
TR/TL	X500	Slotting	0,06 - 0,10	0,05 - 0,08	0,06 - 0,08	0,05 - 0,07	0,05 - 0,10	0,05 - 0,10	0,05 - 0,08	-	-	-	-	-	-	-	-
TR/TL	SP6519	Slotting	0,06 - 0,10	0,05 - 0,08	0,06 - 0,08	0,04 - 0,06	0,04 - 0,08	0,04 - 0,08	0,04 - 0,08	-	-	-	-	-	-	-	-
TR/TL	SP4019	Slotting	0,06 - 0,10	0,05 - 0,08	0,06 - 0,08	0,04 - 0,06	0,04 - 0,08	0,04 - 0,08	0,04 - 0,08	-	-	-	-	-	-	-	-
Insert Size 06																	
FR/FL-701	GH1	Slotting	-	-	-	-	-	-	-	0,05 - 0,12	0,05 - 0,10	-	-	-	-	-	-
TR/TL	X500	Slotting	0,06 - 0,13	0,06 - 0,11	0,06 - 0,12	0,06 - 0,10	0,06 - 0,12	0,06 - 0,12	0,06 - 0,10	-	-	-	-	-	-	-	-
TR/TL	SP6519	Slotting	0,06 - 0,13	0,06 - 0,11	0,06 - 0,12	0,06 - 0,10	0,06 - 0,12	0,06 - 0,12	0,06 - 0,10	-	-	-	-	-	-	-	-
TR/TL	SP4019	Slotting	0,06 - 0,12	0,06 - 0,10	0,06 - 0,12	0,06 - 0,10	0,06 - 0,12	0,06 - 0,12	0,06 - 0,10	-	-	-	-	-	-	-	-
Insert Size 08																	
FR/FL-701	SP4019	Slotting	-	-	0,04 - 0,10	-	-	-	-	0,05 - 0,12	0,05 - 0,10	-	-	-	-	-	-
FR/FL-701	GH1	Slotting	-	-	-	-	-	-	-	0,05 - 0,12	0,05 - 0,10	-	-	-	-	-	-
TL/TL-42	X500	Slotting	-	-	0,10 - 0,15	0,10 - 0,14	-	-	-	-	-	-	-	-	-	-	-
TR/TL-42	SP6519	Slotting	0,10 - 0,16	0,10 - 0,14	0,10 - 0,15	0,10 - 0,14	-	-	-	-	-	-	-	-	-	-	-
TR/TL-42	MP91M	Slotting	0,10 - 0,15	0,10 - 0,13	-	-	0,10 - 0,15	0,10 - 0,15	0,10 - 0,13	-	-	-	-	-	-	-	-
TR/TL	X400	Slotting	0,10 - 0,16	0,10 - 0,14	-	-	-	-	-	-	-	-	-	-	-	-	-
TR/TL	SP4019	Slotting	-	-	-	-	0,10 - 0,15	0,10 - 0,15	0,10 - 0,13	-	-	-	-	-	-	-	-
TR/TL	GH1	Slotting	-	-	-	-	0,10 - 0,14	0,10 - 0,14	-	-	-	-	-	-	-	-	-
Insert Size 11																	
FR/FL-701	GH1	Slotting	-	-	-	-	-	-	-	0,05 - 0,12	0,05 - 0,10	-	-	-	-	-	-
TR/TL-42	X500	Slotting	0,10 - 0,18	0,10 - 0,15	0,10 - 0,16	0,10 - 0,15	-	-	-	-	-	-	-	-	-	-	-
TR/TL-42	SP6519	Slotting	0,10 - 0,18	0,10 - 0,15	0,10 - 0,16	0,10 - 0,15	-	-	-	-	-	-	-	-	-	-	-
TR/TL-42	MP91M	Slotting	0,10 - 0,17	0,10 - 0,14	-	-	0,10 - 0,16	0,10 - 0,16	0,10 - 0,14	-	-	-	-	-	-	-	-
TR/TL	SP4019	Slotting	-	-	-	-	0,10 - 0,16	0,10 - 0,16	0,10 - 0,14	-	-	-	-	-	-	-	-
TR/TL	GH1	Slotting	-	-	-	-	0,10 - 0,14	0,10 - 0,14	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A276.



T-Slot Mills

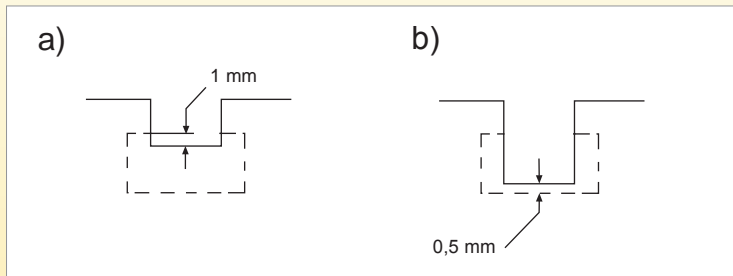


Speed v_c (m/min)														
5400VM Series			Wear Resistance											
			- ← → +											
Coolant Recommendation			Speed min. - max.											
Recommended ● Possible ○			PVD X Grade		CVD X Grade		PVD Standard		PVD Standard		CVD Standard		Uncoated Micrograin	
ISO	Materials	Rm and Hardness	ⓘ ⓘ	X400	ⓘ ⓘ	X500	ⓘ ⓘ	SP6519	ⓘ ⓘ	SP4019	ⓘ ⓘ	MP91M	ⓘ ⓘ	GH1
P	Unalloyed Steel	<600 N/mm ² <180 HBN	○ ●	120 - 260	○ ●	130 - 270	○ ●	130 - 295	○ ●	140 - 315	○ ●	140 - 345	○ ●	
		<950 N/mm ² <280 HBN	○ ●	105 - 230	○ ●	115 - 240	○ ●	115 - 260	○ ●	120 - 275	○ ●	120 - 305	○ ●	
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○ ●	95 - 200	○ ●	100 - 210	○ ●	100 - 230	○ ●	105 - 245	○ ●	105 - 270	○ ●	
		950-1200 N/mm ² 280-355 HBN	○ ●	70 - 150	○ ●	75 - 160	○ ●	75 - 175	○ ●	80 - 190	○ ●	80 - 205	○ ●	
		1200-1400 N/mm ² 355-415 HBN	○ ●	45 - 95	○ ●	50 - 100	○ ●	50 - 110	○ ●	50 - 120	○ ●	50 - 130	○ ●	
M	Stainless Steel	Austenitic + Ferritic 300 series	○ ●		○ ●	115 - 250	○ ●	115 - 270	○ ●	120 - 280	○ ●			
		Martensitic 400 series	○ ●		○ ●	100 - 220	○ ●	105 - 235	○ ●	110 - 250	○ ●			
	PH Stainless	Refractory P.H.	○ ●		○ ●	50 - 110	○ ●	50 - 120	○ ●	50 - 130	○ ●			
K	Cast Iron	Grey GG-Ft	○ ●		○ ●	120 - 280	○ ●	140 - 295	○ ●	145 - 330	○ ●	145 - 365	○ ●	135 - 290
		Spheroidal-Ductile GGG-FGS	○ ●		○ ●	105 - 205	○ ●	110 - 240	○ ●	115 - 255	○ ●	115 - 285	○ ●	120 - 245
		Malleable GTS - MN/MP	○ ●		○ ●	95 - 170	○ ●	100 - 220	○ ●	105 - 235	○ ●	105 - 260	○ ●	
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN	○ ●		○ ●		○ ●		○ ●	400 - 2895	○ ●		○ ●	400 - 3050
		Aluminium + Silicon > 16% Si 92 HBN	○ ●		○ ●		○ ●		○ ●	295 - 2320	○ ●		○ ●	295 - 2440
S	High Temperature Alloys	Iron Based	○ ●		○ ●		○ ●		○ ●		○ ●		○ ●	
		Cobalt Based	○ ●		○ ●		○ ●		○ ●		○ ●		○ ●	
		Nickel Based	○ ●		○ ●		○ ●		○ ●		○ ●		○ ●	
		Titanium Based	○ ●		○ ●		○ ●		○ ●		○ ●		○ ●	
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	○ ●		○ ●		○ ●		○ ●		○ ●		○ ●	
		Chilled Cast Iron >1400 N/mm ² > 400 HBN	○ ●		○ ●		○ ●		○ ●		○ ●		○ ●	

T-Slot Mills



5400VM Technical Information

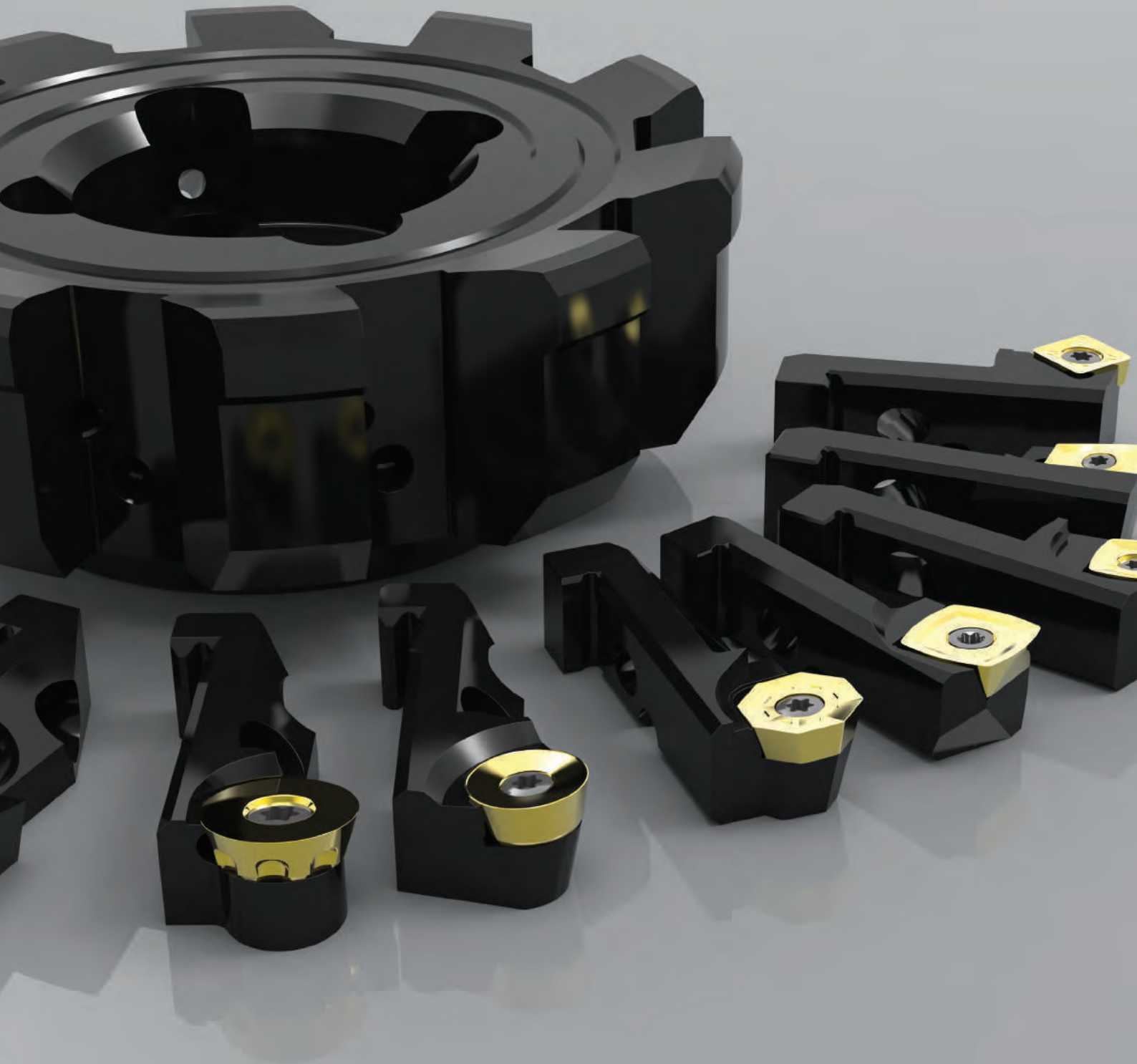


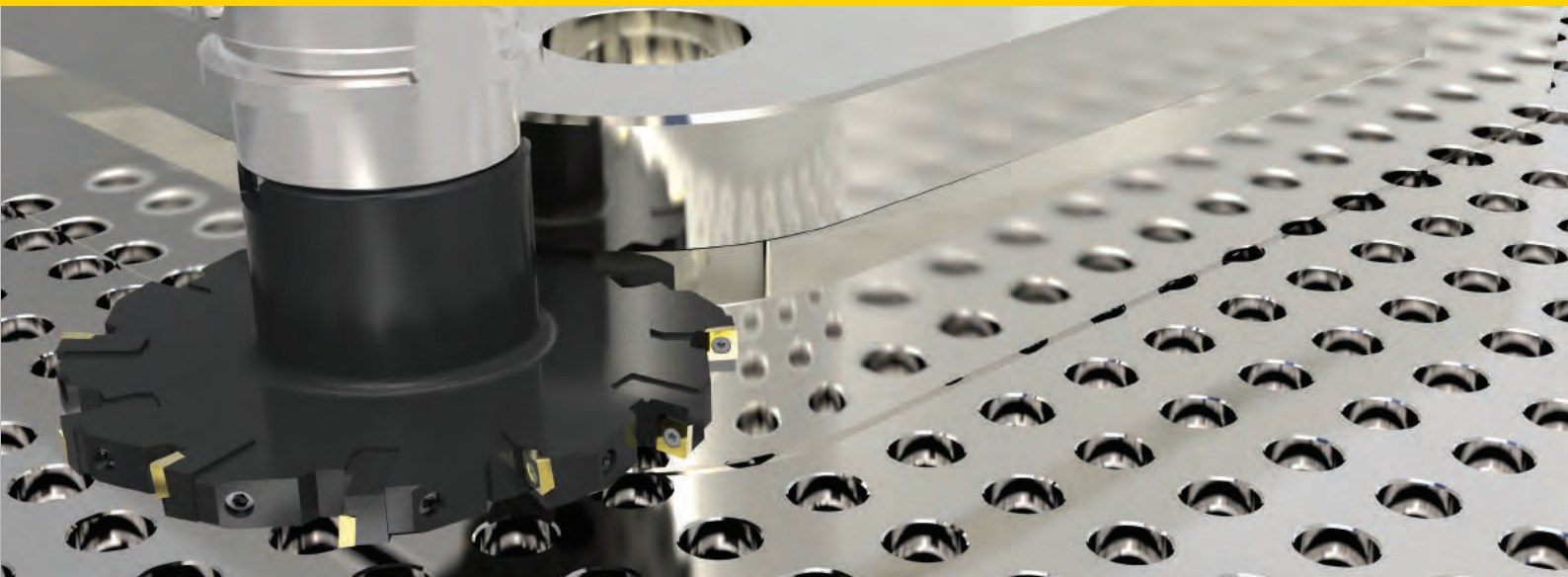
Stellram recommends the use of method a) whenever possible.
Compressed air or sufficient coolant is used to ensure adequate chip evacuation.

Note: Machining method a) is preferred as this method greatly reduces vibration.



T-Slot Mills





DISK MILL CARTRIDGE CUTTERS

7220VM Disk Mill Cutter series with adjustable cartridges are designed for machining deep slots or side shoulder milling operations. They are equipped with interchangeable cartridges with width adjustment.

The cartridges are fixed to the cutter body by an efficient clamping system which works in the same direction as the cutting force.

Due to the adjustable cartridges, these cutters are perfectly qualified to machine precision slots.

This cutter series is designed for roughing, semi-finishing and finishing of Steel, Steel Alloys, Stainless Steel, Cast Iron, Aluminium Alloys, and High Temperature Alloys.

This Stellram® 72VM .. cartridge system is noted for its simplicity, reliability and precision. The minimal size of the cartridge means it has a larger area for chip flow – a major factor for full-side cutters where chips cannot be released when teeth are engaged. Stellram's cutters can achieve deep slotting operations without the chip flow problems of other systems.

The cutter bodies can be adapted for different milling operations. They can be fitted with alternating left/right cartridges (full-side cutters) mainly for slotting, or only right or left cartridges (half-side cutters) for maximum side cutting performance.

Note: The 7220VM series cutters in this section are assembled as Full Side Disc Cutters (Slotting) which is called Neutral (N). They are set with 50 percent right hand and 50 percent left hand cartridges for slotting applications.

For applications as a right hand or left hand Half Side Disc Mills, please order the necessary cartridges depending on the hand cutter you require.

7220VM

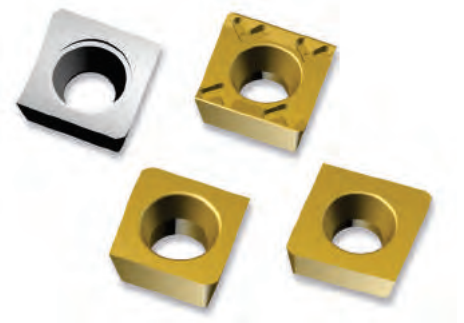
The 7220VM range with width adjustment is as follows:

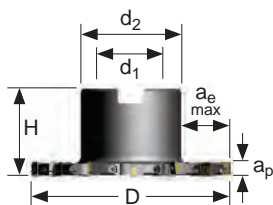
Dia. 63mm to 125mm is 1mm adjustable.
Available width of cut: 6/7; 7/8; 8/9; 9/10

Example: Cartridge 72VM_6/7 = 6mm to 7mm
+/- 0,2mm; = 5,8mm to 7,2mm

Dia. 125mm to 160mm is 2mm adjustable.
Available width of cut: 10/12; 12/14; 14/16;
16/18; 18/20

Example: Cartridge 72VM_10/12 = 10mm to
12mm +/- 0,2mm; = 9,8mm to 12,2mm



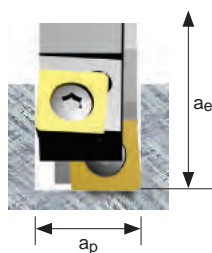


Disc Cutter & Cartridge

Product		Dimensions (mm)						ap adjustment range		Screw Tightening Nm	Insert type	Insert size metric
EDP	Assembled Description	D	L/H	d1	d2	No. of Teeth (right / left)	ae max	ap min	ap max			
7220VM04 Disk Mill Cutters with Shell Mill Fixation												
016700	7220VM04-063R06/07N	63	40	22	35	4R + 4L	14,00	6,00	7,00	0,40	MP	04
016701	7220VM04-063R07/08N	63	40	22	35	4R + 4L	14,00	7,00	8,00	0,40		
016702	7220VM04-080R06/07N	80	45	27	45	5R + 5L	17,50	6,00	7,00	0,40		
016703	7220VM04-080R07/08N	80	45	27	45	5R + 5L	17,50	7,00	8,00	0,40		
7220VM06 Disk Mill Cutters with Shell Mill Fixation												
016704	7220VM06-100R08/09N	100	50	32	48	6R + 6L	26,00	8,00	9,00	0,80	MP	06
016705	7220VM06-100R09/10N	100	50	32	48	6R + 6L	26,00	9,00	10,00	0,80		
033233	7220VM06-125R08/09N	125	55	40	62	7R + 7L	30,50	8,00	9,00	0,80		
016706	7220VM06-125R09/10N	125	55	40	62	7R + 7L	30,50	9,00	10,00	0,80		
7220VM08 Disk Mill Cutters with Shell Mill Fixation												
016707	7220VM08-125R10/12N	125	55	40	62	5R + 5L	30,50	10,00	12,00	2,10	MP	08
033234	7220VM08-125R12/14N	125	55	40	62	5R + 5L	30,50	12,00	14,00	2,10		
033235	7220VM08-160R10/12N	160	60	40	66	6R + 6L	44,10	10,00	12,00	2,10		
033236	7220VM08-160R12/14N	160	60	40	66	6R + 6L	44,10	12,00	14,00	2,10		
7220VM11 Disk Mill Cutters with Shell Mill Fixation												
033237	7220VM11-125R14/16N	125	55	40	62	4R + 4L	30,50	14,00	16,00	3,10	MP	11
033238	7220VM11-125R16/18N	125	55	40	62	4R + 4L	30,50	16,00	18,00	3,10		
033239	7220VM11-160R16/18N	160	60	40	66	5R + 5L	44,10	16,00	18,00	3,10		
033240	7220VM11-160R18/20N	160	60	40	66	5R + 5L	44,10	18,00	20,00	3,10		

The 7220VM series cutters in this section are assembled as Full Side Disc Cutters (Slotting) which is called Neutral (N).



Product		Mounting Bolt	
EDP	Assembled Description	EDP	Bolt
7220VM04 Disk Mill Cutters			
016700	7220VM04-063R06/07N	031299	M10 1.5 X 25 SHCS
016701	7220VM04-063R07/08N	031299	M10 1.5 X 25 SHCS
016702	7220VM04-080R06/07N	031268	M12 X 1.75 X 30 SHCS
016703	7220VM04-080R07/08N	031268	M12 X 1.75 X 30 SHCS
7220VM06 Disk Mill Cutters			
016704	7220VM06-100R08/09N	031269	M16 X 2 X 40 SHCS
016705	7220VM06-100R09/10N	031269	M16 X 2 X 40 SHCS
033233	7220VM06-125R08/09N	031270	M20 X 2.5 X 50 SHCS
016706	7220VM06-125R09/10N	031270	M20 X 2.5 X 50 SHCS
7220VM08 Disk Mill Cutters			
016707	7220VM08-125R10/12N	031270	M20 X 2.5 X 50 SHCS
033234	7220VM08-125R12/14N	031270	M20 X 2.5 X 50 SHCS
033235	7220VM08-160R10/12N	031270	M20 X 2.5 X 50 SHCS
033236	7220VM08-160R12/14N	031270	M20 X 2.5 X 50 SHCS
7220VM11 Disk Mill Cutters			
033237	7220VM11-125R14/16N	031270	M20 X 2.5 X 50 SHCS
033238	7220VM11-125R16/18N	031270	M20 X 2.5 X 50 SHCS
033239	7220VM11-160R16/18N	031270	M20 X 2.5 X 50 SHCS
033240	7220VM11-160R18/20N	031270	M20 X 2.5 X 50 SHCS



Depth of Cut (ap)






Disc Cutter & Cartridge

Product				Hardware Spares			
EDP	Right hand Cartridge	EDP	Left hand Cartridge	Insert Screw EDP		Insert Screwdriver EDP	
7220VM04 Disk Mill Cutters							
016759	72VMR06/07	016751	72VML06/07	015059	F2004T	018487	T6
016760	72VMR07/08	016752	72VML07/08	015059	F2004T	018487	T6
7220VM06 Disk Mill Cutters							
016761	72VMR08/09	016753	72VML08/09	015060	F2505T	018488	T7
016762	72VMR09/10	016754	72VML09/10	015060	F2505T	018488	T7
7220VM08 Disk Mill Cutters							
016763	72VMR10/12	016755	72VML10/12	015063	F3008T	013214	T9
016764	72VMR12/14	016756	72VML12/14	015063	F3008T	013214	T9
7220VM11 Disk Mill Cutters							
016765	72VMR14/16	016757	72VML14/16	015262	D4010T	015240	T15
016766	72VMR16/18	016758	72VML16/18	015262	D4010T	015240	T15
015445	72VMR18/20	015444	72VML18/20	015262	D4010T	015240	T15



Left & Right Cartridges

Product				Cartridge Spares					
EDP	Right hand Cartridge	EDP	Left hand Cartridge	Cartridge Adjustment Screw EDP		Cartridge Fixation Screw EDP		Cartridge Screwdriver EDP	
7220VM04 Disk Mill Cutters									
016759	72VMR06/07	016751	72VML06/07	-	-	015259	72.698T	013214	T9
016760	72VMR07/08	016752	72VML07/08	-	-	015259	72.698T	013214	T9
7220VM06 Disk Mill Cutters									
016761	72VMR08/09	016753	72VML08/09	-	-	015258	72.697T	015240	T15
016762	72VMR09/10	016754	72VML09/10	-	-	015258	72.697T	015240	T15
7220VM08 Disk Mill Cutters									
016763	72VMR10/12	016755	72VML10/12	-	-	015256	72.693T	015273	T20
016764	72VMR12/14	016756	72VML12/14	-	-	015256	72.693T	015273	T20
7220VM11 Disk Mill Cutters									
016765	72VMR14/16	016757	72VML14/16	016858	72.602	015257	72.694T	015273	T20
016766	72VMR16/18	016758	72VML16/18	016858	72.602	015257	72.694T	015273	T20
015445	72VMR18/20	015444	72VML18/20	016858	72.602	015257	72.694T	015273	T20

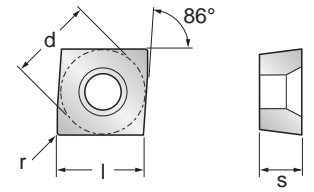
Note: Adjusting screw is only supplied for the 7220VM11 size Disk Mills. All other Disk Mills do not have an adjusting screw, the smaller sizes are adjusted manually.

The 7220VM series cutters in this section are assembled as Full Side Disc Cutters (Slotting) which is called Neutral (N).

The Cartridges are set-staggered with 50 percent right hand and 50 percent left hand cartridges for slotting applications.

For applications as a Right hand or Left hand Half Side Disc Mill please order the necessary cartridges depending on the hand cutter you require.

Disc Mills & Cartridges



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
			a _p / a _e max*	a _p / a _e min - max 1,00 - 3,00	a _p / a _e min - max 0,20 - 1,00					
Insert size 04										
017667	MPHW0402PPTL	X500	■◆●	●●●●●	-	4,76	4,76	2,38	Facet	0,07
017666	MPHW0402PPTR	X500	■◆●	●●●●●	-	4,76	4,76	2,38	Facet	0,07
031508	MPFW0402PPTL	SP6519	◆■●	◆■●	■□■	4,76	4,76	2,38	Facet	0,07
031507	MPFW0402PPTR	SP6519	◆■●	◆■●	■□■	4,76	4,76	2,38	Facet	0,07
034523	MPFW0402PPTL	SP4019	●■□◆	■□◆	◆◆◆◆◆	4,76	4,76	2,38	Facet	0,07
034524	MPFW0402PPTR	SP4019	●■□◆	■□◆	◆◆◆◆◆	4,76	4,76	2,38	Facet	0,07
Insert size 06										
024926	MPEX0602PPFL-701	GH1	◆	◆	◆	6,35	6,35	2,38	Facet	0,02
024927	MPEX0602PPFR-701	GH1	◆	◆	◆	6,35	6,35	2,38	Facet	0,02
017669	MPHW0602PPTL	X500	■◆●	●●●●●	-	6,35	6,35	2,38	Facet	0,07
017668	MPHW0602PPTR	X500	■◆●	●●●●●	-	6,35	6,35	2,38	Facet	0,07
031571	MPFW0602PPTL	SP6519	◆■●	◆■●	■□■	6,35	6,35	2,38	Facet	0,07
031570	MPFW0602PPTR	SP6519	◆■●	◆■●	■□■	6,35	6,35	2,38	Facet	0,07
034525	MPFW0602PPTL	SP4019	●■□◆	■□◆	◆◆◆◆◆	4,76	4,76	2,38	Facet	0,07
034526	MPFW0602PPTR	SP4019	●■□◆	■□◆	◆◆◆◆◆	4,76	4,76	2,38	Facet	0,07

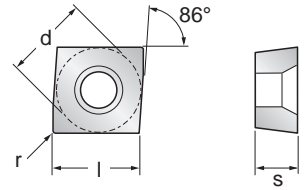


Disc Mills & Cartridges

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

* Max a_p and a_e is determined by selection of the cutter.

Note: Feed recommendations can be found on page A284. Speed recommendations can be found on page A285.



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing	Semi-Finishing	Finishing	d (IC)	l	s	r	h _m min
			▼	▼▼	▼▼▼					
			Depth of Cut (mm)							
a _p / a _e max*			a _p / a _e min - max 1,00 - 3,00	a _p / a _e min - max 0,20 - 1,00						

Insert size 08

034527	MPEX0803PPFL-701	SP4019	■	●■	◆■◆	7,94	7,94	3,18	Facet	0,02
034528	MPEX0803PPFR-701	SP4019	■	●■	◆■◆	7,94	7,94	3,18	Facet	0,02
024928	MPEX0803PPFL-701	GH1	◆	◆	◆	7,94	7,94	3,18	Facet	0,02
017642	MPEX0803PPFR-701	GH1	◆	◆	◆	7,94	7,94	3,18	Facet	0,02
015138	MPHT0803PPTL-42	X500	■◆	●■□	-	7,94	7,94	3,18	Facet	0,10
015140	MPHT0803PPTR-42	X500	■◆	●■□	-	7,94	7,94	3,18	Facet	0,10
031510	MPHT0803PPTL-42	SP6519	◆■◆	◆■◆	◆■◆	7,94	7,94	3,18	Facet	0,10
031509	MPHT0803PPTR-42	SP6519	◆■◆	◆■◆	◆■◆	7,94	7,94	3,18	Facet	0,10
017296	MPHT0803PPTL-42	MP91M	●■	●■	●●	7,94	7,94	3,18	Facet	0,10
017297	MPHT0803PPTR-42	MP91M	●■	●■	●●	7,94	7,94	3,18	Facet	0,10
034532	MPFW0803PPTL	X400	■◆	-	-	7,94	7,94	3,18	Facet	0,10
034531	MPFW0803PPTR	X400	■◆	-	-	7,94	7,94	3,18	Facet	0,10
034529	MPFW0803PPTL	SP4019	◆	◆	■◆	7,94	7,94	3,18	Facet	0,10
034530	MPFW0803PPTR	SP4019	◆	◆	■◆	7,94	7,94	3,18	Facet	0,10
017658	MPFW0803PPTL	GH1	-	●	■	7,94	7,94	3,18	Facet	0,10
017655	MPFW0803PPTR	GH1	-	●	■	7,94	7,94	3,18	Facet	0,10

Insert size 11

017644	MPEX1104PPFL-701	GH1	◆	◆	◆	11,11	11,11	4,76	Facet	0,02
017643	MPEX1104PPFR-701	GH1	◆	◆	◆	11,11	11,11	4,76	Facet	0,02
015141	MPHT1104PPTL-42	X500	●■◆	●■□	●○■	11,11	11,11	4,76	Facet	0,10
015142	MPHT1104PPTR-42	X500	●■◆	●■□	●○■	11,11	11,11	4,76	Facet	0,10
031512	MPHT1104PPTL-42	SP6519	◆■◆	◆■◆	◆■◆	11,11	11,11	4,76	Facet	0,10
031511	MPHT1104PPTR-42	SP6519	◆■◆	◆■◆	◆■◆	11,11	11,11	4,76	Facet	0,10
017298	MPHT1104PPTL-42	MP91M	■●	■●	●●	11,11	11,11	4,76	Facet	0,10
017299	MPHT1104PPTR-42	MP91M	■●	■●	●●	11,11	11,11	4,76	Facet	0,10
034533	MPFW1104PPTL	SP4019	●◆	●◆	■◆	11,11	11,11	4,76	Facet	0,15
034534	MPFW1104PPTR	SP4019	●◆	●◆	■◆	11,11	11,11	4,76	Facet	0,15
017439	MPFW1104PPTL	GH1	-	●	■	11,11	11,11	4,76	Facet	0,15
017440	MPFW1104PPTR	GH1	-	●	■	11,11	11,11	4,76	Facet	0,15

 Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page A5.

 * Max a_p and a_e is determined by selection of the cutter.

Note: Feed recommendations can be found on page A284. Speed recommendations can be found on page A285.



Disc Mills & Cartridges



7220VM Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
Insert size 04																	
TR/TL	X500	Slotting	0,06 - 0,10	0,05 - 0,08	0,06 - 0,08	0,05 - 0,07	0,05 - 0,10	0,05 - 0,10	0,05 - 0,08	-	-	-	-	-	-	-	-
TR/TL	SP6519	Slotting	0,06 - 0,10	0,05 - 0,08	0,06 - 0,08	0,04 - 0,06	0,04 - 0,08	0,04 - 0,08	0,04 - 0,08	-	-	-	-	-	-	-	-
TR/TL	SP4019	Slotting	0,06 - 0,10	0,05 - 0,08	0,06 - 0,08	0,04 - 0,06	0,04 - 0,08	0,04 - 0,08	0,04 - 0,08	-	-	-	-	-	-	-	-
Insert size 06																	
FR/FL-701	GH1	Slotting	-	-	-	-	-	-	-	0,05 - 0,12	0,05 - 0,10	-	-	-	-	-	-
TR/TL	X500	Slotting	0,06 - 0,13	0,06 - 0,11	0,06 - 0,12	0,06 - 0,10	0,06 - 0,12	0,06 - 0,12	0,06 - 0,10	-	-	-	-	-	-	-	-
TR/TL	SP6519	Slotting	0,06 - 0,13	0,06 - 0,11	0,06 - 0,12	0,06 - 0,10	0,06 - 0,12	0,06 - 0,12	0,06 - 0,10	-	-	-	-	-	-	-	-
TR/TL	SP4019	Slotting	0,06 - 0,12	0,06 - 0,10	0,06 - 0,12	0,06 - 0,10	0,06 - 0,12	0,06 - 0,12	0,06 - 0,10	-	-	-	-	-	-	-	-
Insert size 08																	
FR/FL-701	SP4019	Slotting	-	-	0,04 - 0,10	0,04 - 0,08	-	-	-	0,05 - 0,12	0,05 - 0,10	0,03 - 0,07	0,03 - 0,07	0,04 - 0,08	0,04 - 0,09	-	-
FR/FL-701	GH1	Slotting	-	-	-	-	-	-	-	0,05 - 0,12	0,05 - 0,10	-	-	-	-	-	-
TL/TL-42	X500	Slotting	0,10 - 0,16	0,10 - 0,14	0,10 - 0,15	0,10 - 0,14	-	-	-	-	-	0,09 - 0,12	0,09 - 0,12	0,09 - 0,13	0,09 - 0,14	-	-
TR/TL-42	SP6519	Slotting	0,10 - 0,16	0,10 - 0,14	0,10 - 0,15	0,10 - 0,14	-	-	-	-	-	0,09 - 0,12	0,09 - 0,12	0,09 - 0,13	0,09 - 0,14	-	-
TR/TL-42	MP91M	Slotting	0,10 - 0,15	0,10 - 0,13	-	-	0,10 - 0,15	0,10 - 0,15	0,10 - 0,13	-	-	-	-	-	-	-	-
TR/TL	X400	Slotting	0,10 - 0,16	0,10 - 0,14	-	-	-	-	-	-	-	-	-	-	-	-	-
TR/TL	SP4019	Slotting	0,10 - 0,15	0,10 - 0,13	-	-	0,10 - 0,15	0,10 - 0,15	0,10 - 0,13	-	-	-	-	-	-	-	-
TR/TL	GH1	Slotting	-	-	-	-	0,10 - 0,14	0,10 - 0,14	-	-	-	-	-	-	-	-	-
Insert size 11																	
FR/FL-701	GH1	Slotting	-	-	-	-	-	-	-	0,05 - 0,15	0,05 - 0,15	-	-	-	-	-	-
TR/TL-42	X500	Slotting	0,10 - 0,20	0,10 - 0,18	0,10 - 0,20	0,10 - 0,17	-	-	-	-	-	0,10 - 0,14	0,10 - 0,14	0,10 - 0,15	0,10 - 0,16	-	-
TR/TL-42	SP6519	Slotting	0,10 - 0,20	0,10 - 0,18	0,10 - 0,20	0,10 - 0,17	-	-	-	-	-	0,10 - 0,14	0,10 - 0,14	0,10 - 0,15	0,10 - 0,16	-	-
TR/TL-42	MP91M	Slotting	0,10 - 0,19	0,10 - 0,17	-	-	0,10 - 0,20	0,10 - 0,20	0,10 - 0,18	-	-	-	-	-	-	-	-
TR/TL	SP4019	Slotting	0,13 - 0,22	0,13 - 0,19	0,13 - 0,22	0,13 - 0,19	0,13 - 0,22	0,13 - 0,22	0,13 - 0,20	-	-	-	-	-	-	-	-
TR/TL	GH1	Slotting	-	-	-	-	0,13 - 0,22	0,13 - 0,22	0,13 - 0,20	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page A285.

Disc Mills & Cartridges

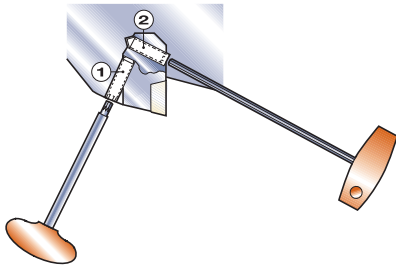


Speed v_c (m/min)			Wear Resistance												
7220VM Series			- ← → +												
Coolant Recommendation			Speed min. - max.												
Recommended ● Possible ◎			PVD X Grade		CVD X Grade		PVD Standard		PVD Standard		CVD Standard		Uncoated Micrograin		
ISO	Materials	Rm and Hardness	Water	Oil	Water	Oil	Water	Oil	Water	Oil	Water	Oil	Water	Oil	
			⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	⊕	⊖	
P	Unalloyed Steel	<600 N/mm ² <180 HBN	◎	●	120 - 260	◎	●	130 - 270	◎	●	130 - 295	●	140 - 315	●	140 - 345
		<950 N/mm ² <280 HBN	◎	●	105 - 230	◎	●	115 - 240	◎	●	115 - 260	●	120 - 275	●	120 - 305
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	◎	●	95 - 200	◎	●	100 - 210	◎	●	100 - 230	●	105 - 245	●	105 - 270
		950-1200 N/mm ² 280-355 HBN	◎	●	70 - 150	◎	●	75 - 160	◎	●	75 - 175	●	80 - 190	●	80 - 205
		1200-1400 N/mm ² 355-415 HBN	◎	●	45 - 95	◎	●	50 - 100	◎	●	50 - 110	●	50 - 120	●	50 - 130
M	Stainless Steel	Austenitic + Ferritic 300 series				◎	●	115 - 250	◎	●	115 - 270	◎	●	120 - 280	
		Martensitic 400 series				◎	●	100 - 220	◎	●	105 - 235	◎	●	110 - 250	
	PH Stainless	Refractory P.H.				●		50 - 110	●		50 - 120	●		50 - 130	
K	Cast Iron	Grey GG-Fl						120 - 280			140 - 295			145 - 330	
		Spheroidal-Ductile GGG-FGS			◎	●	105 - 205	◎	●	110 - 240	●	115 - 255	●	115 - 285	◎
		Malleable GTS - MN/MP						95 - 170			100 - 220			105 - 235	
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN										●	400 - 2895		●
		Aluminium + Silicon > 16% Si 92 HBN												295 - 2320	
S	High Temperature Alloys	Iron Based						23 - 48			23 - 55			24 - 63	
		Cobalt Based						21 - 44			22 - 48			23 - 52	
		Nickel Based			●			24 - 51	●		25 - 55	●		26 - 59	
		Titanium Based						35 - 73			36 - 79			37 - 84	
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN													
		Chilled Cast Iron >1400 N/mm ² > 400 HBN													

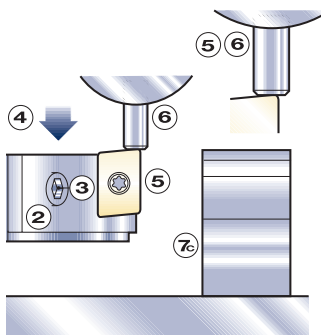
Disc Mills & Cartridges



“A” Adjusting 7220VM11 with Adjusting Screw



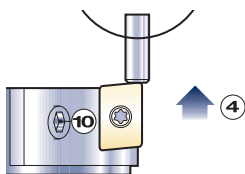
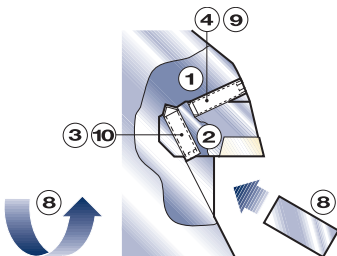
1. Mount the cutter body on the pre-setter.
2. Before mounting the cartridge into the cutter body seat, turn back adjustment screw No. 2 of the first cartridge.
3. Gently loosen fixing screw No. 1. Then fit this cartridge into the seat and push the cartridge downwards.
4. Mount the insert on the cartridge to be adjusted



IMPORTANT!

Be sure to use a RH insert on a right cartridge and LH insert on a left cartridge; to do this it is sufficient to ensure that the wiper edge is positioned laterally on the outer side of the tool.

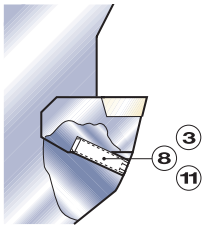
5. Re-tighten, but do not lock screw No.1
6. Turn adjustment screw No.2 to move the cartridge so that the wiper edge reaches the reticle of the previously set up with of cut on the pre-setter.
7. Lock screw No.1; in doing so the cartridge will tend to move by about 0,01mm up or down. Having again unlocked screw No.1 repeat the mounting instruction point 6, talking account of the value and direction of the observed displacement. In this way the final locking of the cartridge will tend towards the required zero reading.
8. It is recommended to adjust all cartridges on one side first and afterwards the cartridges on the opposite side.
9. Repeat point 2 to 7 until all cartridges are mounted and adjusted.
10. Proceed with a final checking and be sure to lock the fixing screw No.1 on all cartridges.
11. Gently re-tighten the adjustment screw No.2 against the bottom of the seat.



***NOTE:** “Half-side” cutters, with non-staggered teeth, need only be adjusted on one side.



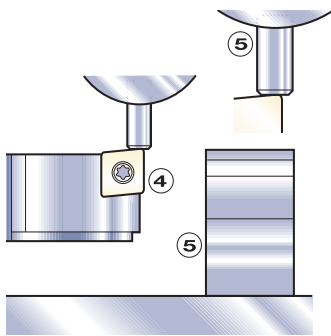
“B” Adjusting 7220VM 04, 06 & 08 Cutters without Adjusting Screw



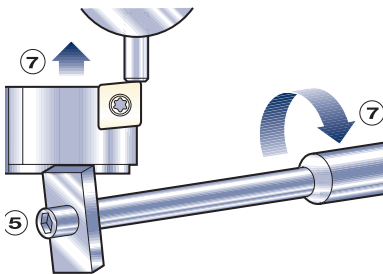
1. Mount the cutter body on the pre-setter.
2. Gently loosen fixing screw No. 1. Then fit this cartridge into the seat and push the cartridge downwards.
3. Mount the insert on the cartridge to be adjusted.

IMPORTANT!

Be sure to use a RH insert on a right cartridge and LH insert on a left cartridge; to do this it is sufficient to ensure that the wiper edge is positioned laterally on the outer side of the tool.



4. Re-tighten, but do not lock screw No.1.
5. Move the cartridge by using the blunt end of the screw driver and tap lightly the side of the cartridge so that the wiper edge reaches the reticle of the previously set up with of cut on the pre-setter.
6. Tighten the fixing screw No.1 of the cartridge but do not lock completely, while making sure that the dial hand remains on the pre-set mark.
7. It is recommended to adjust all cartridges on one side first and afterwards the cartridges on the opposite side.
8. Repeat point 2 to 6 until all cartridges are mounted and adjusted.
9. Proceed with a final checking and be sure to lock the fixing screw No.1 on all cartridges.



***NOTE:** “Half-side” cutters, with non-staggered teeth, need only be adjusted on one side.

Disc Mills & Cartridges



Calculation of the average chip thickness in relation with the a_e (Radial Engagement)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
 a_e = Radial engagement
 f_z = Feed per tooth
 d = Cutter diameter

Formula: Average Chip Thickness (h_m)

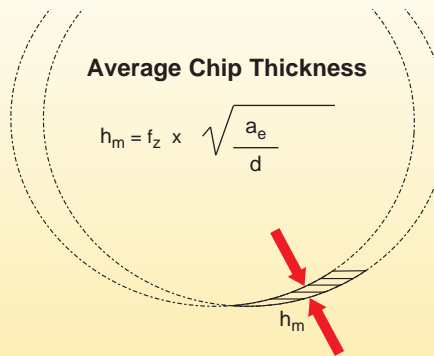
$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

7220VM Technical Information

Important

For a given f_z (mm/tooth) feed rate, **the thickness of the chip h_m** (effective feed rate per tooth) **decreases with the radial depth of cut a_e .**

It is imperative that this parameter be taken into account when selecting the machine feed rate, calculated in accordance with the formula above:



Disc Mills & Cartridges



ISO Grade Classification

Groups	Materials	Code	Uncoated		Cermets		CVD				PVD					Code				
			GH1	GH2	SA9608	SA9808	SC3025	SC6525	MP91M	X500	SP1019	SP4019	SP6519	X700	X400		SP5419			
			Uncoated	Uncoated	Uncoated	Uncoated	TiN-TiCN-Al ₂ O ₃	TiN-TiCN-Al ₂ O ₃	TiN-MT-TiCN-Al ₂ O ₃	TiN-TiC-TiN	TiAlN	TiAlN	TiAlN	TiAlN	TiAlN		TiAlN			
P	Unalloyed and Alloyed Steel	P01															P01			
		P05			SA9608						SP1019							P05		
		P10				SA9808												P10		
		P15						SC6525										P15		
		P20							MP91M			SP4019						P20		
		P25											SP6519					P25		
		P30									X500					X400		P30		
		P35															SP5419	P35		
		P40																P40		
		P45																	P45	
P50																	P50			
M	Stainless Steels	M01			SA9608												M01			
		M05				SA9808					SP1019							M05		
		M10																M10		
		M15										SP4019						M15		
		M20											SP6519	X700				M20		
		M25																M25		
		M30								X500								M30		
		M35																M35		
		M40																M40		
		K	Cast Irons	K01			SA9608												K01	
K05						SA9808					SP1019							K05		
K10	GH1						SC3025	SC6525	MP91M			SP4019						K10		
K15													SP6519					K15		
K20				GH2														K20		
K25																		K25		
K30										X500								K30		
K35																		K35		
K40																		K40		
N	Aluminum & Alloys			N01	GH1														N01	
		N05									SP1019							N05		
		N10										SP4019						N10		
		N15		GH2														N15		
		N20																N20		
		N25																N25		
		N30																N30		
		S	High Temperature Alloys	S01			SA9608						SP1019						S01	
				S05										SP4019						S05
				S10											SP6519					S10
S15														X700				S15		
S20										X500								S20		
S25																		S25		
S30																		S30		
H	Hard Materials	H01															H01			
		H05									SP1019							H05		
		H10																H10		
		H15								MP91M			SP4019					H15		
		H20																H20		
		H25													X400			H25		
		H30																H30		
					GH1	GH2	SA9608	SA9808	SC3025	SC6525	MP91M	X500	SP1019	SP4019	SP6519	X700	X400	SP5419		





Speed v_c (m/min)													
For all Families			Wear Resistance										
			Speed min. - max.										
Coolant Recommendation													
Recommended ● Possible ○													
ISO	Materials	Rm and Hardness	SP5419	X400	X500	X700	SP6519	GH2	SP4019				
P	Unalloyed Steel	<600 N/mm ² <180 HBN	○ ●	○ ●	○ ●		○ ●			○ ●			○ ●
		<950 N/mm ² <280 HBN	○ ●	○ ●	○ ●		○ ●			○ ●			○ ●
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	○ ●	○ ●	○ ●		○ ●			○ ●			○ ●
		950-1200 N/mm ² 280-355 HBN	○ ●	○ ●	○ ●		○ ●			○ ●			○ ●
		1200-1400 N/mm ² 355-415 HBN	○ ●	○ ●	○ ●		○ ●			○ ●			○ ●
M	Stainless Steel	Austenitic + Ferritic 300 series			○ ●		○ ●			○ ●			○ ●
		Martensitic 400 series			○ ●		○ ●			○ ●			○ ●
	PH Stainless	Refractory P.H.			○ ●		○ ●			○ ●			○ ●
K	Cast Iron	Grey GG-Ft											
		Spheroidal-Ductile GGG-FGS			○ ●		○ ●			○ ●			○ ●
		Malleable GTS - MN/MP											
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN								○ ●			○ ●
		Aluminium + Silicon > 16% Si 92 HBN								○ ●			○ ●
S	High Temperature Alloys	Iron Based											
		Cobalt Based			○ ●		○ ●			○ ●			○ ●
		Nickel Based											
		Titanium Based											
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN											
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			○ ●		○ ●			○ ●			○ ●

Technical



Speed v_c (m/min)												
For all Families			Wear Resistance									
			Speed min. - max.									
Coolant Recommendation												
Recommended ● Possible ○												
ISO	Materials	Rm and Hardness	MP91M	SC6525	SC3025	GH1*	SP1019	SA9808	SA9608			
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	○	○	○	○	○	○	○	○	○
		<950 N/mm ² <280 HBN	●	○	○	○	○	○	○	○	○	○
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	●	○	○	○	○	○	○	○	○	○
		950-1200 N/mm ² 280-355 HBN	●	○	○	○	○	○	○	○	○	○
		1200-1400 N/mm ² 355-415 HBN	●	○	○	○	○	○	○	○	○	
M	Stainless Steel	Austenitic + Ferritic 300 series				○	○				○	
		Martensitic 400 series				○	○				○	
	PH Stainless	Refractory P.H.				○	○				○	
K	Cast Iron	Grey GG-Ft	●	○	○	○	○	○	○	○	○	
		Spheroidal-Ductile GGG-FGS	●	○	○	○	○	○	○	○	○	
		Malleable GTS - MN/MP	●	○	○	○	○	○	○	○	○	
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN				○	○					
		Aluminium + Silicon > 16% Si 92 HBN				○	○					
S	High Temperature Alloys	Iron Based										
		Cobalt Based										
		Nickel Based										
		Titanium Based										
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	●									
		Chilled Cast Iron >1400 N/mm ² > 400 HBN	●									



* Note: Wiper Insert SPHX12M512EN GH1 can be used for Steel, Steel Alloys, Stainless Steel and Cast Iron.
 * Note: All other GH1 Grade Inserts are only for Aluminium or Cast Iron depending on the selected Geometry.



Speed-Spindle Rotation (rpm)

$$n = \frac{V_c \times 1000}{D_c \times \pi}$$

Cutting Speed (m/min.)

$$V_c = \frac{D_c \times \pi \times n}{1000}$$

Feed Rate (mm/min.)

$$V_f = f_z \times Z \times n$$

Feed Per Tooth (mm/z)

$$f_z = \frac{V_f}{Z \times n}$$

Feed Per Revolution (mm/rev.)

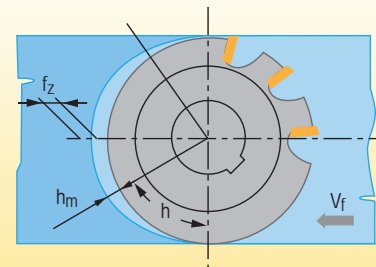
$$f_n = f_z \times Z$$

Metal Removal Rate (cm³/min.)

$$Q = \frac{a_e \times a_p \times V_f}{1000}$$

Medium Chip Thickness

$$h_m = f_z \times \sqrt{\frac{a_e}{D_c}} \quad \text{or} \quad f_z = h_m \times \sqrt{\frac{D_c}{a_e}}$$



Terminology

n	Spindle speed	rpm
D _c	Cutting diameter	mm
a _p	Cut depth	mm
a _e	Cut width	mm
Z	No. of teeth	
V _c	Cutting speed	m/min
V _f	Feed rate	mm/min
f _z	Feed per tooth	mm/Z
f _n	Feed per revolution	mm/rev.
Q	Metal removal rate	cm ³ /min
h _m	Medium chip thickness	mm
π	Pi Symbol (3.1416)	pi



Feed Rate Compensation

V_f	feed rate of tool	[mm/min]
V_{fa}	feed rate of tool axis	[mm/min]
D_c	cutter diameter	[mm]
D_w	workpiece diameter	[mm]
n	rotation	[rpm]
f_z	feed per tooth	[mm/z]
Z	number of teeth	

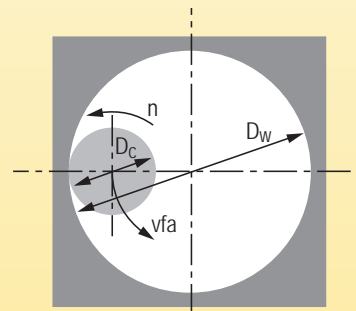
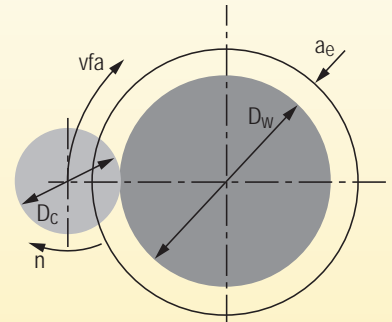
$$V_f = n \times f_z \times Z$$

External

$$V_{fa} = V_f \times \left(\frac{D_w + D_c}{D_w} \right)$$

Internal

$$V_{fa} = V_f \times \left(\frac{D_w - D_c}{D_w} \right)$$





Technical

Brinell	Rockwell		Vickers	Tensile Strength	
	HBN Hardness	HRC Hardness	HV Hardness	Rm Tensile Strength	Rm Tensile Strength
Brinell 3000 Kgf	Diamond penetrator	Ball 1/16"	Vickers 30	N / mm ² MPa	KSI
92	-	49	-	320	46
94	-	51	-	330	48
-	-	54	-	-	-
100	-	55	100	340	49
101	-	56	101	-	-
103	-	57	103	350	51
104	-	58	104	-	-
106	-	59	106	360	52
107	-	60	107	-	-
108	-	61	108	-	-
110	-	62	110	370	54
112	-	63	112	-	-
114	-	64	114	-	-
116	-	65	116	385	56
117	-	66	117	395	57
119	-	67	119	400	58
121	-	68	121	405	59
123	-	69	123	415	60
125	-	70	125	420	61
127	-	71	127	425	62
130	-	72	130	435	63
132	-	73	132	440	64
135	-	74	135	450	65
137	-	75	137	455	66
139	-	76	139	460	67
141	-	77	141	470	68
144	-	78	144	475	69
147	-	79	147	485	70
150	-	80	150	495	72
153	-	81	153	505	73
156	-	82	156	530	77
159	-	83	159	550	80
162	-	84	162	560	81
165	-	85	165	565	82
169	-	86	169	570	83
172	-	87	172	580	84
176	-	88	176	590	86
180	-	89	180	605	88
185	-	90	185	615	89
190	-	91	190	620	90
195	-	92	195	635	92
200	-	93	200	650	94
205	-	94	205	675	98
210	-	95	210	690	100
216	-	96	216	705	102
222	-	97	222	715	104
228	-	98	228	750	109
234	-	99	234	785	114
240	-	100	240	800	116

Brinell	Rockwell		Vickers	Tensile Strength	
	HBN Hardness	HRC Hardness	HV Hardness	Rm Tensile Strength	Rm Tensile Strength
Brinell 3000 Kgf	Diamond penetrator	Ball 1/16"	Vickers 30	N / mm ² MPa	KSI
226	20	-	238	760	110
231	21	-	243	770	112
237	22	-	248	790	115
243	23	-	254	810	117
247	24	-	260	820	119
253	25	-	266	850	123
258	26	-	272	860	125
264	27	-	279	880	128
271	28	-	286	900	131
279	29	-	294	930	135
286	30	-	302	950	138
294	31	-	310	970	141
301	32	-	318	1010	146
311	33	-	327	1050	149
319	34	-	336	1080	152
327	35	-	345	1110	157
336	36	-	354	1140	161
344	37	-	363	1140	165
353	38	-	372	1180	171
362	39	-	382	1220	177
371	40	-	392	1250	181
381	41	-	402	1300	189
390	42	-	412	1340	194
400	43	-	423	1390	202
409	44	-	434	1430	207
421	45	-	446	1480	215
432	46	-	458	1520	220
442	47	-	471	1580	229
455	48	-	484	1640	238
468	49	-	498	1700	247
482	50	-	513	1760	255
496	51	-	528	1820	264
512	52	-	544	1880	273
525	53	-	560	1950	283
543	54	-	577	2010	292
560	55	-	595	2070	300
577	56	-	613	2160	313
595	57	-	633	2240	325
615	58	-	653	2330	338
634	59	-	674	2420	351
654	60	-	697	-	-
670	61	-	720	-	-
688	62	-	746	-	-
706	63	-	772	-	-
722	64	-	800	-	-
739	65	-	832	-	-
-	66	-	865	-	-
-	67	-	900	-	-
-	68	-	940	-	-

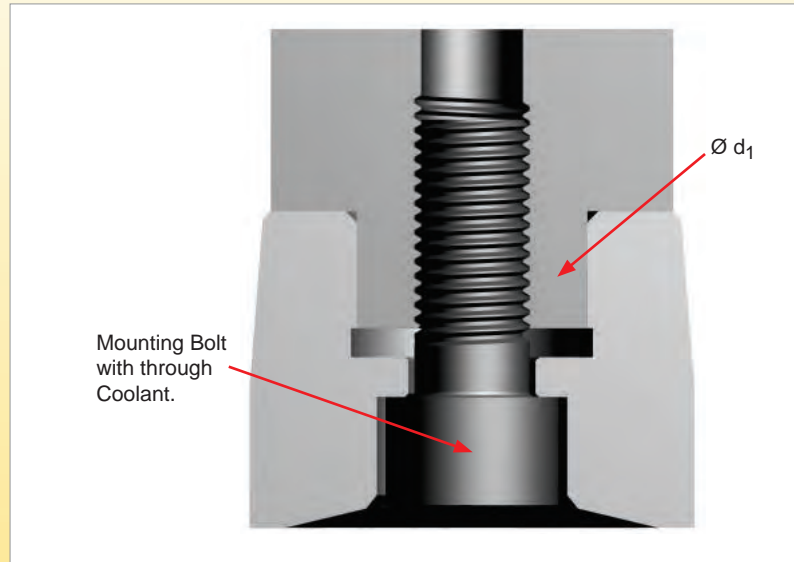
HV = Vickers hardness HRC = Rockwell hardness, C scale
HBN = Brinell hardness HRB = Rockwell hardness, B scale



Mounting Bolts and Torque Values for Shell Mill Cutters


Replacement bolts for Metric Shell Mills, please use the chart below.

Chart is based on Bore Size of the Shell Mill Cutter



EDP	Socket Head Cap Screw	Metric Bore d_1	**Torque Values in Nm	
			Normal Condition	Excessive Condition
031297	M6-1x20 SHCS	13	10	12
031298	M8-1.25x25 SHCS	16	30	32
031299	M10-1.5x25 SHCS	22	50	60
031268	M12-1.75x30 SHCS	27	80	100
031269	M16-2x40 SHCS	32	110	150
031270	M20-2.5x50 SHCS	40	120	180

** Torque values for mounting bolts.
Excessive condition is when long reach extensions are required or when cutting parameters are elevated to extreme parameters.

Hex Keys

M6 = Hex Key Size 5
M8 = Hex Key Size 86
M10 = Hex Key Size 8
M12 = Hex Key Size 10
M16 = Hex Key Size 14
M20 = Hex Key Size 17

Technical





MILLING

Solid Carbide Milling





Kennametal is committed to being the leading manufacturer and supplier of solid carbide rotary cutting tools in the world. Through a combination of state-of-the-art technology, rigorous quality procedures and highly skilled people, we strive to provide cost effective solutions and support to increase your competitive advantage.

Technology

Major investment in the latest CNC grinding and inspection equipment has enabled Kennametal to become a major supplier of standard and special solid carbide tooling worldwide.

Technical

An experienced team of application sales engineers together with a dedicated in-house department is focussed to offer technical support and deliver production engineering improvements.





Solid Carbide Milling

INTRODUCTION

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Application Index	B5 - B7

AEROSPACE END MILLS

XE / XER	B9 - B13
RSM.....	B15 - B18

RAPIDE HIGH PERFORMANCE / HIGH SPEED END MILLS

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HE.....	B23 - B25
HER	B26 - B28
HB.....	B29 - B31
HMR.....	B32 - B36
HMN.....	B37 - B39
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GENERAL PURPOSE END MILLS

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E_NN3	B51 - B53
E_NN4	B54 - B56
ER_NN4-with Radius (r).....	B57 - B59
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B_NN4	B63 - B65
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MINIATURE END MILLS

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B_NTN2	B81 - B83
B_NTN4	B84 - B86

TECHNICAL

RSM / General.....	B87 - B90
Grade Description.....	B91 - B92
Cross Reference.....	B93 - B102



XER 100 N N 4 - E

1 2 3 4 5 6

1 End mill Family

B - Ball Nosed End Mill	HER - High Performance End Mill with Radius
E - Standard End Mill (Square Ended)	HMN - High Performance Multiflute End Mill (Negative)
EA - End Mill - Aluminium	HMR - High Performance Multiflute End Mill with Radius
ER - Standard End Mill with Radius	HPA - High Performance End Mill - Aluminium
ERC - Roughing End Mill with Chamfer	RSM - Reduced Shank - Multiflute End Mill
HB - High Performance End Mill - Ball Nosed	XE - Unequal Form Aerospace End Mill
HE - High Performance End Mill	XER - Unequal Form Aerospace End Mill with Radius

2 Cutting Diameter



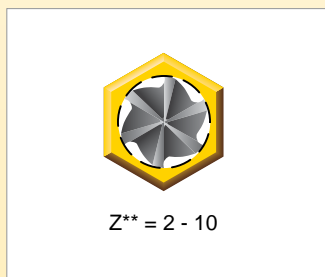
3 Overall Length

N = Normal
 S = Short
 M = Medium
 K = Intermediate
 L = Long
 XL = Extra Long
 T* = Taper
 X = Special

4 Flute length

N = Normal
 S = Short
 M = Medium
 K = Intermediate
 L = Long
 XL = Extra Long
 X = Special

5 Number of Flutes



6 Radius

C = 0,25
D = 0,30
E = 0,50
F = 0,75
G = 1,00
H = 1,25
J = 1,50
K = 2,00
L = 2,50
M = 3,00
P = 4,00
Q = 5,00

* When cutting diameter (D) is smaller than the shank diameter (d1), the overall length designation is followed by a "T".

eg. XER030NTN4-C

** An "X" following the number of flutes designation signifies the use of special geometry.

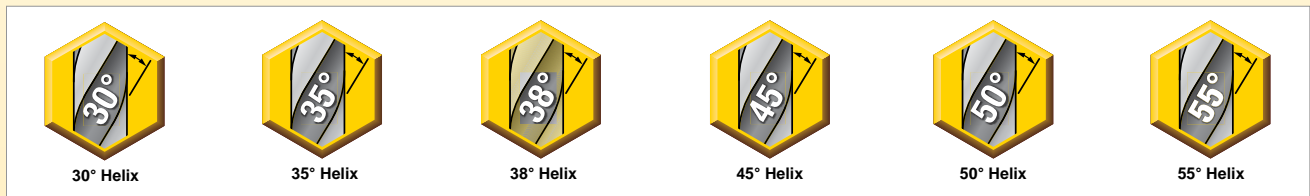
eg. RSM250LM10X-M



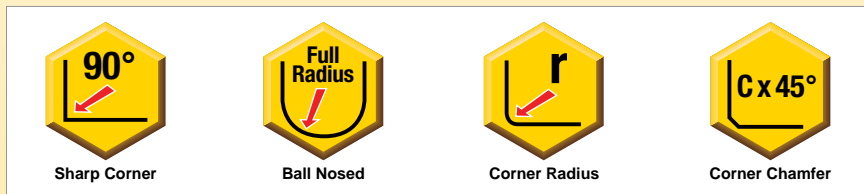
Number of Flutes / Cutting Edges



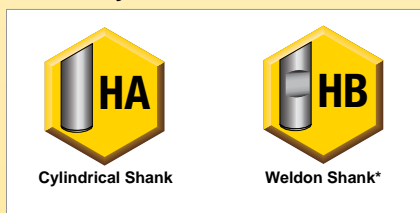
Helix



Corner Style



Shank Style



Shank Tolerance

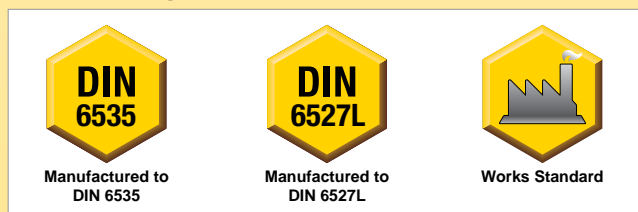


Performance

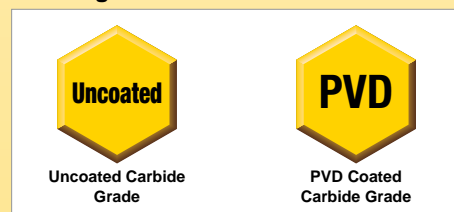


* Available on request

Manufacturing Standards



Coating





General Applications



Slotting - Square Ended



Slotting - Ball Nosed

Slotting Application
Technical information provided with each family.



Shoulder Milling - Square Ended



Shoulder Milling - Ball Nosed

Profiling / Shoulder Milling Application
Technical information provided with each family.

Tool Path Strategies



Pocketing

Tool Suitable for Pocketing
Technical information provided with each family. (As Slotting Parameters)



Drilling

Tool Suitable for Drilling
See Page B89 - for Technical Details



Helical Interpolation

Tool Suitable for Helical Interpolation
See Page B89 - for Technical Details



Ramping

Tool Suitable for Ramping
See Page B88 - for Technical Details



Copy / 3D

Tool Suitable for Copy Milling
See Page B90 - for Technical Details



Facing

Tool Suitable for Facing



Trochoidal

Tool Suitable for Trochoidal Milling
See Page B89 - for Technical Details

		Aerospace			Rapide® High Speed / High Performance Machining Series								
Family Range		XE	XER	RSM	ERC	HE	HER	HB	HMR	HMN	EA	HPA	
Number of Flutes / Cutting Edges		4	4	6 - 8 - 10	3	4	4	2	6	6	2	2	
Length		Medium	Normal	Long	Normal/Long	Normal	Normal	Long	Normal	Normal	Normal	Normal	
Corner style		Radius			Chamfer	Sharp	Radius	Ball Nose	Radius	Sharp	Sharp	Sharp	
Helix angle		35° - 38°			45°	30°	30°	30°	45°	50°	30°	55°	
Coating		PVD		Uncoated	PVD					Uncoated			
Shank Style		HA Cylindrical				HA Cylindrical							
Manufacturing Standards		DIN ³			DIN ³								
mm	Diameter Range	mm	2,00 - 20,00	2,00 - 20,00	10,00 - 25,00	3,00 - 20,00	2,00 - 16,00	6,00 - 12,00	3,00 - 12,00	3,00 - 20,00	6,00 - 20,00	2,00 - 20,00	3,00 - 20,00
Page		B9 - B13	B9 - B13	B15 - B18	B19 - B22	B23 - B25	B26 - B28	B29 - B31	B32 - B36	B37 - B39	B40 - B42	B43 - B45	
General Application	Slotting - Square Ended												
	Slotting - Ball Nosed												
	Shoulder Milling - Square Ended												
	Shoulder Milling - Ball Nosed												
Tool Path Strategy	Pocketing												
	Drilling												
	Helical Interpolation												
	Ramping												
	Copy / 3D												
	Facing												
	Trochoidal												

Note: DIN¹ = DIN6535, DIN² = DIN6527L, DIN³ = DIN6535 and DIN 6527L.



Introduction

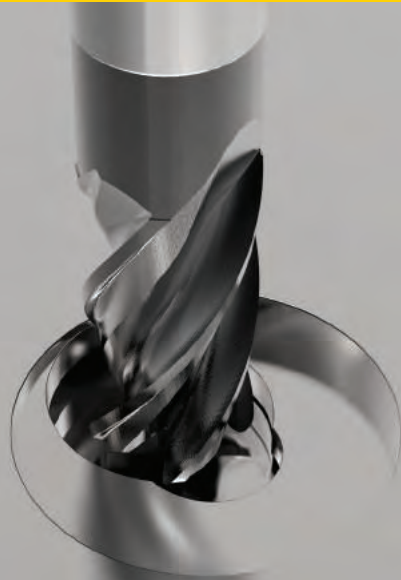
General Purpose Milling Series							
	E		ER	B		E	B
2	3	4	4	2	4	4	2
Normal			Normal	Normal		Long	Long / X-Long
Sharp			Radius	Ball Nose		Sharp	Ball Nose
30°			30°	30°		30°	30°
PVD			PVD	PVD		PVD	PVD
HA Cylindrical			HA Cylindrical	HA Cylindrical		HA Cylindrical	HA Cylindrical
							DIN 6535
3,00 - 20,00	3,00 - 20,00	3,00 - 20,00	3,00 - 16,00	3,00 - 20,00	3,00 - 12,00	6,00 - 16,00	4,00 - 12,00
B47 - B50	B51 - B53	B54 - B56	B57 - B59	B60 - B62	B63 - B65	B66 - B68	B69 - B71

Note: DIN¹ = DIN6535, DIN² = DIN6527L, DIN³ = DIN6535 and DIN 6527L.

			Miniature Milling Series				
Family Range			E			B	
Number of Flutes / Cutting Edges			2	3	4	2	4
Length			Normal			Normal	
Corner style			Sharp			Ball Nose	
Helix angle			30°			30°	
Coating			PVD	PVD	PVD	PVD	PVD
Shank Style			HA Cylindrical			HA Cylindrical	
Manufacturing Standards							
mm	Diameter Range	mm	0,40 - 2,50	1,00 - 2,50	1,00 - 2,00	0,40 - 2,50	1,00 - 2,50
Page			B72 - B74	B75 - B77	B78 - B80	B81 - B83	B84 - B86
General Application	Slotting - Square Ended						
	Slotting - Ball Nosed						
	Shoulder Milling - Square Ended						
	Shoulder Milling - Ball Nosed						
Tool Path Strategy	Pocketing						
	Drilling						
	Helical Interpolation						
	Ramping						
	Copy / 3D						
	Facing						
	Trochoidal						

Note: DIN¹ = DIN6535, DIN² = DIN6527L, DIN³ = DIN6535 and DIN 6527L.





AEROSPACE RADIUS END MILL

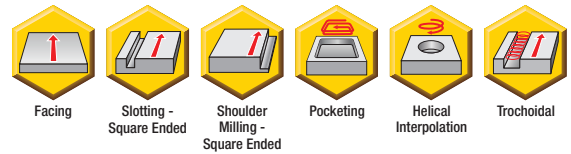
XE & XER End Mills have been specifically designed and manufactured for the machining of Titanium and High Temperature Alloys that are typically found in Aerospace, Defence, Medical and Oils & Gas Segments.

Key Features

- Advanced Geometric design
- Tough and Wear resistant Submicron Substrate
- Advanced Nano - Composite PVD Coating
- High Precision Radii

Benefits

- Improved stability with the suppression of vibration & harmonics
- Excellent chip control
- Increased application capacity for Slotting and Profiling
- Increased metal removal rates by up to 2X against comparable tools



XE / XER

Range:

XE:
Ø: 2,00mm - 20,00mm
Radii : 0,25mm

XER:
Ø : 2,00mm - 20,00mm
Radii : 0,25mm - 4,00mm



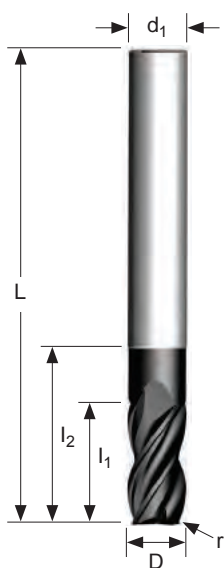


Aerospace End Mills

Materials Application

SP4060

P	M	K	N	S	H



4 - Flute End Mill

Solid Carbide
Aerospace End Mills

Metric Product		Dimensions (mm)										
EDP	Item Description	D	L	l ₁	l ₂	d ₁	r	a _p max	No. of Teeth	Helical Hole min - max		Trochoidal min
031360	XE 020MTN4-C	2,00	65,00	4,00	-	6,00	0,25	4,00	4	2,86	3,41	2,86
031361	XE 025MTN4-C	2,50	65,00	5,00	-	6,00		5,00	4	3,58	4,39	3,58
031362	XE 030MTN4-C	3,00	65,00	6,00	-	6,00		6,00	4	4,29	5,36	4,29
031363	XE 035MTN4-C	3,50	65,00	7,00	-	6,00		7,00	4	5,01	6,34	5,01
031364	XE 040MTN4-C	4,00	65,00	8,00	-	6,00		4,00	4	5,72	7,31	5,72
031365	XE 045MTN4-C	4,50	65,00	9,00	-	6,00		9,00	4	6,44	8,29	6,44
031366	XE 050MTN4-C	5,00	75,00	10,00	-	6,00		10,00	4	7,15	9,26	7,15
031367	XE 060MN4-C	6,00	75,00	12,00	18,00	6,00		12,00	4	8,58	11,21	8,58
031368	XE 080MN4-C	8,00	75,00	16,00	24,00	8,00		16,00	4	11,44	15,11	11,44
031369	XE 100MN4-C	10,00	100,00	20,00	30,00	10,00		20,00	4	14,30	19,01	14,30
031370	XE 120MN4-C	12,00	100,00	24,00	36,00	12,00		24,00	4	17,16	22,91	17,16
031371	XE 160MN4-C	16,00	115,00	32,00	48,00	16,00		32,00	4	22,88	30,71	22,88
031372	XE 200MN4-C	20,00	120,00	40,00	60,00	20,00		40,00	4	28,60	38,51	28,60

Technical Information

XE - Radial a_e and Axial a_p depth of cut range

Product	Dimensions						
	Shoulder Milling						Slotting
	Roughing			Finishing			
Grade	a _e %	a _p %	f _z	a _e %	a _p %	f _z	a _p %
SP4060	0,2 - 0,5 D	0,5 - 2,0 D	Mid - High	0,05 - 0,2 D	0,1 - 2,0 D	Low - Mid	0,5 - 1,25 D

Note: For ramping angle, helical a_p max. and trochoidal application details, refer to pages B88 - B89.

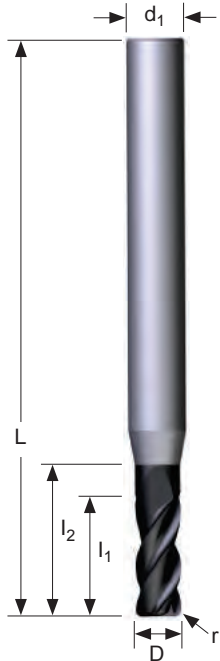


Slotting - Square Ended



Materials Application

SP4060					
P	M	K	N	S	H



4 - Flute End Mill

Solid Carbide
Aerospace End Mills

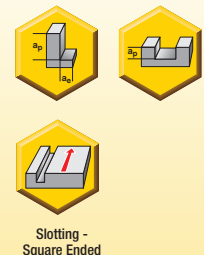
Metric Product		Dimensions (mm)										
EDP	Item Description	D	L	l ₁	l ₂	d ₁	r	a _p max	No. of Teeth	Helical Hole min - max		Trochoidal min
031936	XER 020NTN4-C	2,00	57,00	7,00	-	6,00	0,25	7,00	4	2,86	3,41	2,86
031937	XER 025NTN4-C	2,50	57,00	8,00	-	6,00	0,25	8,00	4	3,58	4,39	3,58
031938	XER 030NTN4-C	3,00	57,00	8,00	-	6,00	0,25	8,00	4	4,29	5,36	4,29
031939	XER 035NTN4-C	3,50	57,00	10,00	-	6,00	0,25	10,00	4	5,01	6,33	5,01
031940	XER 040NTN4-C	4,00	57,00	11,00	-	6,00	0,25	11,00	4	5,72	7,31	5,72
031941	XER 040NTN4-E	4,00	57,00	11,00	-	6,00	0,50	11,00	4	5,72	6,83	5,72
031942	XER 050NTN4-C	5,00	57,00	13,00	-	6,00	0,25	13,00	4	7,15	9,26	7,15
031943	XER 050NTN4-E	5,00	57,00	13,00	-	6,00	0,50	13,00	4	7,15	8,78	7,15
031944	XER 050NTN4-F	5,00	57,00	13,00	-	6,00	0,75	13,00	4	7,15	8,29	7,15
031945	XER 060NN4-C	6,00	57,00	13,00	21,00	6,00	0,25	13,00	4	8,58	11,21	8,58
031946	XER 060NN4-E	6,00	57,00	13,00	21,00	6,00	0,50	13,00	4	8,58	10,73	8,58
031947	XER 060NN4-G	6,00	57,00	13,00	21,00	6,00	1,00	13,00	4	8,58	9,75	8,58
031948	XER 080NN4-C	8,00	63,00	19,00	27,00	8,00	0,25	19,00	4	11,44	15,11	11,44
031949	XER 080NN4-E	8,00	63,00	19,00	27,00	8,00	0,50	19,00	4	11,44	14,63	11,44
031950	XER 080NN4-G	8,00	63,00	19,00	27,00	8,00	1,00	19,00	4	11,44	13,65	11,44
031951	XER 100NN4-C	10,00	72,00	22,00	32,00	10,00	0,25	22,00	4	14,30	19,01	14,30
031952	XER 100NN4-E	10,00	72,00	22,00	32,00	10,00	0,50	22,00	4	14,30	18,53	14,30
031953	XER 100NN4-G	10,00	72,00	22,00	32,00	10,00	1,00	22,00	4	14,30	17,55	14,30
031954	XER 100NN4-J	10,00	72,00	22,00	32,00	10,00	1,50	22,00	4	14,30	16,58	14,30
031955	XER 120NN4-C	12,00	83,00	26,00	38,00	12,00	0,25	26,00	4	17,16	22,91	17,16
031956	XER 120NN4-E	12,00	83,00	26,00	38,00	12,00	0,50	26,00	4	17,16	22,43	17,16
031957	XER 120NN4-G	12,00	83,00	26,00	38,00	12,00	1,00	26,00	4	17,16	21,45	17,16
031958	XER 120NN4-J	12,00	83,00	26,00	38,00	12,00	1,50	26,00	4	17,16	20,48	17,16
032269	XER 120NN4-L	12,00	83,00	26,00	38,00	12,00	2,50	26,00	4	17,16	18,53	17,16
031959	XER 160NN4-C	16,00	92,00	32,00	44,00	16,00	0,25	32,00	4	22,88	30,71	22,88
031960	XER 160NN4-G	16,00	92,00	32,00	44,00	16,00	1,00	32,00	4	22,88	29,25	22,88
031961	XER 160NN4-J	16,00	92,00	32,00	44,00	16,00	1,50	32,00	4	22,88	28,28	22,88
031962	XER 160NN4-K	16,00	92,00	32,00	44,00	16,00	2,00	32,00	4	22,88	27,30	22,88
032270	XER 160NN4-L	16,00	92,00	32,00	44,00	16,00	2,50	32,00	4	22,88	26,33	22,88
031963	XER 160NN4-M	16,00	92,00	32,00	44,00	16,00	3,00	32,00	4	22,88	25,35	22,88
032271	XER 160NN4-P	16,00	92,00	32,00	44,00	16,00	4,00	32,00	4	22,88	23,40	22,88
031964	XER 200NN4-C	20,00	104,00	38,00	54,00	20,00	0,25	38,00	4	28,60	38,51	28,60
031965	XER 200NN4-G	20,00	104,00	38,00	54,00	20,00	1,00	38,00	4	28,60	37,05	28,60
031966	XER 200NN4-J	20,00	104,00	38,00	54,00	20,00	1,50	38,00	4	28,60	36,08	28,60
031967	XER 200NN4-K	20,00	104,00	38,00	54,00	20,00	2,00	38,00	4	28,60	35,10	28,60
032272	XER 200NN4-L	20,00	104,00	38,00	54,00	20,00	2,50	38,00	4	28,60	34,13	28,60
031968	XER 200NN4-M	20,00	104,00	38,00	54,00	20,00	3,00	38,00	4	28,60	33,15	28,60
032273	XER 200NN4-P	20,00	104,00	38,00	54,00	20,00	4,00	38,00	4	28,60	31,20	28,60

Technical Information

XER - Radial a _e and Axial a _p depth of cut range							
Product	Dimensions (mm)						
Grade	Shoulder Milling						Slotting
	Roughing			Finishing			
	a _e %	a _p %	f _z	a _e %	a _p %	f _z	
SP4060	0,2 - 0,5 D	0,5 - a _p max*	Mid - High	0,05 - 0,2 D	0,5 - a _p max*	Low - Mid	0,5 - 1,16 D

* Do not exceed 2 D for a_p max - where 2 D is available

Note: For ramping angle, helical a_p max. and trochoidal application details, refer to pages B88 - B89.



Aerospace End Mills



Aerospace End Mills

Solid Carbide
Aerospace End Mills

Recommended Feeds

XE / XER Feeds fz (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGC-FGS	Cast Irons Malleable GTS-40MMP	Aluminum & Alloys <16% Si/16 HBN	Aluminum & Silicon >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
2.0	-	-	-	0,005 0,007	0,005 0,007	0,005 0,007	0,005 0,007	0,004 0,006	-	-	-	-	-	0,005 0,007	0,003 0,005	0,003 0,005	0,005 0,007	-	-
2.5	-	-	-	0,006 0,010	0,006 0,009	0,006 0,010	0,005 0,009	0,005 0,008	-	-	-	-	-	0,006 0,010	0,004 0,008	0,004 0,008	0,006 0,010	-	-
3.0	-	-	-	0,007 0,012	0,007 0,011	0,007 0,012	0,005 0,011	0,006 0,009	-	-	-	-	-	0,007 0,013	0,005 0,011	0,005 0,011	0,007 0,013	-	-
3.5	-	-	-	0,009 0,015	0,008 0,013	0,009 0,014	0,006 0,013	0,007 0,011	-	-	-	-	-	0,009 0,016	0,006 0,014	0,006 0,013	0,009 0,016	-	-
4.0	-	-	-	0,010 0,018	0,009 0,015	0,010 0,016	0,006 0,014	0,008 0,013	-	-	-	-	-	0,010 0,019	0,006 0,016	0,006 0,014	0,010 0,018	-	-
5.0	-	-	-	0,013 0,023	0,011 0,018	0,013 0,021	0,008 0,018	0,008 0,016	-	-	-	-	-	0,013 0,025	0,008 0,021	0,008 0,018	0,013 0,024	-	-
6.0	-	-	-	0,015 0,029	0,013 0,022	0,015 0,026	0,010 0,022	0,012 0,020	-	-	-	-	-	0,015 0,031	0,010 0,026	0,010 0,022	0,015 0,030	-	-
8.0	-	-	-	0,020 0,039	0,017 0,029	0,020 0,037	0,014 0,031	0,016 0,028	-	-	-	-	-	0,020 0,044	0,014 0,036	0,014 0,031	0,020 0,042	-	-
10.0	-	-	-	0,025 0,050	0,021 0,037	0,025 0,048	0,018 0,040	0,020 0,036	-	-	-	-	-	0,025 0,057	0,018 0,048	0,018 0,040	0,025 0,055	-	-
12.0	-	-	-	0,030 0,062	0,025 0,044	0,030 0,060	0,022 0,049	0,024 0,044	-	-	-	-	-	0,030 0,071	0,022 0,059	0,022 0,049	0,030 0,069	-	-
16.0	-	-	-	0,040 0,084	0,032 0,059	0,040 0,085	0,030 0,069	0,032 0,060	-	-	-	-	-	0,040 0,100	0,030 0,084	0,030 0,069	0,040 0,098	-	-
20.0	-	-	-	0,050 0,108	0,040 0,073	0,050 0,111	0,038 0,089	0,040 0,076	-	-	-	-	-	0,050 0,131	0,038 0,109	0,038 0,089	0,050 0,127	-	-

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	ae	Correction Factor
	0,05 D	2,30 x fz
	0,10 D	1,65 x fz
	0,15 D	1,40 x fz
	0,20 D	1,25 x fz
	0,30 D	1,09 x fz

For ae less than ae max, use correction factors stated above.
For ae max, use feeds stated above.

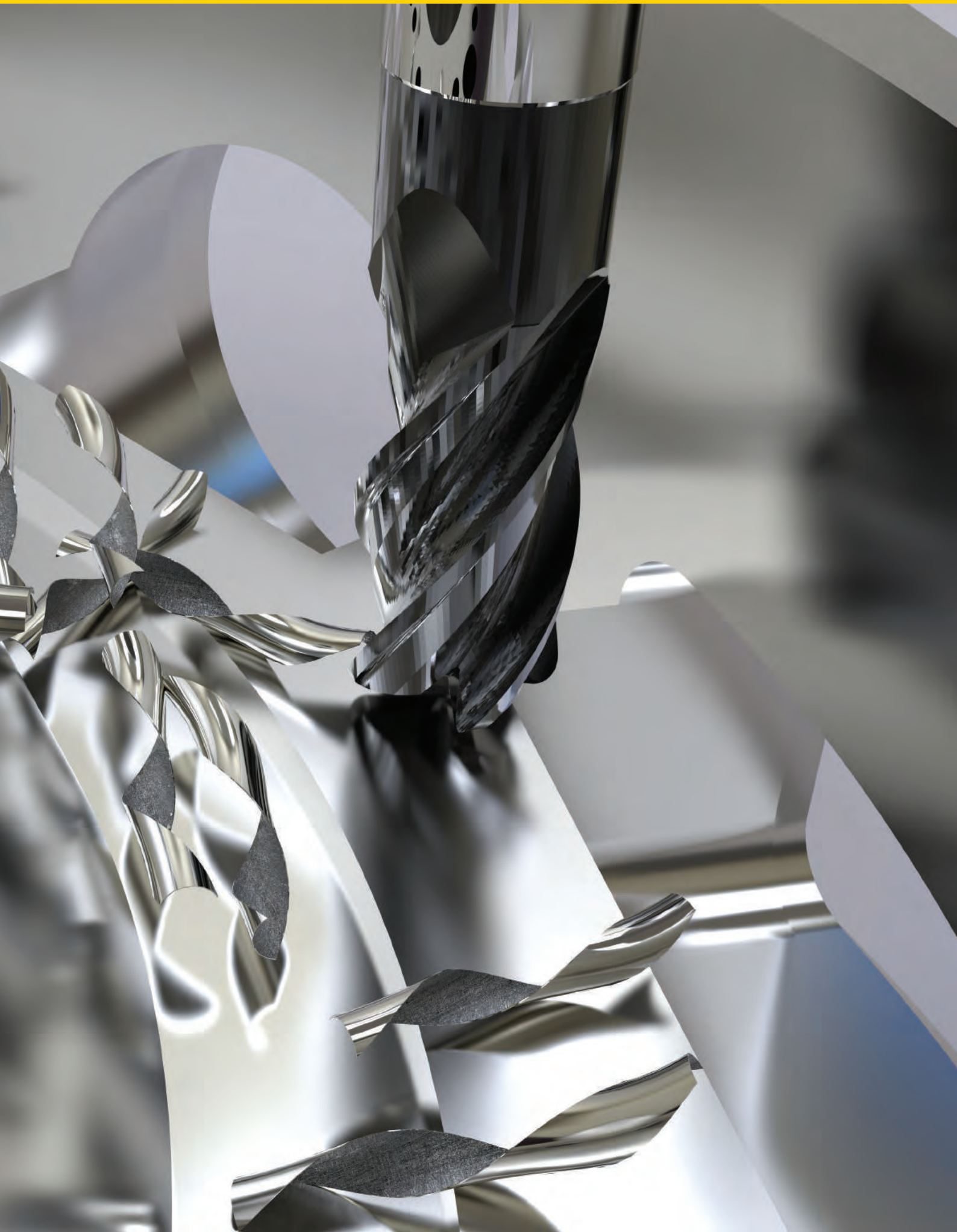


Solid Carbide
Aerospace End Mills

Aerospace End Mills

Recommended Speeds

Speed v_c (m/min)					
XE / XER Series					
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Standard
P	Unalloyed Steel	<600 N/mm ² <180 HBN			
		<950 N/mm ² <280 HBN			
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			
		950-1200 N/mm ² 280-355 HBN	●	◎	50 - 280
		1200-1400 N/mm ² 355-415 HBN			45 - 160
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	95 - 200
		Martensitic 400 series			70 - 145
	PH Stainless	Refractory P.H.	●		60 - 110
K	Cast Iron	Grey GG-Ft			
		Spheroidal-Ductile GGG-FGS			
		Malleable GTS - MN/MP			
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			60 - 140
		Cobalt Based	●	◎	20 - 75
		Nickel Based			25 - 80
		Titanium Based			40 - 120
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			





RSM AEROSPACE PROGRAM

The RSM program is specially designed to overcome a number of problems usually associated with machining Titanium components, in particular the profiling of walls, pockets and surfaces in 2D and 3D applications.

Issues such as vibration and material tarnishing are significantly reduced by the tool's unique geometry. The tool also features a reduced shank which offers optimum flexibility. This allows the user to obtain maximum reach and workholding length* to suit individual requirements, thereby reducing required inventory.

* Recommended minimum secure clamping length is 2,5 x shank diameter.



CRSM / RSM

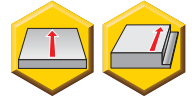
RSM Range:

Ø: 10,00mm - 25,00mm
Radii*: 0,50mm - 5,00mm

Z*: 6, 8 & 10

* Radii and Cutting edges dependent on diameter

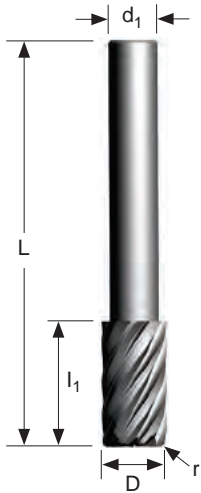




Materials Application

SU4000

P	M	K	N	S	H



Multi-Flute End Mill

Solid Carbide
Aerospace End Mills

Metric Product		Dimensions (mm)									
EDP	Item Description	D	L	I ₁	d ₁	a _p max	Radius r	No. of Teeth	Helical Hole min - max		Trochoidal min
031027	RSM100LM6X-E	10,00	125,00	20,00	9,00	20,00	0,50	6	-	-	-
031028	RSM100LM6X-G	10,00	125,00	20,00	9,00	20,00	1,00	6	-	-	-
031029	RSM100LM6X-K	10,00	125,00	20,00	9,00	20,00	2,00	6	-	-	-
031030	RSM100LM6X-M	10,00	125,00	20,00	9,00	20,00	3,00	6	-	-	-
031023	RSM120LM6X-E	12,00	125,00	24,00	10,00	24,00	0,50	6	-	-	-
031024	RSM120LM6X-G	12,00	125,00	24,00	10,00	24,00	1,00	6	-	-	-
031025	RSM120LM6X-K	12,00	125,00	24,00	10,00	24,00	2,00	6	-	-	-
031026	RSM120LM6X-M	12,00	125,00	24,00	10,00	24,00	3,00	6	-	-	-
031015	RSM160LM6X-G	16,00	150,00	32,00	14,00	32,00	1,00	6	-	-	-
031016	RSM160LM6X-K	16,00	150,00	32,00	14,00	32,00	2,00	6	-	-	-
031017	RSM160LM6X-M	16,00	150,00	32,00	14,00	32,00	3,00	6	-	-	-
031018	RSM160LM6X-P	16,00	150,00	32,00	14,00	32,00	4,00	6	-	-	-
031019	RSM160LM8X-G	16,00	150,00	32,00	14,00	32,00	1,00	8	-	-	-
031020	RSM160LM8X-K	16,00	150,00	32,00	14,00	32,00	2,00	8	-	-	-
031021	RSM160LM8X-M	16,00	150,00	32,00	14,00	32,00	3,00	8	-	-	-
031022	RSM160LM8X-P	16,00	150,00	32,00	14,00	32,00	4,00	8	-	-	-
031005	RSM200LM6X-G	20,00	160,00	39,00	18,00	39,00	1,00	6	-	-	-
031006	RSM200LM6X-K	20,00	160,00	39,00	18,00	39,00	2,00	6	-	-	-
031007	RSM200LM6X-M	20,00	160,00	39,00	18,00	39,00	3,00	6	-	-	-
031008	RSM200LM6X-P	20,00	160,00	39,00	18,00	39,00	4,00	6	-	-	-
031009	RSM200LM6X-Q	20,00	160,00	39,00	18,00	39,00	5,00	6	-	-	-
031010	RSM200LM8X-G	20,00	160,00	39,00	18,00	39,00	1,00	8	-	-	-
031011	RSM200LM8X-K	20,00	160,00	39,00	18,00	39,00	2,00	8	-	-	-
031012	RSM200LM8X-M	20,00	160,00	39,00	18,00	39,00	3,00	8	-	-	-
031013	RSM200LM8X-P	20,00	160,00	39,00	18,00	39,00	4,00	8	-	-	-
031014	RSM200LM8X-Q	20,00	160,00	39,00	18,00	39,00	5,00	8	-	-	-
033036	RSM250LM8X-K	25,00	160,00	47,00	22,00	47,00	2,00	8	-	-	-
033037	RSM250LM8X-M	25,00	160,00	47,00	22,00	47,00	3,00	8	-	-	-
033038	RSM250LM8X-P	25,00	160,00	47,00	22,00	47,00	4,00	8	-	-	-
033039	RSM250LM8X-Q	25,00	160,00	47,00	22,00	47,00	5,00	8	-	-	-
033040	RSM250LM10X-K	25,00	160,00	47,00	22,00	47,00	2,00	10	-	-	-
033041	RSM250LM10X-M	25,00	160,00	47,00	22,00	47,00	3,00	10	-	-	-
033042	RSM250LM10X-P	25,00	160,00	47,00	22,00	47,00	4,00	10	-	-	-
033043	RSM250LM10X-Q	25,00	160,00	47,00	22,00	47,00	5,00	10	-	-	-

For technical information, refer to page B87.

Aerospace End Mills


Solid Carbide
 Aerospace End Mills

Aerospace End Mills

Recommended Feeds
RSM Technical Information

Product		Dimensions (mm)																		
Family Description	Diameter	Z	Profiling					Facing					Chip Thickness		Profiling (mm/z)				Facing (mm/z)	
			a _e min	a _e max	a _p min	a _p max	a _d max mm ²	a _e min	a _e max	a _p min	a _p max	a _d max mm ²	h _m min	h _m max	for a _e min	f _z min	f _z max	for a _e max	f _z min	f _z max
RSM100	10,00	6	0,17	0,67	10,30	13,00	6,87	Radius +0,50	7,50	0,20	Radius +0,50	1,25	0,02	0,05	0,078	0,195	0,040	0,100	0,020	0,057
RSM120	12,00	6	0,20	0,80	12,80	15,60	10,24		9,00			1,80			0,078	0,195	0,040	0,100		
RSM160	16,00	6	0,27	1,07	17,80	20,80	18,99		12,00			3,20			0,078	0,195	0,040	0,100		
RSM160	16,00	8	0,20	0,80	12,00	20,80	9,60		12,00			3,20			0,090	0,225	0,046	0,115		
RSM200	20,00	6	0,33	1,33	23,00	26,00	30,67		15,00			5,00			0,078	0,195	0,040	0,100		
RSM200	20,00	8	0,25	1,00	16,00	26,00	16,00		15,00			5,00			0,090	0,225	0,046	0,115		
RSM250	25,00	8	0,31	1,25	20,50	32,50	25,63		18,75			7,81			0,090	0,225	0,046	0,115		
RSM250	25,00	10	0,25	1,00	15,50	32,50	15,50		18,75			7,81			0,101	0,251	0,051	0,128		

In the application of RSM end mills, it is vital that a_d max mm² is not exceeded. For this, adjust a_e & a_p accordingly.

Example:

When using a_p max, then a_e = a_d max mm² / a_p max
 = 15,50 / 32,50
 = 0,47mm

When using a_e max, Then a_p = a_d max mm² / a_e max
 = 15,5 / 1
 = 15,50mm

Example based on values for RSM250 (Z=10)



Solid Carbide
Aerospace End Mills

Recommended Speeds

Material Reference Chart and Recommended Surface Speeds

Type	Commercial Name	Designation	Hardness HRB HRC HB	Rm N/mm2	WC (0.15) W/cm ³ /min	WC (0.006) Hp/in ³ /min	Metric	
							V _c min (m/min)	V _c max (m/min)
Titanium a	Ti-5Al-2.5Sn	ATI 5-2.5	HRC36	1130	49	1,08	60	120
Titanium a	Ti-6Al-4Zr-2Mo-2Sn	ATI 6-2-4-2®	HRC28	900	31	0,67	60	130
Titanium a	Ti-6Al-4Zr-2Mo-2Sn-0.2Si	ATI 6-2-4-2Si	HRC28	900	31	0,67	60	130
Titanium a	Ti-8Al-1Mo-1V	ATI 8-1-1®	HRC35	1100	49	1,08	60	120
Titanium b	Ti-11.5Mo-6Zr-4.5Sn	-	-	-	45	0,99	35	70
Titanium b	Ti-13V-11Cr-3Al	-	-	-	45	0,99	35	70
Titanium b	Ti-3Al-8V-6Cr-4Mo-4Zr	ATI 38-644®	HRC32	1000	45	0,99	35	70
Titanium b	Ti-8Mo-8V-2Fe-3Al	-	-	-	45	0,99	35	70
Titanium b	Ti-13V-11Cr-3Al	ATI 13-11-3	HRC40	1270	70	1,53	30	60
Titanium b	Ti 10.2.3	ATI 10-2-3®	HRC35	1100	62	1,35	25	60
Titanium b	Ti-15Mo	ATI 15Mo®	HRC24	820	33	0,72	50	105
Titanium b	Ti-15-333	ATI 15-3-3-3®	HRC32	1000	45	0,99	35	70
Titanium b	Ti 45Nb	ATI 45Nb®	-	-	30	0,65	45	95
Titanium b - ab	5Al-5V-5Mo-3Cr	ATI Ti5-5-5-3 Alloy	HRC40	1270	70	1,53	30	60
Titanium ab	Ti-425	ATI 425® MIL	HRC36	1130	49	1,08	30	60
Titanium ab	Ti-6AL-4V	ATI 6-4®	HRC30-34	1130	49	1,08	60	120
Titanium ab	Ti-6Al-4V	ATI 6-4®	HRC35-39	1200	62	1,35	55	110
Titanium ab	Ti-6Al-5Zr-0.5Mo-0.25Si	-	-	-	49	1,08	50	105
Titanium ab	Ti-6Al-5Zr-4Mo-Cu-0.2Si	-	-	-	49	1,08	50	105
Titanium ab	Ti-6Al-6V-2Sn	ATI 6-6-2®	HRC35	1100	49	1,08	50	110
Titanium ab	Ti-7Al-4Mo	-	-	-	45	0,99	50	105
Titanium ab	3-2.5	ATI 3-2.5®	HRC24	820	33	0,72	60	130
Titanium ab	6-4ELI	ATI 6-4 ELI®	HRC32	1000	45	0,99	60	125
Titanium ab	6-2-4-6	ATI 6-2-4-6®	HRC36	1130	47	1,03	55	110
Titanium ab	Ti-17	ATI 17®	HRC38	1200	51	1,12	55	110
Titanium ab	Ti-4Al-4Mo-2Sn-0.5Si	ATI 4-4-2®	HRC35	1100	49	1,08	50	105
Titanium ab	Ti-4Al-4Mo-4Sn-0.5Si	-	-	-	49	1,08	50	105
Pure Titanium	Ti 99.5	ATI CP4®	HRB100	780	30	0,65	90	185
Pure Titanium	Ti 99.6	ATI CP3®	HRB90	600	30	0,65	95	205
Pure Titanium	Ti 99.7	ATI CP2®	HRB80	510	30	0,65	105	220
Pure Titanium	Ti 99.8	ATI CP1®	HRB70	430	30	0,65	115	240

Aerospace End Mills



RAPIDE END MILLS

The Rapide family offers a comprehensive range of end mills suitable for High Speed and High Performance Machining, in an array of materials including Steels, Stainless Steels, High Temperature Alloys, Cast Irons, Hard Materials and Aluminium Alloys.

Key Features

- Material Specific Geometries
- Advanced PVD coating
- Premium Micrograin Carbide

Benefits

- Higher speeds and feeds achievable
- Rapid material removal
- Suitable for machining materials up to 65 HRC
- Dry machining possible

Rapide

Range:

Ø: 2,00mm - 20,00mm

Z: 2,3,4 & 6

End Styles: Square Ended, Square Ended with Radius, Ball Nosed



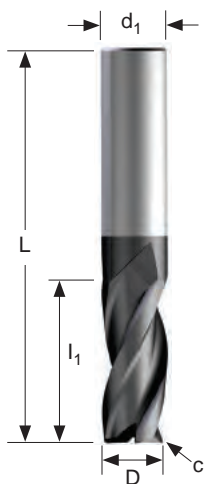


Materials Application

SP4060

P	M	K	N	S	H
◆	◆	◆	◆	◆	◆

PVD



3 - Flute End Mill

Solid Carbide
Rapide End Mill

Metric Product		Dimensions (mm)									
EDP	Item Description	D	L	l ₁	d ₁	c	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034343	ERC 030NTN3	3,00	57,00	8,00	6,00	0,10	8,00	3	4,29	5,85	4,29
034344	ERC 040NTN3	4,00	57,00	11,00	6,00	0,10	11,00	3	5,72	7,80	5,72
034345	ERC 050NTN3	5,00	57,00	13,00	6,00	0,20	13,00	3	7,15	9,75	7,15
034346	ERC 060NN3	6,00	57,00	13,00	6,00	0,20	13,00	3	8,58	11,70	8,58
034347	ERC 080NN3	8,00	63,00	20,00	8,00	0,20	20,00	3	11,44	15,60	11,44
034348	ERC 100NN3	10,00	72,00	22,00	10,00	0,20	22,00	3	14,30	19,50	14,30
034349	ERC 120NN3	12,00	75,00	25,00	12,00	0,25	25,00	3	17,16	23,40	17,16
034839	ERC 160NN3	16,00	93,00	35,00	16,00	0,25	35,00	3	22,88	31,20	22,88
034351	ERC 200NN3	20,00	100,00	44,00	20,00	0,25	44,00	3	28,60	39,00	28,60

ERC - Radial a_e and Axial a_p depth of cut range

Product	Dimensions (mm)						
	Shoulder Milling						Slotting a _p %
	Roughing			Finishing			
a _e %	a _p %	f _z	a _e %	a _p %	f _z	a _p %	
SP4035	0,1 - 0,5 D	0,05 - 2 D	Mid - High	0,05 - 0,1 D	0,05 - 2 D	Low - Mid	0,1 - 1,5 D

* For a_p max do not exceed 0,05 D (a_e)

Note: For ramping angle, helical a_p max. and trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.




Slotting - Square Ended


Solid Carbide
Rapide End Mill
Recommended Feeds

Rapide High Performance / High Speed End Mills

ERC Feeds f_z (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS-MIMP	Aluminium & Alloys <16% Si/11.6 HBN	Aluminium & Silicon >16% Si/9.2 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3,0	0,009 0,014	0,009 0,014	0,009 0,014	0,009 0,014	0,008 0,013	0,009 0,014	0,009 0,013	0,008 0,011	0,009 0,014	0,009 0,013	0,009 0,013	-	-	0,009 0,014	0,007 0,011	0,007 0,010	0,009 0,014	0,006 0,010	0,006 0,010
4,0	0,012 0,020	0,012 0,020	0,012 0,020	0,012 0,019	0,011 0,017	0,012 0,019	0,012 0,017	0,010 0,015	0,012 0,020	0,012 0,019	0,012 0,017	-	-	0,012 0,020	0,009 0,015	0,009 0,014	0,012 0,019	0,008 0,014	0,008 0,014
5,0	0,015 0,027	0,015 0,027	0,015 0,027	0,015 0,025	0,014 0,022	0,015 0,025	0,015 0,022	0,013 0,020	0,015 0,027	0,015 0,025	0,015 0,022	-	-	0,015 0,027	0,011 0,020	0,011 0,019	0,015 0,026	0,010 0,019	0,010 0,018
6,0	0,018 0,033	0,018 0,033	0,018 0,033	0,018 0,030	0,016 0,027	0,018 0,030	0,018 0,027	0,015 0,024	0,018 0,034	0,018 0,030	0,018 0,027	-	-	0,018 0,034	0,013 0,025	0,013 0,024	0,018 0,033	0,012 0,023	0,012 0,022
8,0	0,024 0,049	0,024 0,049	0,024 0,049	0,024 0,043	0,021 0,037	0,024 0,043	0,024 0,037	0,020 0,033	0,024 0,051	0,024 0,043	0,024 0,037	-	-	0,024 0,051	0,018 0,036	0,018 0,035	0,024 0,047	0,016 0,033	0,016 0,030
10,0	0,030 0,065	0,030 0,065	0,030 0,065	0,030 0,056	0,026 0,047	0,030 0,056	0,030 0,047	0,025 0,042	0,030 0,068	0,030 0,056	0,030 0,047	-	-	0,030 0,068	0,023 0,049	0,023 0,046	0,030 0,063	0,020 0,043	0,020 0,039
12,0	0,036 0,082	0,036 0,082	0,036 0,082	0,036 0,070	0,030 0,057	0,036 0,070	0,036 0,057	0,030 0,051	0,036 0,087	0,036 0,070	0,036 0,057	-	-	0,036 0,087	0,029 0,062	0,029 0,058	0,036 0,079	0,024 0,053	0,024 0,049
16,0	0,048 0,119	0,048 0,119	0,048 0,119	0,048 0,099	0,039 0,079	0,048 0,099	0,048 0,079	0,040 0,070	0,048 0,127	0,048 0,099	0,048 0,079	-	-	0,048 0,127	0,039 0,090	0,039 0,084	0,048 0,115	0,032 0,076	0,032 0,068
20,0	0,060 0,160	0,060 0,160	0,060 0,160	0,060 0,130	0,048 0,101	0,060 0,130	0,060 0,101	0,050 0,090	0,060 0,171	0,060 0,130	0,060 0,101	-	-	0,060 0,171	0,050 0,120	0,050 0,112	0,060 0,152	0,040 0,100	0,040 0,089

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling 	Feed Correction Parameters	
	a_e	Correction Factor
	0,05 D	$2,30 \times f_z$
	0,10 D	$1,65 \times f_z$
	0,15 D	$1,40 \times f_z$
	0,20 D	$1,25 \times f_z$
	0,30 D	$1,09 \times f_z$

For a_e less than a_e max, use correction factors stated above.
 For a_e max, use feeds stated above.



Solid Carbide
Rapide End Mill

Recommended Speeds

Rapide High Performance / High Speed End Mills

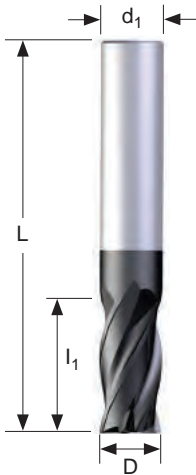
Speed v_c (m/min)					
ERC Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Standard
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	80 - 360
		<950 N/mm ² <280 HBN			70 - 320
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			70 - 320
		950-1200 N/mm ² 280-355 HBN	●	◎	50 - 280
		1200-1400 N/mm ² 355-415 HBN			45 - 160
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	80 - 160
		Martensitic 400 series			55 - 120
	PH Stainless	Refractory P.H.	●		50 - 90
K	Cast Iron	Grey GG-Ft			100 - 225
		Spheroidal-Ductile GGG-FGS	●	◎	70 - 155
		Malleable GTS - MN/MP			65 - 130
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			50 - 110
		Cobalt Based	●	◎	15 - 60
		Nickel Based			20 - 65
		Titanium Based			30 - 100
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN		◎	60 - 140
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			50 - 130



Materials Application

SP4060

P	M	K	N	S	H



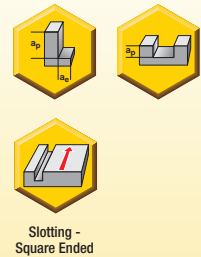
4 - Flute End Mill

Solid Carbide
Rapide End Mill

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	l ₁	d ₁	ap max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034352	HE 020NTN4	2,00	50,00	6,00	6,00	6,00	4	-	-	2,86
034353	HE 030NTN4	3,00	50,00	8,00	6,00	8,00	4	-	-	4,29
034354	HE 040NTN4	4,00	50,00	11,00	6,00	11,00	4	-	-	5,72
034355	HE 050NTN4	5,00	50,00	13,00	6,00	13,00	4	-	-	7,15
034356	HE 060NN4	6,00	50,00	13,00	6,00	13,00	4	-	-	8,58
034357	HE 080NN4	8,00	63,00	20,00	8,00	20,00	4	-	-	11,44
034358	HE 100NN4	10,00	72,00	22,00	10,00	22,00	4	-	-	14,30
034359	HE 120NN4	12,00	75,00	25,00	12,00	25,00	4	-	-	17,16
034360	HE 160NN4	16,00	88,00	32,00	16,00	32,00	4	-	-	22,88

Rapide High Performance / High Speed End Mills

HE - Radial a _e and Axial a _p depth of cut range							
Product	Dimensions (mm)						
	Shoulder Milling						Slotting a _p %
	Roughing			Finishing			
Material	a _e %	a _p %	f _z	a _e %	a _p %	f _z	
Alloyed Steel	-	-	-	0,01 - 0,05 D	0,1 - 1,25 D	-	0,05 - 0,2 D
Cast Iron	-	-	-	0,01 - 0,05 D	0,1 - 1,25 D	-	0,05 - 0,2 D
Hard Materials	-	-	-	0,01 - 0,03 D	0,1 - 1 D	-	0,05 - 0,1 D



* For a_p max do not exceed 0.05 D (a_e)

Note: For trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
Rapide End Mill

Recommended Feeds

Rapide High Performance / High Speed End Mills

HE Feeds fz (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS -M/MMP	Aluminum & Alloys <16% Si/16 HBN	Aluminum & Silicon >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
2,0	-	-	0,005 0,007	0,005 0,007	0,005 0,007	-	-	-	0,005 0,007	0,005 0,007	0,005 0,007	-	-	-	-	-	-	0,003 0,005	0,003 0,005
3,0	-	-	0,008 0,012	0,008 0,012	0,007 0,011	-	-	-	0,008 0,012	0,008 0,012	0,008 0,011	-	-	-	-	-	-	0,005 0,008	0,005 0,008
4,0	-	-	0,010 0,017	0,010 0,016	0,009 0,015	-	-	-	0,010 0,017	0,010 0,016	0,010 0,015	-	-	-	-	-	-	0,006 0,011	0,006 0,011
5,0	-	-	0,013 0,023	0,013 0,021	0,011 0,020	-	-	-	0,013 0,023	0,013 0,021	0,013 0,020	-	-	-	-	-	-	0,008 0,015	0,008 0,015
6,0	-	-	0,015 0,029	0,015 0,026	0,013 0,024	-	-	-	0,015 0,029	0,015 0,026	0,015 0,024	-	-	-	-	-	-	0,009 0,019	0,009 0,018
8,0	-	-	0,020 0,042	0,020 0,037	0,017 0,033	-	-	-	0,020 0,042	0,020 0,037	0,020 0,033	-	-	-	-	-	-	0,012 0,026	0,012 0,025
10,0	-	-	0,025 0,057	0,025 0,048	0,021 0,042	-	-	-	0,025 0,057	0,025 0,048	0,025 0,042	-	-	-	-	-	-	0,015 0,034	0,015 0,032
12,0	-	-	0,030 0,072	0,030 0,060	0,025 0,051	-	-	-	0,030 0,072	0,030 0,060	0,030 0,051	-	-	-	-	-	-	0,018 0,043	0,018 0,039
16,0	-	-	0,040 0,104	0,040 0,085	0,032 0,070	-	-	-	0,040 0,104	0,040 0,085	0,040 0,070	-	-	-	-	-	-	0,024 0,061	0,024 0,055

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	a _e	Correction Factor
	0,01	5,00 x f _z
	0,03	2,90 x f _z
	0,05	2,25 x f _z
	0,08	1,85 x f _z

For a_e less than a_e max, use correction factors stated above.
For a_e max, use feeds stated above.



Recommended Speeds

Solid Carbide
Rapid End Mill

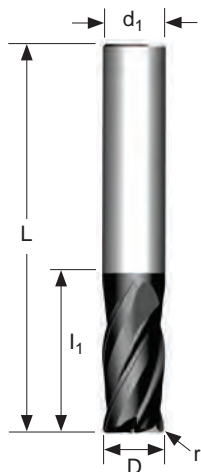
Rapide High Performance / High Speed End Mills

Speed v_c (m/min)					
HE Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Standard
P	Unalloyed Steel	<600 N/mm ² <180 HBN			
		<950 N/mm ² <280 HBN			
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			70 - 320
		950-1200 N/mm ² 280-355 HBN	●	◎	50 - 280
		1200-1400 N/mm ² 355-415 HBN			45 - 160
M	Stainless Steel	Austenitic + Ferritic 300 series			
		Martensitic 400 series			
	PH Stainless	Refractory P.H.			
K	Cast Iron	Grey GG-Ft			100 - 225
		Spheroidal-Ductile GGG-FGS	●	◎	70 - 155
		Malleable GTS - MN/MP			65 - 130
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			
		Cobalt Based			
		Nickel Based			
		Titanium Based			
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			60 - 140
		Chilled Cast Iron >1400 N/mm ² > 400 HBN		◎	50 - 130



Materials Application

SP4060					
P	M	K	N	S	H



4 - Flute End Mill

Solid Carbide
Rapide End Mill

Metric Product		Dimensions (mm)									
EDP	Item Description	D	L	l ₁	d ₁	r	ap max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034361	HER 060NN4-E	6,00	50,00	13,00	6,00	0,50	13,00	4	-	-	8,58
034362	HER 060NN4-G	6,00	50,00	13,00	6,00	1,00	13,00	4	-	-	8,58
034363	HER 080NN4-E	8,00	63,00	20,00	8,00	0,50	20,00	4	-	-	11,44
034364	HER 080NN4-G	8,00	63,00	20,00	8,00	1,00	20,00	4	-	-	11,44
034365	HER 100NN4-E	10,00	72,00	22,00	10,00	0,50	22,00	4	-	-	14,30
034366	HER 100NN4-G	10,00	72,00	22,00	10,00	1,00	22,00	4	-	-	14,30
034367	HER 120NN4-E	12,00	75,00	25,00	12,00	0,50	25,00	4	-	-	17,16
034368	HER 120NN4-G	12,00	75,00	25,00	12,00	1,00	25,00	4	-	-	17,16

HER - Radial a_e and Axial a_p depth of cut range

Product	Dimensions (mm)						
	Shoulder Milling						Slotting a _p %
	Roughing			Finishing			
Material	a _e %	a _p %	f _z	a _e %	a _p %	f _z	
Alloyed Steel	-	-	-	0,01 - 0,05 D	0,1 - 1,25 D	Low - Mid	0,05 - 0,2 D
Cast Iron	-	-	-	0,01 - 0,03 D	0,1 - 1 D	Low - Mid	0,05 - 0,1 D
Hard Materials	-	-	-	0,01 - 0,03 D	0,1 - 1 D	Low - Mid	0,05 - 0,1 D



Slotting - Square Ended

* For a_p max do not exceed 0,05 D (a_e)

Note: For trochoidal application details, refer to pages B88 - B89.



See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.


Solid Carbide
Rapide End Mill
Recommended Feeds

Rapide High Performance / High Speed End Mills

HER Feeds f_z (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS-MIMP	Aluminium & Alloys <16% Si Ti B HBN	Aluminium & Silicon >16% Si Ti B HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
2,0	-	-	0,005 0,007	0,005 0,007	0,005 0,007	-	-	-	0,005 0,007	0,005 0,007	0,005 0,007	-	-	-	-	-	-	0,003 0,005	0,003 0,005
3,0	-	-	0,008 0,012	0,008 0,012	0,007 0,011	-	-	-	0,008 0,012	0,008 0,012	0,008 0,011	-	-	-	-	-	-	0,005 0,008	0,005 0,008
4,0	-	-	0,010 0,017	0,010 0,016	0,009 0,015	-	-	-	0,010 0,017	0,010 0,016	0,010 0,015	-	-	-	-	-	-	0,006 0,011	0,006 0,011
5,0	-	-	0,013 0,023	0,013 0,021	0,011 0,020	-	-	-	0,013 0,023	0,013 0,021	0,013 0,020	-	-	-	-	-	-	0,008 0,015	0,008 0,015
6,0	-	-	0,015 0,029	0,015 0,026	0,013 0,024	-	-	-	0,015 0,029	0,015 0,026	0,015 0,024	-	-	-	-	-	-	0,009 0,019	0,009 0,018
8,0	-	-	0,020 0,042	0,020 0,037	0,017 0,033	-	-	-	0,020 0,042	0,020 0,037	0,020 0,033	-	-	-	-	-	-	0,012 0,026	0,012 0,025
10,0	-	-	0,025 0,057	0,025 0,048	0,021 0,042	-	-	-	0,025 0,057	0,025 0,048	0,025 0,042	-	-	-	-	-	-	0,015 0,034	0,015 0,032
12,0	-	-	0,030 0,072	0,030 0,060	0,025 0,051	-	-	-	0,030 0,072	0,030 0,060	0,030 0,051	-	-	-	-	-	-	0,018 0,043	0,018 0,039
16,0	-	-	0,040 0,104	0,040 0,085	0,032 0,070	-	-	-	0,040 0,104	0,040 0,085	0,040 0,070	-	-	-	-	-	-	0,024 0,061	0,024 0,055

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
 	0,01	5,00 x f_z
	0,03	2,90 x f_z
	0,05	2,25 x f_z
	0,08	1,85 x f_z

For a_e less than a_e max, use correction factors stated above.
 For a_e max, use feeds stated above.

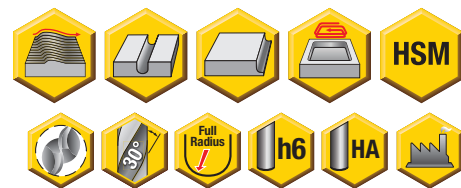


Solid Carbide
Rapide End Mill

Recommended Speeds

Rapide High Performance / High Speed End Mills

Speed v_c (m/min)					
HER Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Standard
P	Unalloyed Steel	<600 N/mm ² <180 HBN			
		<950 N/mm ² <280 HBN			
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			70 - 320
		950-1200 N/mm ² 280-355 HBN	●	◎	50 - 280
		1200-1400 N/mm ² 355-415 HBN			45 - 160
M	Stainless Steel	Austenitic + Ferritic 300 series			
		Martensitic 400 series			
	PH Stainless	Refractory P.H.			
K	Cast Iron	Grey GG-Ft			100 - 225
		Spheroidal-Ductile GGG-FGS	●	◎	70 - 155
		Malleable GTS - MN/MP			65 - 130
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			
		Cobalt Based			
		Nickel Based			
		Titanium Based			
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN		◎	60 - 140
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			50 - 130



Materials Application

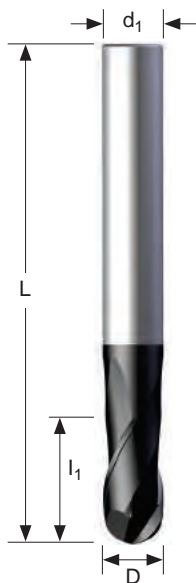
SP4060

P	M	K	N	S	H
◆		◆			◆



Solid Carbide
Rapide End Mill

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	l ₁	d ₁	a _p max	No. of Teeth	Helical Hole min - max		Trochoidal min
034375	HB 030LTL2	3,00	63,00	8,00	6,00	8,00	2	-	-	-
034376	HB 040LTL2	4,00	63,00	8,00	6,00	8,00	2	-	-	-
034377	HB 060LL2	6,00	75,00	12,00	6,00	12,00	2	-	-	-
034378	HB 080LL2	8,00	75,00	14,00	8,00	14,00	2	-	-	-
034379	HB 100LL2	10,00	100,00	18,00	10,00	18,00	2	-	-	-
034380	HB 120LL2	12,00	100,00	22,00	12,00	22,00	2	-	-	-



2-Flute Ball Nose End Mill

HB - Radial a _e and Axial a _p depth of cut range							
Product	Dimensions						
	Shoulder Milling						Slotting a _p %
	Roughing			Finishing			
a _e %	a _p %	f _z	a _e %	a _p %	f _z		
Alloyed Steel	-	-	-	0,03 - 0,05 D	0,1 - 0,8 D	-	0,05 - 0,2 D
Cast Iron	-	-	-	-	-	-	-
Hard Materials	-	-	-	0,01 - 0,03 D	0,1 - 0,5 D	-	0,05 - 0,1 D



For copy milling & shoulder milling applications, refer to page B90.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.

Rapide High Performance / High Speed End Mills



Solid Carbide
Rapide End Mill

Recommended Feeds

Rapide High Performance / High Speed End Mills

HB Feeds fz (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS -M/MMP	Aluminium & Alloys <16% Si/16 HBN	Aluminium & Silicon >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3,0	-	-	0,008 0,012	0,008 0,012	0,007 0,011	-	-	-	0,008 0,012	0,008 0,012	0,008 0,011	-	-	-	-	-	-	0,005 0,008	0,005 0,008
4,0	-	-	0,010 0,017	0,010 0,016	0,009 0,015	-	-	-	0,010 0,017	0,010 0,016	0,010 0,015	-	-	-	-	-	-	0,006 0,011	0,006 0,011
6,0	-	-	0,015 0,029	0,015 0,026	0,013 0,024	-	-	-	0,015 0,029	0,015 0,026	0,015 0,024	-	-	-	-	-	-	0,009 0,019	0,009 0,018
8,0	-	-	0,020 0,042	0,020 0,037	0,017 0,033	-	-	-	0,020 0,042	0,020 0,037	0,020 0,033	-	-	-	-	-	-	0,012 0,026	0,012 0,025
10,0	-	-	0,025 0,057	0,025 0,048	0,021 0,042	-	-	-	0,025 0,057	0,025 0,048	0,025 0,042	-	-	-	-	-	-	0,015 0,034	0,015 0,032
12,0	-	-	0,030 0,072	0,030 0,060	0,025 0,051	-	-	-	0,030 0,072	0,030 0,060	0,030 0,051	-	-	-	-	-	-	0,018 0,043	0,018 0,039

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	ae	Correction Factor
	For copy milling & shoulder milling applications, refer to page B90.	



Recommended Speeds

Solid Carbide
Rapide End Mill

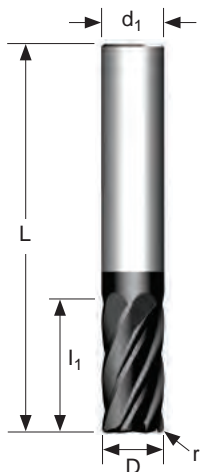
Rapide High Performance / High Speed End Mills

Speed v_c (m/min)					
HB Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Standard
P	Unalloyed Steel	<600 N/mm ² <180 HBN			
		<950 N/mm ² <280 HBN			
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			90 - 400
		950-1200 N/mm ² 280-355 HBN	●	◎	60 - 350
	1200-1400 N/mm ² 355-415 HBN			55 - 200	
M	Stainless Steel	Austenitic + Ferritic 300 series			
		Martensitic 400 series			
	PH Stainless	Refractory P.H.			
K	Cast Iron	Grey GG-Ft			120 - 280
		Spheroidal-Ductile GGG-FGS	●	◎	90 - 190
		Malleable GTS - MN/MP			80 - 160
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			
		Cobalt Based			
		Nickel Based			
		Titanium Based			
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN		◎	80 - 175
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			70 - 160



Materials Application

SP4060					
P	M	K	N	S	H



6 - Flute End Mill

Solid Carbide
Rapide End Mill

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	l ₁	d ₁	r	a _p max*	No. of Teeth	Helical Hole min - max	Trochoidal min
034333	HMR 030NTN6-C	3,00	50,00	10,00	6,00	0,25	10,00	6	-	4,29
034334	HMR 040NTN6-C	4,00	50,00	10,00	6,00	0,25	10,00	6	-	5,72
034335	HMR 050NTN6-C	5,00	50,00	15,00	6,00	0,25	15,00	6	-	7,15
034336	HMR 060NN6-C	6,00	50,00	20,00	6,00	0,25	20,00	6	-	8,58
034645	HMR 060NN6-E	6,00	50,00	20,00	6,00	0,50	20,00	6	-	8,58
034337	HMR 080NN6-C	8,00	63,00	20,00	8,00	0,25	20,00	6	-	11,44
034646	HMR 080NN6-E	8,00	63,00	20,00	8,00	0,50	20,00	6	-	11,44
034338	HMR 100NN6-C	10,00	72,00	25,00	10,00	0,25	25,00	6	-	14,30
034339	HMR 100NN6-E	10,00	72,00	25,00	10,00	0,50	25,00	6	-	14,30
034340	HMR 120NN6-C	12,00	75,00	25,00	12,00	0,25	25,00	6	-	17,16
034647	HMR 120NN6-E	12,00	75,00	25,00	12,00	0,50	25,00	6	-	17,16
034341	HMR 160NN6-C	16,00	93,00	30,00	16,00	0,25	30,00	6	-	22,88
034648	HMR 160NN6-E	16,00	93,00	30,00	16,00	0,50	30,00	6	-	22,88
034342	HMR 200NN6-C	20,00	100,00	44,00	20,00	0,25	44,00	6	-	28,60

HMR - Radial a_e and Axial a_p depth of cut range

Product	Dimensions (mm)						
	Shoulder Milling						Slotting a _p %
	Roughing			Finishing			
a _e %	a _p %	f _z	a _e %	a _p %	f _z		
SP4035	-	-	-	0,01 - 0,1 D	0,05 - 2 D	-	0,05 D



Slotting - Square Ended

* For a_p max do not exceed 0,05 D (a_e)

Note: For trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.


Solid Carbide
 Rapide End Mill

Recommended Feeds

Rapide High Performance / High Speed End Mills

HMR Feeds f_z (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS -M/MMP	Aluminium & Alloys <16% Si/16 HBN	Aluminium & Alloys >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3,0	0,008 0,012	0,008 0,012	0,008 0,012	0,008 0,012	0,007 0,011	-	-	-	0,008 0,012	0,008 0,012	0,008 0,011	-	-	0,008 0,012	0,005 0,009	0,005 0,009	0,008 0,013	0,005 0,008	0,005 0,008
4,0	0,010 0,017	0,010 0,017	0,010 0,017	0,010 0,016	0,009 0,015	-	-	-	0,010 0,017	0,010 0,016	0,010 0,015	-	-	0,010 0,017	0,006 0,012	0,006 0,012	0,010 0,017	0,006 0,011	0,006 0,011
5,0	0,013 0,023	0,013 0,023	0,013 0,023	0,013 0,021	0,011 0,020	-	-	-	0,013 0,023	0,013 0,021	0,013 0,020	-	-	0,013 0,023	0,008 0,017	0,008 0,016	0,013 0,023	0,008 0,015	0,008 0,015
6,0	0,015 0,029	0,015 0,029	0,015 0,029	0,015 0,026	0,013 0,024	-	-	-	0,015 0,029	0,015 0,026	0,015 0,024	-	-	0,015 0,029	0,010 0,021	0,010 0,020	0,015 0,028	0,009 0,019	0,009 0,018
8,0	0,020 0,042	0,020 0,042	0,020 0,042	0,020 0,037	0,017 0,033	-	-	-	0,020 0,042	0,020 0,037	0,020 0,033	-	-	0,020 0,042	0,014 0,030	0,014 0,028	0,020 0,041	0,012 0,026	0,012 0,025
10,0	0,025 0,057	0,025 0,057	0,025 0,057	0,025 0,048	0,021 0,042	-	-	-	0,025 0,057	0,025 0,048	0,025 0,042	-	-	0,025 0,057	0,018 0,041	0,018 0,037	0,025 0,054	0,015 0,034	0,015 0,032
12,0	0,030 0,072	0,030 0,072	0,030 0,072	0,030 0,060	0,025 0,051	-	-	-	0,030 0,072	0,030 0,060	0,030 0,051	-	-	0,030 0,072	0,022 0,051	0,022 0,047	0,030 0,068	0,018 0,043	0,018 0,039
16,0	0,040 0,104	0,040 0,104	0,040 0,104	0,040 0,085	0,032 0,070	-	-	-	0,040 0,104	0,040 0,085	0,040 0,070	-	-	0,040 0,104	0,030 0,075	0,030 0,067	0,040 0,098	0,024 0,061	0,024 0,055
20,0	0,050 0,140	0,050 0,140	0,050 0,140	0,050 0,111	0,040 0,090	-	-	-	0,050 0,140	0,050 0,111	0,050 0,090	-	-	0,050 0,140	0,038 0,100	0,038 0,089	0,050 0,130	0,030 0,079	0,030 0,071

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	0,01	5,00 x f_z
	0,03	2,90 x f_z
	0,05	2,25 x f_z
	0,08	1,85 x f_z

For a_e less than a_e max, use correction factors stated above.
 For a_e max, use feeds stated above.



Solid Carbide
Rapide End Mill

Recommended Speeds

Rapide High Performance / High Speed End Mills

Speed v_c (m/min)					
HMR Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Standard
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	100 - 450
		<950 N/mm ² <280 HBN	●	◎	90 - 400
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	●	◎	90 - 400
		950-1200 N/mm ² 280-355 HBN	●	◎	60 - 350
		1200-1400 N/mm ² 355-415 HBN	●	◎	55 - 200
M	Stainless Steel	Austenitic + Ferritic 300 series			
		Martensitic 400 series			
	PH Stainless	Refractory P.H.			
K	Cast Iron	Grey GG-Ft			120 - 280
		Spheroidal-Ductile GGG-FGS	●	◎	90 - 190
		Malleable GTS - MN/MP			80 - 160
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			60 - 140
		Cobalt Based	●	◎	20 - 75
		Nickel Based			25 - 80
		Titanium Based			40 - 120
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN		◎	80 - 175
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			70 - 160


Solid Carbide
 Rapide End Mill

Recommended Feeds
Rapide High Performance / High Speed End Mills

HMR Feeds f_z (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS -M/MMP	Aluminium & Alloys <16% Si/16 HBN	Aluminium & Silicon >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3,0	0,009 0,014	0,009 0,014	0,009 0,014	0,009 0,014	0,008 0,013	0,009 0,013	0,009 0,012	0,008 0,011	0,009 0,014	0,009 0,013	0,009 0,013	-	-	0,009 0,014	0,006 0,010	0,006 0,010	0,009 0,013	0,006 0,010	0,006 0,010
4,0	0,012 0,020	0,012 0,020	0,012 0,020	0,012 0,019	0,011 0,017	0,012 0,019	0,012 0,017	0,010 0,015	0,012 0,020	0,012 0,019	0,012 0,017	-	-	0,012 0,020	0,009 0,015	0,009 0,015	0,012 0,019	0,008 0,014	0,008 0,014
5,0	0,015 0,027	0,015 0,027	0,015 0,027	0,015 0,025	0,014 0,022	0,015 0,024	0,015 0,022	0,013 0,020	0,015 0,027	0,015 0,025	0,015 0,022	-	-	0,016 0,027	0,011 0,020	0,011 0,019	0,015 0,026	0,010 0,019	0,010 0,018
6,0	0,018 0,033	0,018 0,033	0,018 0,033	0,018 0,030	0,016 0,027	0,018 0,030	0,018 0,027	0,015 0,024	0,018 0,034	0,018 0,030	0,018 0,027	-	-	0,018 0,034	0,013 0,025	0,013 0,024	0,018 0,033	0,012 0,023	0,012 0,022
8,0	0,024 0,049	0,024 0,049	0,024 0,049	0,024 0,043	0,021 0,037	0,024 0,043	0,024 0,037	0,020 0,033	0,024 0,051	0,024 0,043	0,024 0,037	-	-	0,024 0,051	0,018 0,036	0,018 0,035	0,024 0,047	0,016 0,033	0,016 0,030
10,0	0,030 0,065	0,030 0,065	0,030 0,065	0,030 0,056	0,026 0,047	0,030 0,056	0,030 0,047	0,025 0,042	0,030 0,068	0,030 0,056	0,030 0,047	-	-	0,030 0,068	0,023 0,049	0,023 0,046	0,030 0,063	0,020 0,043	0,020 0,039
12,0	0,036 0,082	0,036 0,082	0,036 0,082	0,036 0,070	0,030 0,057	0,036 0,070	0,036 0,057	0,030 0,051	0,036 0,087	0,036 0,070	0,036 0,057	-	-	0,036 0,087	0,029 0,062	0,029 0,058	0,036 0,079	0,024 0,053	0,024 0,049
16,0	0,048 0,119	0,048 0,119	0,048 0,119	0,048 0,099	0,039 0,079	0,042 0,084	0,048 0,079	0,040 0,070	0,048 0,127	0,048 0,099	0,048 0,079	-	-	0,048 0,127	0,039 0,090	0,039 0,084	0,048 0,115	0,032 0,076	0,032 0,068
20,0	0,060 0,160	0,060 0,160	0,060 0,160	0,060 0,130	0,048 0,101	0,060 0,130	0,060 0,101	0,050 0,090	0,060 0,171	0,060 0,130	0,060 0,101	-	-	0,060 0,171	0,050 0,120	0,050 0,112	0,060 0,152	0,040 0,100	0,040 0,089

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	0,01	5,00 x f_z
	0,03	2,90 x f_z
	0,05	2,25 x f_z
	0,08	1,85 x f_z

For a_e less than a_e max, use correction factors stated above.
 For a_e max, use feeds stated above.

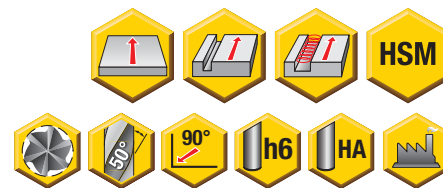


Solid Carbide
Rapide End Mill

Recommended Speeds

Rapide High Performance / High Speed End Mills

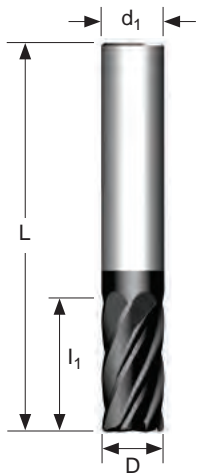
Speed v_c (m/min)					
HMR Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Standard
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	80 - 360
		<950 N/mm ² <280 HBN	●	◎	70 - 320
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	●	◎	70 - 320
		950-1200 N/mm ² 280-355 HBN	●	◎	50 - 280
		1200-1400 N/mm ² 355-415 HBN	●	◎	45 - 160
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	80 - 160
		Martensitic 400 series	●	◎	55 - 120
	PH Stainless	Refractory P.H.	●	◎	55 - 90
K	Cast Iron	Grey GG-Ft	●	◎	100 - 225
		Spheroidal-Ductile GGG-FGS	●	◎	70 - 155
		Malleable GTS - MN/MP	●	◎	65 - 130
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN	●	◎	
		Aluminium + Silicon > 16% Si 92 HBN	●	◎	
S	High Temperature Alloys	Iron Based	●	◎	50 - 110
		Cobalt Based	●	◎	15 - 60
		Nickel Based	●	◎	20 - 65
		Titanium Based	●	◎	30 - 100
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	●	◎	60 - 140
		Chilled Cast Iron >1400 N/mm ² > 400 HBN	●	◎	50 - 130



Materials Application

SP4060

P	M	K	N	S	H


6 - Flute End Mill
Solid Carbide
 Rapide End Mill

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	l ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034369	HMN 060NN6	6,00	50,00	13,00	6,00	13,00	6	-	-	8,58
034370	HMN 080NN6	8,00	63,00	20,00	8,00	20,00	6	-	-	11,44
034371	HMN 100NN6	10,00	72,00	22,00	10,00	22,00	6	-	-	14,30
034372	HMN 120NN6	12,00	75,00	25,00	12,00	25,00	6	-	-	17,16
034373	HMN 160NN6	16,00	92,00	32,00	16,00	32,00	6	-	-	22,88
034374	HMN 200NN6	20,00	100,00	38,00	20,00	38,00	6	-	-	28,60

Rapide High Performance / High Speed End Mills

HMN - Radial a_e and Axial a_p depth of cut range

Product	Dimensions	
	Shoulder Milling	
Grade	a _e %	a _p %
SP4035	0,01 - 0,05 D	0,05 - 2 D



* For a_p max do not exceed 0,05 D (a_e)
 For trochoidal application details refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
Rapide End Mill

Recommended Feeds

Rapide High Performance / High Speed End Mills

HMN Feeds f_z (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS -M/MMP	Aluminum & Alloys <16% Si/Ti/6 HBN	Aluminum & Silicon >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3,0	-	-	-	-	0,008 0,013	-	-	-	0,009 0,014	0,009 0,013	0,009 0,013	-	-	-	-	-	-	0,006 0,010	0,006 0,010
4,0	-	-	-	-	0,011 0,017	-	-	-	0,012 0,020	0,012 0,019	0,012 0,017	-	-	-	-	-	-	0,008 0,014	0,008 0,014
5,0	-	-	-	-	0,014 0,022	-	-	-	0,015 0,027	0,015 0,025	0,015 0,022	-	-	-	-	-	-	0,010 0,019	0,010 0,018
6,0	-	-	-	-	0,016 0,027	-	-	-	0,018 0,034	0,018 0,030	0,018 0,027	-	-	-	-	-	-	0,012 0,023	0,012 0,022
8,0	-	-	-	-	0,021 0,037	-	-	-	0,024 0,051	0,024 0,043	0,024 0,037	-	-	-	-	-	-	0,016 0,033	0,016 0,030
10,0	-	-	-	-	0,026 0,047	-	-	-	0,030 0,068	0,030 0,056	0,030 0,047	-	-	-	-	-	-	0,020 0,043	0,020 0,039
12,0	-	-	-	-	0,030 0,057	-	-	-	0,036 0,087	0,036 0,070	0,036 0,057	-	-	-	-	-	-	0,024 0,053	0,024 0,049
16,0	-	-	-	-	0,039 0,079	-	-	-	0,048 0,127	0,048 0,099	0,048 0,079	-	-	-	-	-	-	0,032 0,076	0,032 0,068
20,0	-	-	-	-	0,048 0,101	-	-	-	0,060 0,171	0,060 0,130	0,060 0,101	-	-	-	-	-	-	0,040 0,100	0,040 0,089

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	0,01 D	5,00 x f_z
	0,02 D	3,55 x f_z
	0,03 D	2,90 x f_z
	0,04 D	2,50 x f_z
	0,05 D	2,25 x f_z

For a_e less than a_e max, use correction factors stated above.
For a_e max, use feeds stated above.

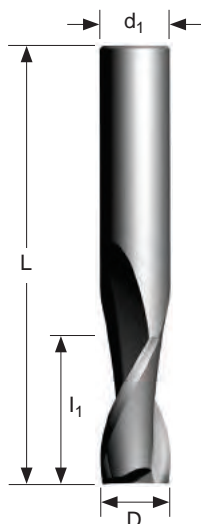

Recommended Speeds
Solid Carbide
Rapide End Mill
Rapide High Performance / High Speed End Mills

Speed v_c (m/min)					
HMN Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Standard
P	Unalloyed Steel	<600 N/mm ² <180 HBN			
		<950 N/mm ² <280 HBN			
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			
		950-1200 N/mm ² 280-355 HBN	●	◎	
	1200-1400 N/mm ² 355-415 HBN			55 - 200	
M	Stainless Steel	Austenitic + Ferritic 300 series			
		Martensitic 400 series			
	PH Stainless	Refractory P.H.			
K	Cast Iron	Grey GG-Ft			120 - 280
		Spheroidal-Ductile GGG-FGS	●	◎	90 - 190
		Malleable GTS - MN/MP			80 - 160
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			
		Cobalt Based			
		Nickel Based			
		Titanium Based			
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN		◎	80 - 175
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			70 - 160



Materials Application

SP4060					
P	M	K	N	S	H
			◆		



2 - Flute End Mill

Solid Carbide
Rapide End Mill

Metric Product		Dimensions (mm)									
EDP	Item Description	D	L	l ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min	
034322	EA 020NTN2	2,00	38,00	6,00	3,00	6,00	2	2,86	3,90	2,86	
034323	EA 025NTN2	2,50	38,00	8,00	3,00	8,00	2	3,58	4,88	3,58	
034324	EA 030NN2	3,00	38,00	12,00	3,00	12,00	2	4,29	5,85	4,29	
034325	EA 040NN2	4,00	50,00	14,00	4,00	14,00	2	5,72	7,80	5,72	
034326	EA 050NN2	5,00	50,00	20,00	5,00	20,00	2	7,15	9,75	7,15	
034327	EA 060NN2	6,00	63,00	20,00	6,00	20,00	2	8,58	11,70	8,58	
034328	EA 080NN2	8,00	63,00	20,00	8,00	20,00	2	11,44	15,60	11,44	
034329	EA 100NN2	10,00	70,00	25,00	10,00	25,00	2	14,30	19,50	14,30	
034330	EA 120NN2	12,00	75,00	25,00	12,00	25,00	2	17,16	23,40	17,16	
034331	EA 160NN2	16,00	88,00	30,00	16,00	30,00	2	22,88	31,20	22,88	
034332	EA 200NN2	20,00	100,0	38,00	20,00	38,00	2	28,60	39,00	28,60	

EA - Radial a_e and Axial a_p depth of cut range

Product	Dimensions (mm)						
	Shoulder Milling						Slotting a _p %
	Roughing			Finishing			
	a _e %	a _p %	f _z	a _e %	a _p %	f _z	
SU0800	0,1 - 0,2 D	0,1 - 1,5 D	Mid - High	0,05 - 0,1 D	0,1 - 1,5 D	Low - Mid	0,05 - 0,5 D

* For a_p max do not exceed 0,05 D (a_e)

Note: For ramping angle, helical a_p max. and trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.




Slotting - Square Ended


Solid Carbide
Rapide End Mill
Recommended Feeds

Rapide High Performance / High Speed End Mills

EA Feeds f_z (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS-MIMP	Aluminium & Alloys <16% Si 11.6 HBN	Aluminium & Silicon >16% Si 9.2 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3,0	-	-	-	-	-	-	-	-	-	-	-	0,017 0,031	0,017 0,027	-	-	-	-	-	-
4,0	-	-	-	-	-	-	-	-	-	-	-	0,022 0,043	0,022 0,037	-	-	-	-	-	-
5,0	-	-	-	-	-	-	-	-	-	-	-	0,027 0,057	0,027 0,049	-	-	-	-	-	-
6,0	-	-	-	-	-	-	-	-	-	-	-	0,032 0,071	0,032 0,061	-	-	-	-	-	-
8,0	-	-	-	-	-	-	-	-	-	-	-	0,042 0,102	0,042 0,087	-	-	-	-	-	-
10,0	-	-	-	-	-	-	-	-	-	-	-	0,051 0,135	0,051 0,114	-	-	-	-	-	-
12,0	-	-	-	-	-	-	-	-	-	-	-	0,060 0,169	0,060 0,142	-	-	-	-	-	-
16,0	-	-	-	-	-	-	-	-	-	-	-	0,078 0,242	0,078 0,202	-	-	-	-	-	-
20,0	-	-	-	-	-	-	-	-	-	-	-	0,095 0,320	0,095 0,266	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling 	Feed Correction Parameters	
	a_e	Correction Factor
	0,05 D	2,30 x f_z
	0,10 D	1,65 x f_z
	0,15 D	1,40 x f_z

For a_e less than a_e max, use correction factors stated above.
 For a_e max, use feeds stated above.



Solid Carbide
Rapide End Mill

Recommended Speeds

Rapide High Performance / High Speed End Mills

Speed v_c (m/min)					
EA Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			Uncoated Micrograin
					SU0800
P	Unalloyed Steel	<600 N/mm ² <180 HBN			
		<950 N/mm ² <280 HBN			
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			
		950-1200 N/mm ² 280-355 HBN			
		1200-1400 N/mm ² 355-415 HBN			
M	Stainless Steel	Austenitic + Ferritic 300 series			
		Martensitic 400 series			
	PH Stainless	Refractory P.H.			
K	Cast Iron	Grey GG-Ft			
		Spheroidal-Ductile GGG-FGS			
		Malleable GTS - MN/MP			
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN	●	◎	300 - 1400
		Aluminium + Silicon > 16% Si 92 HBN			90 - 250
S	High Temperature Alloys	Iron Based			
		Cobalt Based			
		Nickel Based			
		Titanium Based			
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			

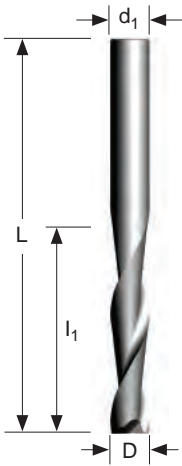


Materials Application

SP4060

P	M	K	N	S	H
			◆		

Uncoated



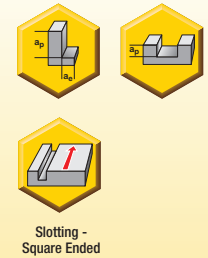
2 - Flute End Mill

Solid Carbide
Rapide End Mill

Metric Product		Dimensions (mm)									
EDP	Item Description	D	L	l ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min	
034381	HPA 030NN2	3,00	50,00	12,00	3,00	12,00	2	4,29	5,85	4,29	
034382	HPA 040NN2	4,00	50,00	14,00	4,00	14,00	2	5,72	7,80	5,72	
034383	HPA 050NN2	5,00	50,00	20,00	5,00	20,00	2	7,15	9,75	7,15	
034384	HPA 060NN2	6,00	63,00	20,00	6,00	20,00	2	8,58	11,70	8,58	
034385	HPA 080NN2	8,00	63,00	20,00	8,00	20,00	2	11,44	15,60	11,44	
034386	HPA 100NN2	10,00	70,00	25,00	10,00	25,00	2	14,30	19,50	14,30	
034387	HPA 120NN2	12,00	75,00	25,00	12,00	25,00	2	17,16	23,40	17,16	
034388	HPA 160NN2	16,00	88,00	32,00	16,00	32,00	2	22,88	31,20	22,88	
034389	HPA 200NN2	20,00	100,00	38,00	20,00	38,00	2	28,60	39,00	28,60	

Rapide High Performance / High Speed End Mills

HPA - Radial a _e and Axial a _p depth of cut range							
Product	Dimensions (mm)						
Grade	Shoulder Milling						Slotting a _p %
	Roughing			Finishing			
	a _e %	a _p %	f _z	a _e %	a _p %	f _z	
SU0800	0,2 - 0,5 D	0,1 - 2 D	Mid - High	0,05 - 0,2 D	0,1 - 2 D	Low - Mid	0,1 - 1 D



* For a_p max do not exceed 0,05 D (a_e)

Note: For ramping angle, helical a_p max. and trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
Rapide End Mill

Recommended Feeds

Rapide High Performance / High Speed End Mills

HPA Feeds f_z (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS - MNMP	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3,0	-	-	-	-	-	-	-	-	-	-	-	0,017 0,031	0,017 0,027	-	-	-	-	-	-
4,0	-	-	-	-	-	-	-	-	-	-	-	0,022 0,043	0,022 0,037	-	-	-	-	-	-
5,0	-	-	-	-	-	-	-	-	-	-	-	0,027 0,057	0,027 0,049	-	-	-	-	-	-
6,0	-	-	-	-	-	-	-	-	-	-	-	0,032 0,071	0,032 0,061	-	-	-	-	-	-
8,0	-	-	-	-	-	-	-	-	-	-	-	0,042 0,102	0,042 0,087	-	-	-	-	-	-
10,0	-	-	-	-	-	-	-	-	-	-	-	0,051 0,135	0,051 0,114	-	-	-	-	-	-
12,0	-	-	-	-	-	-	-	-	-	-	-	0,060 0,169	0,060 0,142	-	-	-	-	-	-
16,0	-	-	-	-	-	-	-	-	-	-	-	0,078 0,242	0,078 0,202	-	-	-	-	-	-
20,0	-	-	-	-	-	-	-	-	-	-	-	0,095 0,320	0,095 0,266	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	0,05 D	2,30 x f_z
	0,10 D	1,65 x f_z
	0,15 D	1,40 x f_z
	0,20 D	1,25 x f_z
	0,30 D	1,09 x f_z

For a_e less than a_e max, use correction factors stated above.
For a_e max, use feeds stated above.

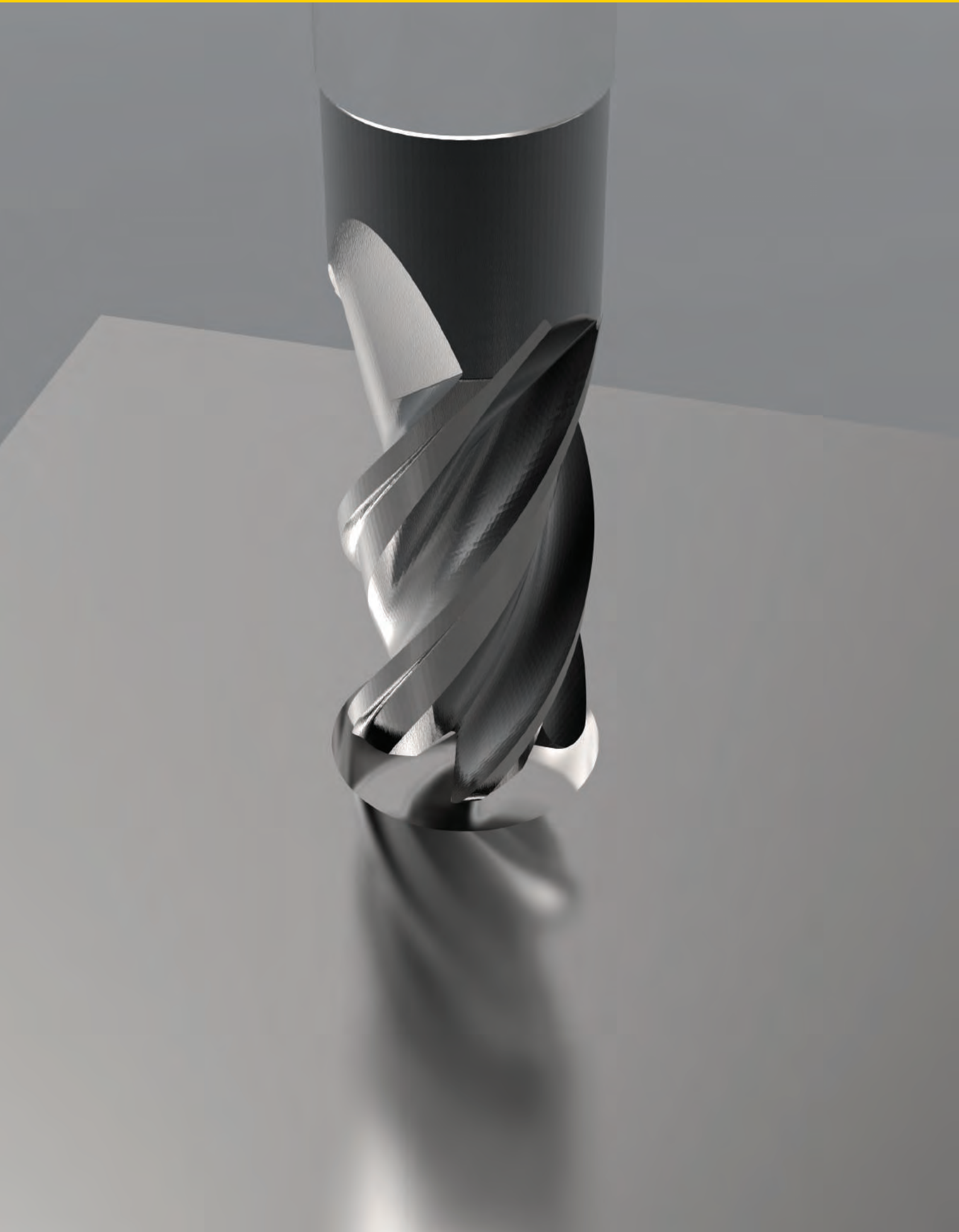


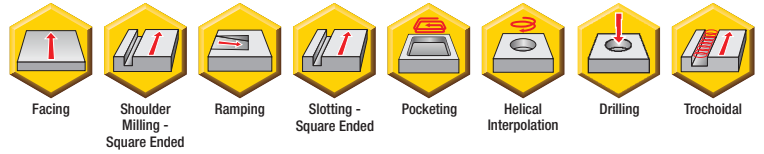
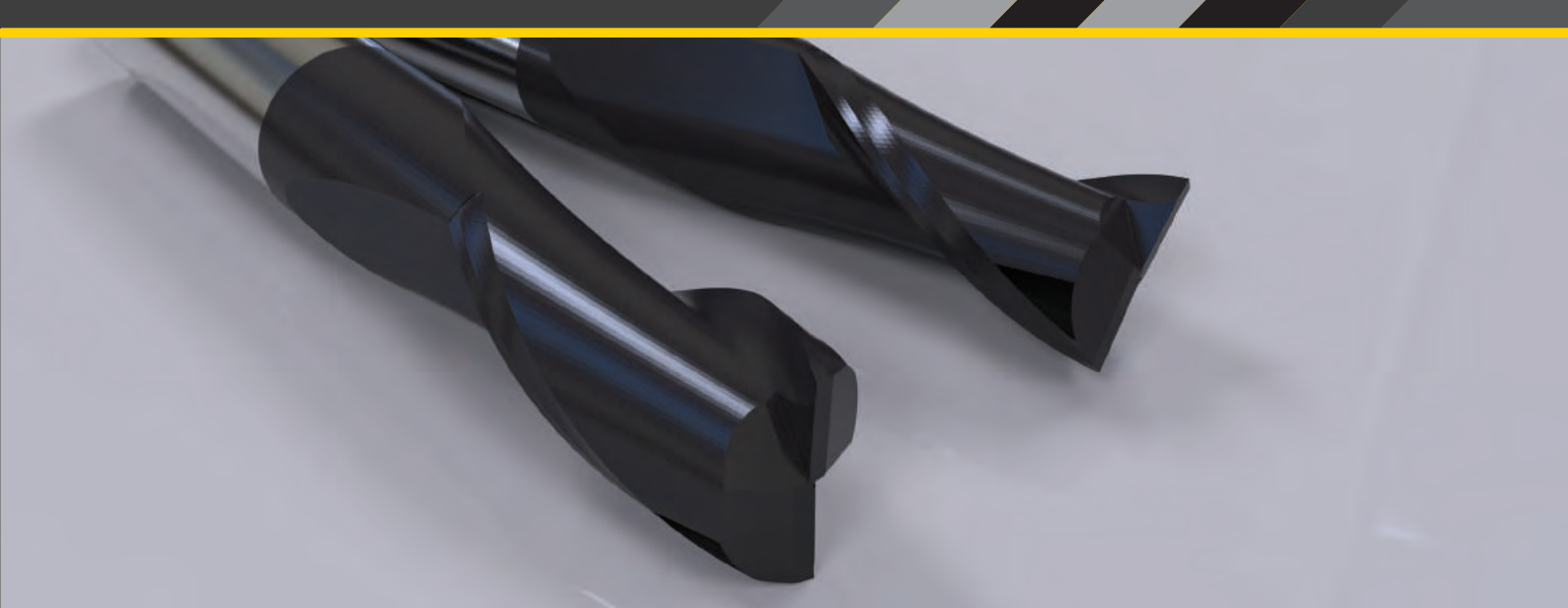
Recommended Speeds

Solid Carbide
Rapid End Mill

Rapide High Performance / High Speed End Mills

Speed v_c (m/min)					
HPA Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			Uncoated Micrograin
					SU0800
P	Unalloyed Steel	<600 N/mm ² <180 HBN			
		<950 N/mm ² <280 HBN			
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			
		950-1200 N/mm ² 280-355 HBN			
		1200-1400 N/mm ² 355-415 HBN			
M	Stainless Steel	Austenitic + Ferritic 300 series			
		Martensitic 400 series			
	PH Stainless	Refractory P.H.			
K	Cast Iron	Grey GG-Ft			
		Spheroidal-Ductile GGG-FGS			
		Malleable GTS - MN/MP			
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN	●	◎	300 - 1400
		Aluminium + Silicon > 16% Si 92 HBN			90 - 400
S	High Temperature Alloys	Iron Based			
		Cobalt Based			
		Nickel Based			
		Titanium Based			
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			





GENERAL PURPOSE MILLING

Designed to complement the Stellram Premium End mills, the general purpose End Mills offer solutions for a wide range of applications and materials.

Available in:

- a comprehensive range of diameters (including miniatures)
- 2, 3 and 4 flute geometries
- Square End, Square End with Radius, and Ball Nosed styles
- Standard and Extended length
- Uncoated and Coated Premium Carbide grades

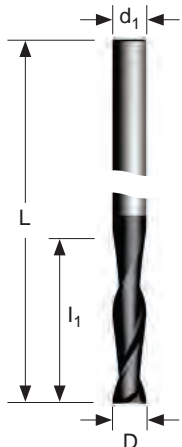
General Purpose Milling
B48 - B86

General Purpose, Miniature
B72 - B86



Materials Application

SP4060					
P	M	K	N	S	H
◆	◆	◆		◆	



2 - Flute End Mill

Solid Carbide
General Purpose - Eng Milling

Metric Product		Dimensions (mm)									
EDP	Item Description	D	L	I ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min	
034169	E 030NN2	3,00	38,00	12,00	3,00	12,00	2	4,29	5,85	4,29	
034170	E 040NN2	4,00	50,00	14,00	4,00	14,00	2	5,72	7,80	5,72	
034171	E 050NN2	5,00	50,00	16,00	5,00	16,00	2	7,15	9,75	7,15	
034172	E 060NN2	6,00	63,00	19,00	6,00	19,00	2	8,58	11,70	8,58	
034173	E 080NN2	8,00	63,00	19,00	8,00	19,00	2	11,44	15,60	11,44	
034174	E 100NN2	10,00	70,00	22,00	10,00	22,00	2	14,30	19,50	14,30	
034175	E 120NN2	12,00	75,00	25,00	12,00	25,00	2	17,16	23,40	17,16	
034176	E 160NN2	16,00	88,00	32,00	16,00	32,00	2	22,88	31,20	22,88	
034177	E 200NN2	20,00	100,00	38,00	20,00	38,00	2	28,60	39,00	28,60	

E_NN2 - Radial a_e and Axial a_p depth of cut range

Product	Dimensions (mm)						
	Shoulder Milling						Slotting
Grade	Roughing			Finishing			a _p %
	a _e %	a _p %	f _z	a _e %	a _p %	f _z	
SP4556	0,1 - 0,2 D	0,5 - 1,5 D	Mid - High	0,05 - 0,1D	0,5 - 1,5 D	Low - Mid	0,1 - 0,5 D



Slotting - Square Ended

* When using a_p max, a_e should not exceed 0,1 D

Note: For ramping angle, helical a_p max. and trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
General Purpose - End Milling

Recommended Feeds



General Purpose End Mills

E_NN2 Feeds f_z (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS-MN/MP	Aluminium & Alloys <16% Si Ti6 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3,0	0,009 0,014	0,009 0,014	0,009 0,014	0,009 0,013	0,009 0,012	0,009 0,013	0,009 0,013	0,007 0,011	0,009 0,014	0,009 0,013	0,009 0,012	-	-	0,009 0,014	0,007 0,011	0,007 0,010	0,009 0,014	-	-
4,0	0,012 0,020	0,012 0,020	0,012 0,020	0,012 0,019	0,011 0,017	0,012 0,019	0,012 0,017	0,010 0,015	0,012 0,020	0,012 0,019	0,012 0,017	-	-	0,012 0,020	0,009 0,015	0,009 0,014	0,012 0,019	-	-
5,0	0,015 0,027	0,015 0,027	0,015 0,027	0,015 0,025	0,013 0,022	0,015 0,024	0,015 0,022	0,013 0,019	0,015 0,027	0,015 0,025	0,015 0,022	-	-	0,015 0,027	0,011 0,020	0,011 0,019	0,015 0,026	-	-
6,0	0,018 0,033	0,018 0,033	0,018 0,033	0,018 0,030	0,016 0,027	0,018 0,030	0,018 0,027	0,015 0,024	0,018 0,034	0,018 0,030	0,018 0,027	-	-	0,018 0,034	0,013 0,025	0,013 0,024	0,018 0,033	-	-
8,0	0,024 0,049	0,024 0,049	0,024 0,049	0,024 0,043	0,021 0,037	0,024 0,043	0,024 0,037	0,020 0,033	0,024 0,051	0,024 0,043	0,024 0,037	-	-	0,024 0,051	0,018 0,036	0,018 0,035	0,024 0,047	-	-
10,0	0,030 0,065	0,030 0,065	0,030 0,065	0,030 0,056	0,026 0,047	0,030 0,056	0,030 0,047	0,025 0,042	0,030 0,068	0,030 0,056	0,030 0,047	-	-	0,030 0,068	0,023 0,049	0,023 0,046	0,030 0,063	-	-
12,0	0,036 0,082	0,036 0,082	0,036 0,082	0,036 0,070	0,030 0,057	0,036 0,070	0,036 0,057	0,030 0,051	0,036 0,087	0,036 0,070	0,036 0,057	-	-	0,036 0,087	0,029 0,062	0,029 0,058	0,036 0,079	-	-
16,0	0,048 0,119	0,048 0,119	0,048 0,119	0,048 0,099	0,039 0,079	0,048 0,099	0,048 0,079	0,040 0,070	0,048 0,127	0,048 0,099	0,048 0,079	-	-	0,048 0,127	0,039 0,090	0,039 0,084	0,048 0,115	-	-
20,0	0,060 0,160	0,060 0,160	0,060 0,160	0,060 0,130	0,048 0,101	0,060 0,130	0,060 0,101	0,050 0,090	0,060 0,171	0,060 0,130	0,060 0,101	-	-	0,060 0,171	0,050 0,120	0,050 0,112	0,060 0,152	-	-

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	0,05 D	2,30 x f_z
	0,10 D	1,65 x f_z
	0,15 D	1,40 x f_z
	0,20 D	1,25 x f_z

For a_e less than a_e max, use correction factors stated above.
For a_e max, use feeds stated above.



Solid Carbide
General Purpose - Eng Milling

Recommended Speeds

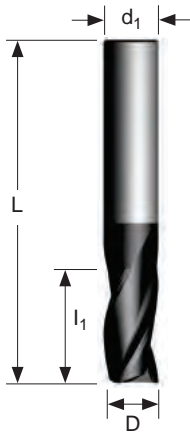
General Purpose End Mills

Speed v_c (m/min)					
E_NN2 Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Micrograin
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	125 - 180
		<950 N/mm ² <280 HBN			100 - 170
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			100 - 170
		950-1200 N/mm ² 280-355 HBN	●	◎	90 - 140
		1200-1400 N/mm ² 355-415 HBN			80 - 120
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	85 - 120
		Martensitic 400 series			65 - 90
	PH Stainless	Refractory P.H.	●		50 - 80
K	Cast Iron	Grey GG-Ft			90 - 150
		Spheroidal-Ductile GGG-FGS	●	◎	60 - 120
		Malleable GTS - MN/MP			50 - 100
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			40 - 90
		Cobalt Based	●	◎	20 - 40
		Nickel Based			25 - 45
		Titanium Based			30 - 60
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			



Materials Application

SP4060					
P	M	K	N	S	H



3 - Flute End Mill

Solid Carbide
General Purpose - End Milling

Metric Product		Dimensions (mm)									
EDP	Item Description	D	L	I ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min	
034195	E 030NN3	3,00	38,00	12,00	3,00	12,00	3	4,29	5,85	4,29	
034196	E 040NN3	4,00	50,00	14,00	4,00	14,00	3	5,72	7,80	5,72	
034197	E 050NN3	5,00	50,00	16,00	5,00	16,00	3	7,15	9,75	7,15	
034198	E 060NN3	6,00	63,00	19,00	6,00	19,00	3	8,58	11,70	8,58	
034199	E 080NN3	8,00	63,00	19,00	8,00	19,00	3	11,44	15,60	11,44	
034200	E 100NN3	10,00	70,00	22,00	10,00	22,00	3	14,30	19,50	14,30	
034201	E 120NN3	12,00	75,00	25,00	12,00	25,00	3	17,16	23,40	17,16	
034202	E 160NN3	16,00	88,00	32,00	16,00	32,00	3	22,88	31,20	22,88	
034203	E 200NN3	20,00	100,00	38,00	20,00	38,00	3	28,60	39,00	28,60	

General Purpose End Mills

E_NN3 - Radial a _e and Axial a _p depth of cut range							
Product	Dimensions						
Grade	Shoulder Milling						Slotting
	Roughing			Finishing			
	a _e %	a _p %	f _z	a _e %	a _p %	f _z	
SP4556	0,1 - 0,5 D	0,5 - 2 D	Mid - High	0,05 - 0,1 D	0,5 - 2 D	Low - Mid	0,1 - 0,5 D



* When using a_p max, a_e should not exceed 0.1D

Note: For ramping angle, helical a_p max. and trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
General Purpose - Eng Milling

Recommended Feeds

General Purpose End Mills

E_NN3 Feeds f_z (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS -M/MMP	Aluminum & Alloys <16% Si/16 HBN	Aluminum & Silicon >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3,0	0,009 0,014	0,009 0,014	0,009 0,014	0,009 0,013	0,009 0,012	0,009 0,013	0,009 0,013	0,007 0,011	0,009 0,014	0,009 0,013	0,009 0,012	-	-	0,009 0,014	0,007 0,011	0,007 0,010	0,009 0,014	-	-
4,0	0,012 0,020	0,012 0,020	0,012 0,020	0,012 0,019	0,011 0,017	0,012 0,019	0,012 0,017	0,010 0,015	0,012 0,020	0,012 0,019	0,012 0,017	-	-	0,012 0,020	0,009 0,015	0,009 0,014	0,012 0,019	-	-
5,0	0,015 0,027	0,015 0,027	0,015 0,027	0,015 0,025	0,013 0,022	0,015 0,024	0,015 0,022	0,013 0,019	0,015 0,027	0,015 0,025	0,015 0,022	-	-	0,015 0,027	0,011 0,020	0,011 0,019	0,015 0,026	-	-
6,0	0,018 0,033	0,018 0,033	0,018 0,033	0,018 0,030	0,016 0,027	0,018 0,030	0,018 0,027	0,015 0,024	0,018 0,034	0,018 0,030	0,018 0,027	-	-	0,018 0,034	0,013 0,025	0,013 0,024	0,018 0,033	-	-
8,0	0,024 0,049	0,024 0,049	0,024 0,049	0,024 0,043	0,021 0,037	0,024 0,043	0,024 0,037	0,020 0,033	0,024 0,051	0,024 0,043	0,024 0,037	-	-	0,024 0,051	0,018 0,036	0,018 0,035	0,024 0,047	-	-
10,0	0,030 0,065	0,030 0,065	0,030 0,065	0,030 0,056	0,026 0,047	0,030 0,056	0,030 0,047	0,025 0,042	0,030 0,068	0,030 0,056	0,030 0,047	-	-	0,030 0,068	0,023 0,049	0,023 0,046	0,030 0,063	-	-
12,0	0,036 0,082	0,036 0,082	0,036 0,082	0,036 0,070	0,030 0,057	0,036 0,070	0,036 0,057	0,030 0,051	0,036 0,087	0,036 0,070	0,036 0,057	-	-	0,036 0,087	0,029 0,062	0,029 0,058	0,036 0,079	-	-
16,0	0,048 0,119	0,048 0,119	0,048 0,119	0,048 0,099	0,039 0,079	0,048 0,099	0,048 0,079	0,040 0,070	0,048 0,127	0,048 0,099	0,048 0,079	-	-	0,048 0,127	0,039 0,090	0,039 0,084	0,048 0,115	-	-
20,0	0,060 0,160	0,060 0,160	0,060 0,160	0,060 0,130	0,048 0,101	0,060 0,130	0,060 0,101	0,050 0,090	0,060 0,171	0,060 0,130	0,060 0,101	-	-	0,060 0,171	0,050 0,120	0,050 0,112	0,060 0,152	-	-

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	0,05 D	2,30 x f_z
	0,10 D	1,65 x f_z
	0,15 D	1,40 x f_z
	0,20 D	1,25 x f_z
	0,30 D	1,09 x f_z

For a_e less than a_e max, use correction factors stated above.
For a_e max, use feeds stated above.



Recommended Speeds

Solid Carbide
General Purpose - End Milling



General Purpose End Mills

Speed v_c (m/min)					
E_NN3 Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Micrograin
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	125 - 180
		<950 N/mm ² <280 HBN			100 - 170
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			100 - 170
		950-1200 N/mm ² 280-355 HBN	●	◎	90 - 140
		1200-1400 N/mm ² 355-415 HBN			80 - 120
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	85 - 120
		Martensitic 400 series			65 - 90
	PH Stainless	Refractory P.H.	●		50 - 80
K	Cast Iron	Grey GG-Ft			90 - 150
		Spheroidal-Ductile GGG-FGS	●	◎	60 - 120
		Malleable GTS - MN/MP			50 - 100
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			40 - 90
		Cobalt Based	●	◎	20 - 40
		Nickel Based			25 - 45
		Titanium Based			30 - 60
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			



Materials Application

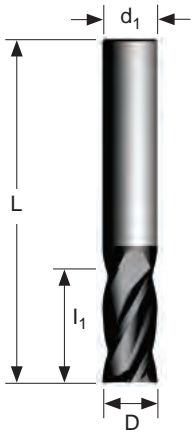
SP4060					
P	M	K	N	S	H
◆	◆	◆	◆	◆	◆



Solid Carbide
General Purpose - Eng Milling

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	l ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034219	E 030NN4	3,00	38,00	12,00	3,00	12,00	4	-	-	4,29
034220	E 040NN4	4,00	50,00	14,00	4,00	14,00	4	-	-	5,72
034221	E 050NN4	5,00	50,00	16,00	5,00	16,00	4	-	-	7,15
034222	E 060NN4	6,00	63,00	19,00	6,00	19,00	4	-	-	8,58
034223	E 080NN4	8,00	63,00	19,00	8,00	19,00	4	-	-	11,44
034224	E 100NN4	10,00	70,00	22,00	10,00	22,00	4	-	-	14,30
034225	E 120NN4	12,00	75,00	25,00	12,00	25,00	4	-	-	17,16
034226	E 160NN4	16,00	88,00	32,00	16,00	32,00	4	-	-	22,88
034227	E 200NN4	20,00	100,00	38,00	20,00	38,00	4	-	-	28,60

General Purpose End Mills



4 - Flute End Mill

E_NN4 - Radial a _e and Axial a _p depth of cut range						
Product	Dimensions (mm)					
	Shoulder Milling			Finishing		
Grade	Roughing			Finishing		
	a _e %	a _p %	f _z	a _e %	a _p %	f _z
SP4556	0,1 - 0,5 D	0,5 - 2 D	Mid - High	0,05 - 0,1 D	0,5 - 2 D	Low - Mid



* When using a_p max, a_e should not exceed 0,1 D

Note: For trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
General Purpose - End Milling

Recommended Feeds

E_NN4 Feeds fz (mm/tooth) - Shoulder Milling (ae max)																			
D	Unalloyed Steel <600 N/mm² <180 HBN	Unalloyed Steel 700-950N/mm² 200-280 HBN	Alloyed Steel <600 N/mm² <180 HBN	Alloyed Steel 950-1200N/mm² 280-355 HBN	Alloyed Steel 1200-1400N/mm² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal-Ductile GGG-FGS	Cast Irons Malleable GTS-MNMP	Aluminum & Alloys <16% Si 11-6 HBN	Aluminum & Silicon >16% Si 9-2 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm² >415 HBN	Chilled Cast Iron >1400 N/mm² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3,0	0,009 0,014	0,009 0,014	0,009 0,014	0,009 0,013	0,009 0,012	0,009 0,013	0,009 0,013	0,007 0,011	0,009 0,014	0,009 0,013	0,009 0,012	-	-	0,009 0,014	0,007 0,011	0,007 0,010	0,009 0,014	-	-
4,0	0,012 0,020	0,012 0,020	0,012 0,020	0,012 0,019	0,011 0,017	0,012 0,019	0,012 0,017	0,010 0,015	0,012 0,020	0,012 0,019	0,012 0,017	-	-	0,012 0,020	0,009 0,015	0,009 0,014	0,012 0,019	-	-
5,0	0,015 0,027	0,015 0,027	0,015 0,027	0,015 0,025	0,013 0,022	0,015 0,024	0,015 0,022	0,013 0,019	0,015 0,027	0,015 0,025	0,015 0,022	-	-	0,015 0,027	0,011 0,020	0,011 0,019	0,015 0,026	-	-
6,0	0,018 0,033	0,018 0,033	0,018 0,033	0,018 0,030	0,016 0,027	0,018 0,030	0,018 0,027	0,015 0,024	0,018 0,034	0,018 0,030	0,018 0,027	-	-	0,018 0,034	0,013 0,025	0,013 0,024	0,018 0,033	-	-
8,0	0,024 0,049	0,024 0,049	0,024 0,049	0,024 0,043	0,021 0,037	0,024 0,043	0,024 0,037	0,020 0,033	0,024 0,051	0,024 0,043	0,024 0,037	-	-	0,024 0,051	0,018 0,036	0,018 0,035	0,024 0,047	-	-
10,0	0,030 0,065	0,030 0,065	0,030 0,065	0,030 0,056	0,026 0,047	0,030 0,056	0,030 0,047	0,025 0,042	0,030 0,068	0,030 0,056	0,030 0,047	-	-	0,030 0,068	0,023 0,049	0,023 0,046	0,030 0,063	-	-
12,0	0,036 0,082	0,036 0,082	0,036 0,082	0,036 0,070	0,030 0,057	0,036 0,070	0,036 0,057	0,030 0,051	0,036 0,087	0,036 0,070	0,036 0,057	-	-	0,036 0,087	0,029 0,062	0,029 0,058	0,036 0,079	-	-
16,0	0,048 0,119	0,048 0,119	0,048 0,119	0,048 0,099	0,039 0,079	0,048 0,099	0,048 0,079	0,040 0,070	0,048 0,127	0,048 0,099	0,048 0,079	-	-	0,048 0,127	0,039 0,090	0,039 0,084	0,048 0,115	-	-
20,0	0,060 0,160	0,060 0,160	0,060 0,160	0,060 0,130	0,048 0,101	0,060 0,130	0,060 0,101	0,050 0,090	0,060 0,171	0,060 0,130	0,060 0,101	-	-	0,060 0,171	0,050 0,120	0,050 0,112	0,060 0,152	-	-

Note: HTA = High Temperature Alloys

General Purpose End Mills

Shoulder Milling / Profiling	Feed Correction Parameters	
	ae	Correction Factor
	0,05 D	2,30 x fz
	0,10 D	1,65 x fz
	0,15 D	1,40 x fz
	0,20 D	1,25 x fz
	0,30 D	1,09 x fz

For ae less than ae max, use correction factors stated above.
For ae max, use feeds stated above.



Solid Carbide
General Purpose - Eng Milling

Recommended Speeds

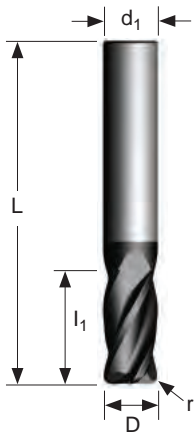
General Purpose End Mills

Speed v_c (m/min)					
E_NN4 Series					
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Micrograin
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	125 - 180
		<950 N/mm ² <280 HBN			100 - 170
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			100 - 170
		950-1200 N/mm ² 280-355 HBN	●	◎	90 - 140
		1200-1400 N/mm ² 355-415 HBN			80 - 120
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	85 - 120
		Martensitic 400 series			65 - 90
	PH Stainless	Refractory P.H.	●		50 - 80
K	Cast Iron	Grey GG-Ft			90 - 150
		Spheroidal-Ductile GGG-FGS	●	◎	60 - 120
		Malleable GTS - MN/MP			50 - 100
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			40 - 90
		Cobalt Based			20 - 40
		Nickel Based	●	◎	25 - 45
		Titanium Based			30 - 60
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			



Materials Application

SP4060					
P	M	K	N	S	H
◆	◆	◆	◆	◆	◆


4 - Flute End Mill
Solid Carbide
 General Purpose - End Milling

Metric Product		Dimensions (mm)									
EDP	Item Description	D	L	I ₁	d ₁	r	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034228	ER 030NN4-E	3,00	38,00	12,00	3,00	0,50	12,00	4	-	-	4,29
034229	ER 040NN4-E	4,00	50,00	14,00	4,00	0,50	14,00	4	-	-	5,72
034230	ER 050NN4-E	5,00	50,00	16,00	5,00	0,50	16,00	4	-	-	7,15
034231	ER 060NN4-E	6,00	63,00	19,00	6,00	0,50	19,00	4	-	-	8,58
034232	ER 060NN4-G	6,00	63,00	19,00	6,00	1,00	19,00	4	-	-	8,58
034233	ER 080NN4-E	8,00	63,00	19,00	8,00	0,50	19,00	4	-	-	11,44
034234	ER 080NN4-G	8,00	63,00	19,00	8,00	1,00	19,00	4	-	-	11,44
034235	ER 100NN4-E	10,00	70,00	22,00	10,00	0,50	22,00	4	-	-	14,30
034236	ER 100NN4-G	10,00	70,00	22,00	10,00	1,00	22,00	4	-	-	14,30
034237	ER 100NN4-J	10,00	70,00	22,00	10,00	1,50	22,00	4	-	-	14,30
034238	ER 120NN4-E	12,00	75,00	25,00	12,00	0,50	25,00	4	-	-	17,16
034239	ER 120NN4-G	12,00	75,00	25,00	12,00	1,00	25,00	4	-	-	17,16
034240	ER 120NN4-J	12,00	75,00	25,00	12,00	1,50	25,00	4	-	-	17,16
034241	ER 120NN4-K	12,00	75,00	25,00	12,00	2,00	25,00	4	-	-	17,16
034242	ER 160NN4-G	16,00	92,00	32,00	16,00	1,00	32,00	4	-	-	22,88
034243	ER 160NN4-J	16,00	92,00	32,00	16,00	1,50	32,00	4	-	-	22,88
034244	ER 160NN4-K	16,00	92,00	32,00	16,00	2,00	32,00	4	-	-	22,88

General Purpose End Mills

E_NN4-(r) Radial a _e and Axial a _p depth of cut range						
Product	Dimensions					
	Shoulder Milling					
	Roughing			Finishing		
Grade	a _e %	a _p %	f _z	a _e %	a _p %	f _z
SP4556	0,1 - 0,5 D	0,5 - 2 D	Mid - High	0,5 - 0,1 D	0,5 - 2 D	Low - Mid



* When using a_p max, a_e should not exceed 0,1D

Note: For trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
General Purpose - Eng Milling

Recommended Feeds

General Purpose End Mills

ER_NN4-(r) Feeds f_z (mm/tooth) - Shoulder Milling (a_e max)

D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS-MIMP	Aluminum & Alloys <16% Si/11.6 HBN	Aluminum & Silicon >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3,0	0,009 0,014	0,009 0,014	0,009 0,014	0,009 0,013	0,009 0,012	0,009 0,013	0,009 0,013	0,007 0,011	0,009 0,014	0,009 0,013	0,009 0,012	-	-	0,009 0,014	0,007 0,011	0,007 0,010	0,007 0,014	-	-
4,0	0,012 0,020	0,012 0,020	0,012 0,020	0,012 0,019	0,011 0,017	0,012 0,019	0,012 0,017	0,010 0,015	0,012 0,020	0,012 0,019	0,012 0,017	-	-	0,012 0,020	0,009 0,015	0,009 0,014	0,012 0,019	-	-
5,0	0,015 0,027	0,015 0,027	0,015 0,027	0,015 0,025	0,013 0,022	0,015 0,024	0,015 0,022	0,013 0,019	0,015 0,027	0,015 0,025	0,015 0,022	-	-	0,015 0,027	0,011 0,020	0,011 0,019	0,015 0,026	-	-
6,0	0,018 0,033	0,018 0,033	0,018 0,033	0,018 0,030	0,016 0,027	0,018 0,030	0,018 0,027	0,015 0,024	0,018 0,034	0,018 0,030	0,018 0,027	-	-	0,018 0,034	0,013 0,025	0,013 0,024	0,018 0,033	-	-
8,0	0,024 0,049	0,024 0,049	0,024 0,049	0,024 0,043	0,021 0,037	0,024 0,043	0,024 0,037	0,020 0,033	0,024 0,051	0,024 0,043	0,024 0,037	-	-	0,024 0,051	0,018 0,036	0,018 0,035	0,024 0,047	-	-
10,0	0,030 0,065	0,030 0,065	0,030 0,065	0,030 0,056	0,026 0,047	0,030 0,056	0,030 0,047	0,025 0,042	0,030 0,068	0,030 0,056	0,030 0,047	-	-	0,030 0,068	0,023 0,049	0,023 0,046	0,030 0,063	-	-
12,0	0,036 0,082	0,036 0,082	0,036 0,082	0,036 0,070	0,030 0,057	0,036 0,070	0,036 0,057	0,030 0,051	0,036 0,087	0,036 0,070	0,036 0,057	-	-	0,036 0,087	0,029 0,062	0,029 0,058	0,036 0,079	-	-
16,0	0,048 0,119	0,048 0,119	0,048 0,119	0,048 0,099	0,039 0,079	0,048 0,099	0,048 0,079	0,040 0,070	0,048 0,127	0,048 0,099	0,048 0,079	-	-	0,048 0,127	0,039 0,090	0,039 0,084	0,048 0,115	-	-

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	0,05 D	2,30 x f_z
	0,10 D	1,65 x f_z
	0,15 D	1,40 x f_z
	0,20 D	1,25 x f_z
	0,30 D	1,09 x f_z

For a_e less than a_e max, use correction factors stated above.
For a_e max, use feeds stated above.



Recommended Speeds

Solid Carbide
General Purpose - End Milling



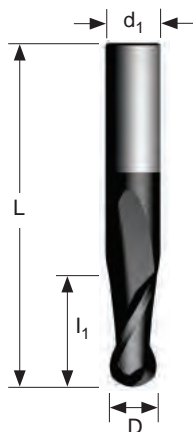
General Purpose End Mills

Speed v_c (m/min)					
ER_NN4-with Radius Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Micrograin
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	125 - 180
		<950 N/mm ² <280 HBN	●	◎	100 - 170
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	●	◎	100 - 170
		950-1200 N/mm ² 280-355 HBN	●	◎	90 - 140
		1200-1400 N/mm ² 355-415 HBN	●	◎	80 - 120
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	85 - 120
		Martensitic 400 series	●	◎	65 - 90
	PH Stainless	Refractory P.H.	●		50 - 80
K	Cast Iron	Grey GG-Ft	●	◎	90 - 150
		Spheroidal-Ductile GGG-FGS	●	◎	60 - 120
		Malleable GTS - MN/MP	●	◎	50 - 100
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			40 - 90
		Cobalt Based	●	◎	20 - 40
		Nickel Based	●	◎	25 - 45
		Titanium Based	●	◎	30 - 60
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			



Materials Application

SP4060					
P	M	K	N	S	H
◆	◆	◆	◆	◆	◆



Solid Carbide
General Purpose - Eng Milling

Metric Product		Dimensions (mm)							
EDP	Item Description	D	L	l ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max	Trochoidal min
034276	B 030NN2	3,00	38,00	12,00	3,00	12,00	2	-	-
034277	B 040NN2	4,00	50,00	14,00	4,00	14,00	2	-	-
034278	B 050NN2	5,00	50,00	16,00	5,00	16,00	2	-	-
034279	B 060NN2	6,00	63,00	19,00	6,00	19,00	2	-	-
034280	B 080NN2	8,00	63,00	19,00	8,00	19,00	2	-	-
034281	B 100NN2	10,00	70,00	22,00	10,00	22,00	2	-	-
034282	B 120NN2	12,00	75,00	25,00	12,00	25,00	2	-	-
034283	B 160NN2	16,00	88,00	32,00	16,00	32,00	2	-	-
034284	B 200NN2	20,00	100,00	38,00	20,00	38,00	2	-	-

General Purpose End Mills

2 - Flute Ball Nose End Mill

B_NN2 - Radial a _e and Axial a _p depth of cut range							
Product	Dimensions (mm)						
	Shoulder Milling						Slotting
	Roughing			Finishing			
	a _e %	a _p %	f _z	a _e %	a _p %	f _z	a _p %
SP4556	0,1 - 0,2 D	0,5 - 1,4 D	Mid - High	0,05 - 0,1 D	0,5 - 1,4 D	Low - Mid	0,1 - 0,4 D



* When using a_p max, a_e should not exceed 0,1 D

Note: For copy milling & shoulder milling applications, refer to page B90.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide

General Purpose - End Milling

Recommended Feeds



General Purpose End Mills

B_NN2 Feeds f_z (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS-MNMP	Aluminium & Alloys <16% Si 11.6 HBN	Aluminium & Silicon >16% Si 9.2 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3.0	0.009 0.014	0.009 0.014	0.009 0.014	0.009 0.013	0.009 0.012	0.009 0.013	0.009 0.013	0.007 0.011	0.009 0.014	0.009 0.013	0.009 0.012	-	-	0.009 0.014	0.007 0.011	0.007 0.010	0.009 0.014	-	-
4.0	0.012 0.020	0.012 0.020	0.012 0.020	0.012 0.019	0.011 0.017	0.012 0.019	0.012 0.017	0.010 0.015	0.012 0.020	0.012 0.019	0.012 0.017	-	-	0.012 0.020	0.009 0.015	0.009 0.014	0.012 0.019	-	-
5.0	0.015 0.027	0.015 0.027	0.015 0.027	0.015 0.025	0.013 0.022	0.015 0.024	0.015 0.022	0.013 0.019	0.015 0.027	0.015 0.025	0.015 0.022	-	-	0.015 0.027	0.011 0.020	0.011 0.019	0.015 0.026	-	-
6.0	0.018 0.033	0.018 0.033	0.018 0.033	0.018 0.030	0.016 0.027	0.018 0.030	0.018 0.027	0.015 0.024	0.018 0.034	0.018 0.030	0.018 0.027	-	-	0.018 0.034	0.013 0.025	0.013 0.024	0.018 0.033	-	-
8.0	0.024 0.049	0.024 0.049	0.024 0.049	0.024 0.043	0.021 0.037	0.024 0.043	0.024 0.037	0.020 0.033	0.024 0.051	0.024 0.043	0.024 0.037	-	-	0.024 0.051	0.018 0.036	0.018 0.035	0.024 0.047	-	-
10.0	0.030 0.065	0.030 0.065	0.030 0.065	0.030 0.056	0.026 0.047	0.030 0.056	0.030 0.047	0.025 0.042	0.030 0.068	0.030 0.056	0.030 0.047	-	-	0.030 0.068	0.023 0.049	0.023 0.046	0.030 0.063	-	-
12.0	0.036 0.082	0.036 0.082	0.036 0.082	0.036 0.070	0.030 0.057	0.036 0.070	0.036 0.057	0.030 0.051	0.036 0.087	0.036 0.070	0.036 0.057	-	-	0.036 0.087	0.029 0.062	0.029 0.058	0.036 0.079	-	-
16.0	0.048 0.119	0.048 0.119	0.048 0.119	0.048 0.099	0.039 0.079	0.048 0.099	0.048 0.079	0.040 0.070	0.048 0.127	0.048 0.099	0.048 0.079	-	-	0.048 0.127	0.039 0.090	0.039 0.084	0.048 0.115	-	-
20.0	0.060 0.160	0.060 0.160	0.060 0.160	0.060 0.130	0.048 0.101	0.060 0.130	0.060 0.101	0.050 0.090	0.060 0.171	0.060 0.130	0.060 0.101	-	-	0.060 0.171	0.050 0.120	0.050 0.112	0.060 0.152	-	-

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	<p>Note: For copy milling & shoulder milling applications, refer to page B90.</p>	



Solid Carbide
General Purpose - Eng Milling

Recommended Speeds

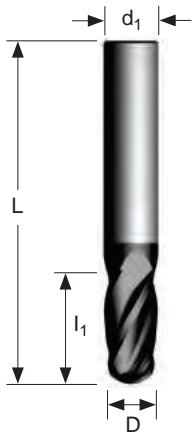
General Purpose End Mills

Speed v_c (m/min)					
B_NN2 Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Micrograin
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	125 - 180
		<950 N/mm ² <280 HBN			100 - 170
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			100 - 170
		950-1200 N/mm ² 280-355 HBN	●	◎	90 - 140
		1200-1400 N/mm ² 355-415 HBN			80 - 120
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	85 - 120
		Martensitic 400 series			65 - 90
	PH Stainless	Refractory P.H.	●		50 - 80
K	Cast Iron	Grey GG-Ft			90 - 150
		Spheroidal-Ductile GGG-FGS	●	◎	60 - 120
		Malleable GTS - MN/MP			50 - 100
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			40 - 90
		Cobalt Based	●	◎	20 - 40
		Nickel Based			25 - 45
		Titanium Based			30 - 60
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			



Materials Application

SP4060					
P	M	K	N	S	H
◆	◆	◆	◆	◆	◆



4 - Flute Ball Nose End Mill

Solid Carbide
General Purpose - End Milling

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	l_1	d_1	a_p max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034724	B 030NN4	3,00	38,00	12,00	3,00	12,00	4	-	-	-
034725	B 040NN4	4,00	50,00	14,00	4,00	14,00	4	-	-	-
034726	B 050NN4	5,00	50,00	16,00	5,00	16,00	4	-	-	-
034727	B 060NN4	6,00	63,00	19,00	6,00	19,00	4	-	-	-
034728	B 080NN4	8,00	63,00	19,00	8,00	19,00	4	-	-	-
034729	B 100NN4	10,00	70,00	22,00	10,00	22,00	4	-	-	-
034730	B 120NN4	12,00	75,00	25,00	12,00	25,00	4	-	-	-

General Purpose End Mills

B_NN4 - Radial a_e and Axial a_p depth of cut range						
Product	Dimensions (mm)					
Grade	Shoulder Milling					
	Roughing			Finishing		
	a_e %	a_p %	f_z	a_e %	a_p %	f_z
SP4556	0,1 - 0,5 D	0,5 - 1,9 D	Mid - High	0,05 - 0,1 D	0,5 - 1,9 D	Low - Mid



* When using a_p max, a_e should not exceed 0,1 D

Note: For copy milling & shoulder milling applications, refer to page B90.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
General Purpose - Eng Milling

Recommended Feeds

General Purpose End Mills

B_NN4 Feeds fz (mm/tooth) - Slotting / Pocketing

D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGC-FGS	Cast Irons Malleable GTS -M/MMP	Aluminium & Alloys <16% Si/16 HBN	Aluminium & Silicon >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
3,0	0,009 0,014	0,009 0,014	0,009 0,014	0,009 0,013	0,009 0,012	0,009 0,013	0,009 0,013	0,007 0,011	0,009 0,014	0,009 0,013	0,009 0,012	-	-	0,009 0,014	0,007 0,011	0,007 0,010	0,009 0,014	-	-
4,0	0,012 0,020	0,012 0,020	0,012 0,020	0,012 0,019	0,011 0,017	0,012 0,019	0,012 0,017	0,010 0,015	0,012 0,020	0,012 0,019	0,012 0,017	-	-	0,012 0,020	0,009 0,015	0,009 0,014	0,012 0,019	-	-
5,0	0,015 0,027	0,015 0,027	0,015 0,027	0,015 0,025	0,013 0,022	0,015 0,024	0,015 0,022	0,013 0,019	0,015 0,027	0,015 0,025	0,015 0,022	-	-	0,015 0,027	0,011 0,020	0,011 0,019	0,015 0,026	-	-
6,0	0,018 0,033	0,018 0,033	0,018 0,033	0,018 0,030	0,016 0,027	0,018 0,030	0,018 0,027	0,015 0,024	0,018 0,034	0,018 0,030	0,018 0,027	-	-	0,018 0,034	0,013 0,025	0,013 0,024	0,018 0,033	-	-
8,0	0,024 0,049	0,024 0,049	0,024 0,049	0,024 0,043	0,021 0,037	0,024 0,043	0,024 0,037	0,020 0,033	0,024 0,051	0,024 0,043	0,024 0,037	-	-	0,024 0,051	0,018 0,036	0,018 0,035	0,024 0,047	-	-
10,0	0,030 0,065	0,030 0,065	0,030 0,065	0,030 0,056	0,026 0,047	0,030 0,056	0,030 0,047	0,025 0,042	0,030 0,068	0,030 0,056	0,030 0,047	-	-	0,030 0,068	0,023 0,049	0,023 0,046	0,030 0,063	-	-
12,0	0,036 0,082	0,036 0,082	0,036 0,082	0,036 0,070	0,030 0,057	0,036 0,070	0,036 0,057	0,030 0,051	0,036 0,087	0,036 0,070	0,036 0,057	-	-	0,036 0,087	0,029 0,062	0,029 0,058	0,036 0,079	-	-

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling		Feed Correction Parameters	
		a_e	Correction Factor
		<p>Note: For copy milling & shoulder milling applications, refer to page B90.</p>	

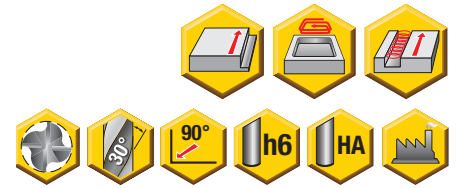


Recommended Speeds

Solid Carbide
General Purpose - End Milling



Speed v_c (m/min)					
B_NN4 Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Micrograin
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	125 - 180
		<950 N/mm ² <280 HBN	●	◎	100 - 170
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	●	◎	100 - 170
		950-1200 N/mm ² 280-355 HBN	●	◎	90 - 140
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	85 - 120
		Martensitic 400 series	●	◎	65 - 90
	PH Stainless	Refractory P.H.	●		50 - 80
K	Cast Iron	Grey GG-Ft	●	◎	90 - 150
		Spheroidal-Ductile GGG-FGS	●	◎	60 - 120
		Malleable GTS - MN/MP	●	◎	50 - 100
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based	●	◎	40 - 90
		Cobalt Based	●	◎	20 - 40
		Nickel Based	●	◎	25 - 45
		Titanium Based	●	◎	30 - 60
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			

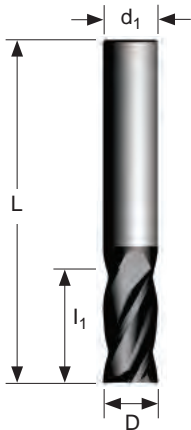


Materials Application

SP4060

P	M	K	N	S	H

PVD



4 - Flute End Mill

Solid Carbide
General Purpose - Eng Milling

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	l ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034317	E 060LL4	6,00	75,00	25,00	6,00	25,00	4	-	-	8,58
034318	E 080LL4	8,00	75,00	25,00	8,00	25,00	4	-	-	11,44
034319	E 100LL4	10,00	100,00	38,00	10,00	38,00	4	-	-	14,30
034320	E 120LL4	12,00	100,00	50,00	12,00	50,00	4	-	-	17,16
034321	E 160LL4	16,00	150,00	75,00	16,00	75,00	4	-	-	22,88

E_LL4 - Radial a_e and Axial a_p depth of cut range

Product	Dimensions (mm)					
	Shoulder Milling					
Grade	Roughing			Finishing		
	a _e %	a _p %	f _z	a _e %	a _p %	f _z
SP4556	0,1 - 0,3 D	0,5 - 3 D	Mid - High	0,05 - 0,1 D	0,5 - 3 D	Low - Mid



* When using a_p max, a_e should not exceed 0,1 D

Note: For trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide

General Purpose - End Milling

Recommended Feeds



General Purpose End Mills

E_LL4 Feeds fz (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS-MNMP	Aluminium & Alloys <16% Si/11.6 HBN	Aluminium & Silicon >16% Si/9.2 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
6,0	0,018 0,033	0,018 0,033	0,018 0,033	0,018 0,030	0,016 0,027	0,018 0,030	0,018 0,027	0,015 0,024	0,018 0,034	0,018 0,030	0,018 0,027	-	-	0,018 0,034	0,013 0,025	0,013 0,024	0,018 0,033	-	-
8,0	0,024 0,049	0,024 0,049	0,024 0,049	0,024 0,043	0,021 0,037	0,024 0,043	0,024 0,037	0,020 0,033	0,024 0,051	0,024 0,043	0,024 0,037	-	-	0,024 0,051	0,018 0,036	0,018 0,035	0,024 0,047	-	-
10,0	0,030 0,065	0,030 0,065	0,030 0,065	0,030 0,056	0,026 0,047	0,030 0,056	0,030 0,047	0,025 0,042	0,030 0,068	0,030 0,056	0,030 0,047	-	-	0,030 0,068	0,023 0,049	0,023 0,046	0,030 0,063	-	-
12,0	0,036 0,082	0,036 0,082	0,036 0,082	0,036 0,070	0,030 0,057	0,036 0,070	0,036 0,057	0,030 0,051	0,036 0,087	0,036 0,070	0,036 0,057	-	-	0,036 0,087	0,029 0,062	0,029 0,058	0,036 0,079	-	-
16,0	0,048 0,119	0,048 0,119	0,048 0,119	0,048 0,099	0,039 0,079	0,048 0,099	0,048 0,079	0,040 0,070	0,048 0,127	0,048 0,099	0,048 0,079	-	-	0,048 0,127	0,039 0,090	0,039 0,084	0,048 0,115	-	-

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	a _e	Correction Factor
	0,05 D	2,30 x fz
	0,10 D	1,65 x fz
	0,15 D	1,40 x fz
	0,20 D	1,25 x fz
	0,30 D	1,09 x fz

For a_e less than a_e max, use correction factors stated above.
For a_e max, use feeds stated above.



Solid Carbide
General Purpose - Eng Milling

Recommended Speeds

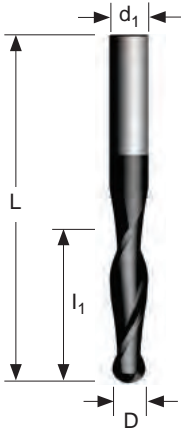
General Purpose End Mills

Speed v_c (m/min)					
E_LL4 Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Micrograin
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	75 - 110
		<950 N/mm ² <280 HBN			60 - 100
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			60 - 100
		950-1200 N/mm ² 280-355 HBN	●	◎	55 - 85
		1200-1400 N/mm ² 355-415 HBN			50 - 70
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	50 - 70
		Martensitic 400 series			40 - 55
	PH Stainless	Refractory P.H.	●		30 - 45
K	Cast Iron	Grey GG-Ft			55 - 90
		Spheroidal-Ductile GGG-FGS	●	◎	35 - 70
		Malleable GTS - MN/MP			30 - 60
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			30 - 70
		Cobalt Based			15 - 35
		Nickel Based	●	◎	20 - 35
		Titanium Based			25 - 50
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			



Materials Application

SP4060					
P	M	K	N	S	H



2 - Flute Ball Nose End Mill

Solid Carbide
General Purpose - End Milling

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	I ₁	d ₁	ap max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034738	B 040LL2	4,00	65,00	25,00	4,00	25,00	2	-	-	-
034739	B 060LL2	6,00	75,00	25,00	6,00	25,00	2	-	-	-
034740	B 060XLXL2	6,00	100,00	38,00	6,00	38,00	2	-	-	-
034741	B 080LL2	8,00	75,00	25,00	8,00	25,00	2	-	-	-
034742	B 080XLXL2	8,00	100,00	38,00	8,00	38,00	2	-	-	-
034743	B 100LL2	10,00	100,00	38,00	10,00	38,00	2	-	-	-
034744	B 100XLXL2	10,00	125,00	63,00	10,00	63,00	2	-	-	-
034745	B 120LL2	12,00	100,00	50,00	12,00	50,00	2	-	-	-
034746	B 120XLXL2	12,00	150,00	75,00	12,00	75,00	2	-	-	-

General Purpose End Mills

Radial a _e and Axial a _p depth of cut range						
Product	Dimensions (mm)					
Grade	Shoulder Milling					
	Roughing			Finishing		
	a _e %	a _p %	f _z	a _e %	a _p %	f _z
B_LL2						
SP4556	0,05 - 0,1 D	0,5 - 2,8 D	Mid - High	0,01 - 0,05 D	0,5 - 2,8 D	Low - Mid
B_XLXL2						
SP4556	0,05 - 0,1 D	1,0 - 3,5 D	Mid - High	0,01 - 0,05 D	1,0 - 3,5 D	Low - Mid



* When using a_p max, a_e should not exceed 0.1 D

Note: For copy milling & shoulder milling applications, refer to page B90.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
General Purpose - Eng Milling

Recommended Feeds

General Purpose End Mills

B_LL2 / B_XLXL2 Feeds f_z (mm/tooth) - Slotting / Pocketing

D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS-M/MMP	Aluminum & Alloys <16% Si/16 HBN	Aluminum & Silicon >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
4,0	0,012 0,020	0,012 0,020	0,012 0,020	0,012 0,019	0,011 0,017	0,012 0,019	0,012 0,017	0,010 0,015	0,012 0,020	0,012 0,019	0,012 0,017	-	-	0,012 0,020	0,009 0,015	0,009 0,014	0,012 0,019	-	-
6,0	0,018 0,033	0,018 0,033	0,018 0,033	0,018 0,030	0,016 0,027	0,018 0,030	0,018 0,027	0,015 0,024	0,018 0,034	0,018 0,030	0,018 0,027	-	-	0,018 0,034	0,013 0,025	0,013 0,024	0,018 0,033	-	-
8,0	0,024 0,049	0,024 0,049	0,024 0,049	0,024 0,043	0,021 0,037	0,024 0,043	0,024 0,037	0,020 0,033	0,024 0,051	0,024 0,043	0,024 0,037	-	-	0,024 0,051	0,018 0,036	0,018 0,035	0,024 0,047	-	-
10,0	0,030 0,065	0,030 0,065	0,030 0,065	0,030 0,056	0,026 0,047	0,030 0,056	0,030 0,047	0,025 0,042	0,030 0,068	0,030 0,056	0,030 0,047	-	-	0,030 0,068	0,023 0,049	0,023 0,046	0,030 0,063	-	-
12,0	0,036 0,082	0,036 0,082	0,036 0,082	0,036 0,070	0,030 0,057	0,036 0,070	0,036 0,057	0,030 0,051	0,036 0,087	0,036 0,070	0,036 0,057	-	-	0,036 0,087	0,029 0,062	0,029 0,058	0,036 0,079	-	-

Note: HTA = High Temperature Alloys

Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	<p>Note: For copy milling & shoulder milling applications, refer to page B90.</p>	



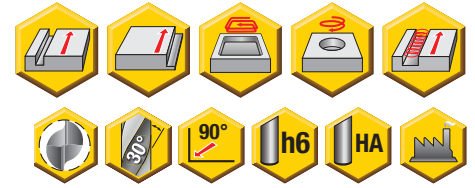
Recommended Speeds

Solid Carbide
General Purpose - End Milling



General Purpose End Mills

Speed v_c (m/min)					
B_LL2 / B_XLXL2 Series			Speed min. - max.		
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Micrograin
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	75 - 110
		<950 N/mm ² <280 HBN	●	◎	60 - 100
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	●	◎	60 - 100
		950-1200 N/mm ² 280-355 HBN	●	◎	55 - 85
		1200-1400 N/mm ² 355-415 HBN	●	◎	50 - 70
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	50 - 70
		Martensitic 400 series	●	◎	40 - 55
	PH Stainless	Refractory P.H.	●		30 - 45
K	Cast Iron	Grey GG-Ft	●	◎	55 - 90
		Spheroidal-Ductile GGG-FGS	●	◎	35 - 70
		Malleable GTS - MN/MP	●	◎	30 - 60
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based	●	◎	30 - 70
		Cobalt Based	●	◎	15 - 35
		Nickel Based	●	◎	20 - 35
		Titanium Based	●	◎	25 - 50
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			

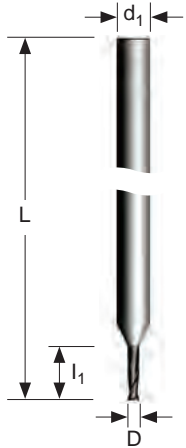


Materials Application

SP4060					
P	M	K	N	S	H
◆	◆	◆	◆	◆	◆



Miniature End Mills



2 - Flute End Mill

Solid Carbide
General Purpose - Miniature

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	l ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034158	E 004NTN2	0,40	38,00	1,20	3,00	1,20	2	0,57	0,78	0,57
034159	E 005NTN2	0,50	38,00	1,50	3,00	1,50	2	0,72	0,98	0,72
034160	E 006NTN2	0,60	38,00	1,80	3,00	1,80	2	0,86	1,17	0,86
034161	E 007NTN2	0,70	38,00	2,10	3,00	2,10	2	1,00	1,37	1,00
034162	E 008NTN2	0,80	38,00	2,40	3,00	2,40	2	1,14	1,56	1,14
034163	E 009NTN2	0,90	38,00	2,70	3,00	2,70	2	1,29	1,76	1,29
034164	E 010NTN2	1,00	38,00	3,00	3,00	3,00	2	1,43	1,95	1,43
034165	E 012NTN2	1,20	38,00	3,60	3,00	3,60	2	1,72	2,34	1,72
034166	E 015NTN2	1,50	38,00	5,00	3,00	5,00	2	2,15	2,93	2,15
034167	E 020NTN2	2,00	38,00	6,00	3,00	6,00	2	2,86	3,90	2,86
034168	E 025NTN2	2,50	38,00	7,00	3,00	7,00	2	3,58	4,88	3,58

E_NTN2 - Radial a _e and Axial a _p depth of cut range			
Product	Dimensions (mm)		
	Shoulder Milling		Slotting
	a _e %	a _p %	a _p %
SP4556	0,05 - 0,2 D	0,05 - 0,2 D	0,1 - 0,3 D



Slotting - Square Ended

* When using a_p max, a_e should not exceed 0,05 D

Note: For ramping angle, helical a_p max. and trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
General Purpose - Miniature

Recommended Feeds

E_NTN2 Feeds f_z (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS-MIMP	Aluminum & Alloys <16% Si 116 HBN	Aluminum & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
0.4	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004	-	-	0,004	0,004	0,004	0,004	-	-
0.5	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	-	-	0,005	0,005	0,005	0,005	-	-
0.6	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	-	-	0,005	0,005	0,005	0,005	-	-
0.7	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	-	-	0,006	0,006	0,006	0,006	-	-
0.8	0,007	0,007	0,007	0,007	0,007	0,007	0,007	0,007	0,007	0,007	0,007	-	-	0,007	0,007	0,007	0,007	-	-
0.9	0,008	0,008	0,008	0,008	0,008	0,008	0,008	0,008	0,008	0,008	0,008	-	-	0,008	0,008	0,008	0,008	-	-
1.0	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	-	-	0,009	0,009	0,009	0,009	-	-
1.2	0,011	0,011	0,011	0,011	0,011	0,011	0,011	0,011	0,011	0,011	0,011	-	-	0,011	0,011	0,011	0,011	-	-
1.5	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	-	-	0,014	0,014	0,014	0,014	-	-
2.0	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	-	-	0,014	0,014	0,014	0,014	-	-
2.5	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	-	-	0,014	0,014	0,014	0,014	-	-

Note: HTA = High Temperature Alloys

Note: Due to the small diameter of the miniature end mill line, the feed rate has been reduced to a starting value only.



Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	0,10 D	1,65 x f_z
	0,20 D	1,25 x f_z

For a_e less than a_e max, use correction factors stated above.
For a_e max, use feeds stated above.



Solid Carbide
General Purpose - Miniature

Recommended Speeds

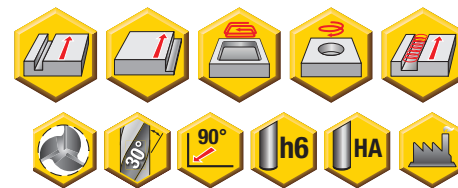


Miniature End Mills

Speed v_c (m/min)					
E_NTN2 Series					
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Micrograin
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	125 - 180
		<950 N/mm ² <280 HBN			100 - 170
	Alloyed Steel	700-950 N/mm ² 200-280 HBN			100 - 170
		950-1200 N/mm ² 280-355 HBN	●	◎	90 - 140
		1200-1400 N/mm ² 355-415 HBN			80 - 120
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	85 - 120
		Martensitic 400 series			65 - 90
	PH Stainless	Refractory P.H.	●		50 - 80
K	Cast Iron	Grey GG-Ft			90 - 150
		Spheroidal-Ductile GGG-FGS	●	◎	60 - 120
		Malleable GTS - MN/MP			50 - 100
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			40 - 90
		Cobalt Based	●	◎	20 - 40
		Nickel Based			25 - 45
		Titanium Based			30 - 60
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			

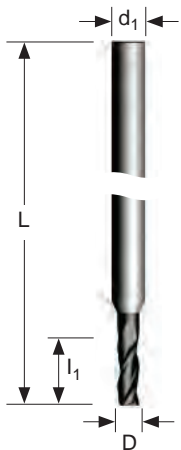
When calculating rotation speed (RPM), use v_c recommendations above.
If the RPM exceeds spindle capacity, use maximum spindle speed available.

When using rotation speeds above 25,000 RPM, ensure a balanced work holding assembly is utilised.



Materials Application

SP4060					
P	M	K	N	S	H
◆	◆	◆		◆	



3 - Flute End Mill

Solid Carbide
General Purpose - Miniature

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	l ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034191	E 010NTN3	1,00	38,00	3,0	3,00	3,00	3	1,43	1,95	1,43
034192	E 015NTN3	1,50	38,00	5,00	3,00	5,00	3	2,15	2,93	2,15
034193	E 020NTN3	2,00	38,00	6,00	3,00	6,00	3	2,86	3,90	2,86
034194	E 025NTN3	2,50	38,00	7,00	3,00	7,00	3	3,58	4,88	3,58

Miniature End Mills

E_NTN3 - Radial a _e and Axial a _p depth of cut range			
Product	Dimensions (mm)		
	Shoulder Milling		Slotting
	a _e %	a _p %	a _p %
SP4556	0,05 - 0,2 D	0,05 - 0,2 D	0,1 - 0,3 D



Slotting - Square Ended

* When using a_p max, a_e should not exceed 0,05 D

Note: For ramping angle, helical a_p max. and trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
General Purpose - Miniature

Recommended Feeds

E_NTN3 Feeds f_z (mm/tooth) - Slotting / Pocketing

D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS-40MMP	Aluminium & Alloys <16% Si/Ti/6 HBN	Aluminium & Silicon >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
1.0	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	-	-	0,009	0,009	0,009	0,009	-	-
1,5	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	-	-	0,014	0,014	0,014	0,014	-	-
2,0	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	-	-	0,014	0,014	0,014	0,014	-	-
2,5	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	-	-	0,014	0,014	0,014	0,014	-	-

Note: HTA = High Temperature Alloys

Note: Due to the small diameter of the miniature end mill line, the feed rate has been reduced to a starting value only.

Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	0,10 D	1,65 x f_z
	0,20 D	1,25 x f_z

For a_e less than a_e max, use correction factors stated above.
For a_e max, use feeds stated above.

Miniature End Mills



Solid Carbide
General Purpose - Miniature

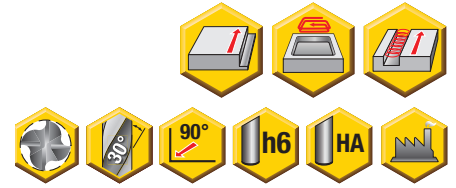
Recommended Speeds

Speed v_c (m/min)					
E_NTN3 Series					
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			Speed min. - max.
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	125 - 180
		<950 N/mm ² <280 HBN	●	◎	100 - 170
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	●	◎	100 - 170
		950-1200 N/mm ² 280-355 HBN	●	◎	90 - 140
		1200-1400 N/mm ² 355-415 HBN	●	◎	80 - 120
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	85 - 120
		Martensitic 400 series	●	◎	65 - 90
	PH Stainless	Refractory PH.	●		50 - 80
K	Cast Iron	Grey GG-Ft	●	◎	90 - 150
		Spheroidal-Ductile GGG-FGS	●	◎	60 - 120
		Malleable GTS - MN/MP	●		50 - 100
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based	●	◎	40 - 90
		Cobalt Based	●	◎	20 - 40
		Nickel Based	●	◎	25 - 45
		Titanium Based	●	◎	30 - 60
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			

When calculating rotation speed (RPM), use v_c recommendations above.
If the RPM exceeds spindle capacity, use maximum spindle speed available.

When using rotation speeds above 25,000 RPM, ensure a balanced work holding assembly is utilised.

Miniature End Mills



Materials Application

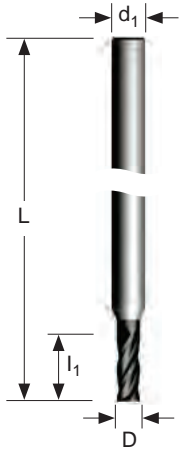
SP4060					
P	M	K	N	S	H
◆	◆	◆	◆	◆	◆



Solid Carbide
General Purpose - Miniature

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	l ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034216	E 010NTN4	1,00	38,00	3,00	3,00	3,00	4	-	-	1,43
034217	E 015NTN4	1,50	38,00	5,00	3,00	5,00	4	-	-	2,15
034218	E 020NTN4	2,00	38,00	6,00	3,00	6,00	4	-	-	2,86

Miniature End Mills



4 - Flute End Mill

E_NTN4 - Radial a_e and Axial a_p depth of cut range

Product	Dimensions (mm)	
	Shoulder Milling	
	a _e %	a _p %
SP4556	0,05 - 0,2 D	0,05 - 0,2 D



* When using a_p max, a_e should not exceed 0,05 D

Note: For trochoidal application details, refer to pages B88 - B89.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
General Purpose - Miniature

Recommended Feeds

E_NTN4 Feeds fz (mm/tooth) - Slotting / Pocketing																			
D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS-MIMP	Aluminium & Alloys <16% Si/Ti/6 HBN	Aluminium & Silicon >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
1.0	0,010	0,010	0,010	0,010	0,010	0,010	0,010	0,010	0,010	0,010	0,010	-	-	0,010	0,010	0,010	0,010	-	-
1.5	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	-	-	0,015	0,015	0,015	0,015	-	-
2.0	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	-	-	0,015	0,015	0,015	0,015	-	-
2.5	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	-	-	0,015	0,015	0,015	0,015	-	-

Note: HTA = High Temperature Alloys

Note: Due to the small diameter of the miniature end mill line, the feed rate has been reduced to a starting value only.



Shoulder Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	0,10 D	1,65 x fz
	0,20 D	1,25 x fz

For a_e less than a_e max, use correction factors stated above.
For a_e max, use feeds stated above.



Solid Carbide
General Purpose - Miniature

Recommended Speeds

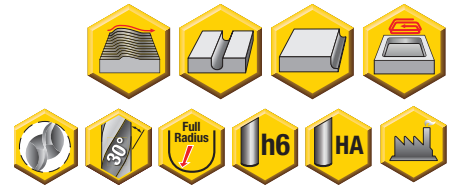


Miniature End Mills

Speed v_c (m/min)					
E_NTN4 Series					
Coolant Recommendation				Speed min. - max.	
Recommended ●		Possible ◎		PVD Micrograin	
ISO	Materials	Rm and Hardness			SP4556
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	125 - 180
		<950 N/mm ² <280 HBN	●	◎	100 - 170
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	●	◎	100 - 170
		950-1200 N/mm ² 280-355 HBN	●	◎	90 - 140
		1200-1400 N/mm ² 355-415 HBN	●	◎	80 - 120
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	85 - 120
		Martensitic 400 series	●	◎	65 - 90
	PH Stainless	Refractory P.H.	●		50 - 80
K	Cast Iron	Grey GG-Ft	●	◎	90 - 150
		Spheroidal-Ductile GGG-FGS	●	◎	60 - 120
		Malleable GTS - MN/MP	●		50 - 100
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based			40 - 90
		Cobalt Based	●	◎	20 - 40
		Nickel Based	●	◎	25 - 45
		Titanium Based	●	◎	30 - 60
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			

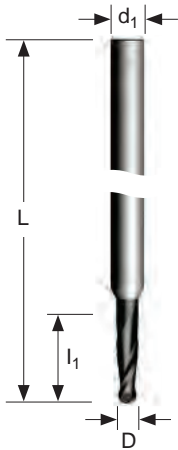
When calculating rotation speed (RPM), use v_c recommendations above.
If the RPM exceeds spindle capacity, use maximum spindle speed available.

When using rotation speeds above 25,000 RPM, ensure a balanced work holding assembly is utilised.



Materials Application

SP4060					
P	M	K	N	S	H



2 - Flute Ball Nose End Mill

Solid Carbide
General Purpose - Miniature

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	l ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034265	B 004NTN2	0,40	38,00	1,20	3,00	1,20	2	-	-	-
034266	B 005NTN2	0,50	38,00	1,50	3,00	1,50	2	-	-	-
034267	B 006NTN2	0,60	38,00	1,80	3,00	1,80	2	-	-	-
034268	B 007NTN2	0,70	38,00	2,10	3,00	2,10	2	-	-	-
034269	B 008NTN2	0,80	38,00	2,40	3,00	2,40	2	-	-	-
034270	B 009NTN2	0,90	38,00	2,70	3,00	2,70	2	-	-	-
034271	B 010NTN2	1,00	38,00	3,00	3,00	3,00	2	-	-	-
034272	B 012NTN2	1,20	38,00	3,60	3,00	3,60	2	-	-	-
034273	B 015NTN2	1,50	38,00	5,00	3,00	5,00	2	-	-	-
034274	B 020NTN2	2,00	38,00	6,00	3,00	6,00	2	-	-	-
034275	B 025NTN2	2,50	38,00	7,00	3,00	7,00	2	-	-	-

Miniature End Mills

B_NTN2 - Radial a _e and Axial a _p depth of cut range			
Product	Dimensions		
	Shoulder Milling		Slotting
	a _e %	a _p %	a _p %
SP4556	0,05 - 0,2D	0,05 - 0,2D	0,1 - 0,3 D



Slotting - Ball Nosed

* When using a_p max, a_e should not exceed 0,05 D

Note: For copy milling & shoulder milling applications, refer to page B90.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
General Purpose - Miniature

Recommended Feeds

B_NTN2 Feeds f_z (mm/tooth) - Slotting / Pocketing

D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS - MINMP	Aluminium & Alloys <16% Si T16 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
0.4	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004	-	-	0,004	0,004	0,004	0,004	-	-
0.5	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	-	-	0,005	0,005	0,005	0,005	-	-
0.6	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	-	-	0,005	0,005	0,005	0,005	-	-
0.7	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	-	-	0,006	0,006	0,006	0,006	-	-
0.8	0,007	0,007	0,007	0,007	0,007	0,007	0,007	0,007	0,007	0,007	0,007	-	-	0,007	0,007	0,007	0,007	-	-
0.9	0,008	0,008	0,008	0,008	0,008	0,008	0,008	0,008	0,008	0,008	0,008	-	-	0,008	0,008	0,008	0,008	-	-
1.0	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	-	-	0,009	0,009	0,009	0,009	-	-
1.2	0,011	0,011	0,011	0,011	0,011	0,011	0,011	0,011	0,011	0,011	0,011	-	-	0,011	0,011	0,011	0,011	-	-
1.5	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	-	-	0,014	0,014	0,014	0,014	-	-
2.0	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	-	-	0,014	0,014	0,014	0,014	-	-
2.5	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,014	-	-	0,014	0,014	0,014	0,014	-	-

Note: HTA = High Temperature Alloys

Note: Due to the small diameter of the miniature end mill line, the feed rate has been reduced to a starting value only.

Copy Milling / Profiling	Feed Correction Parameters	
	a_e	Correction Factor
	<p>Note: For copy milling & shoulder milling applications, refer to page B90.</p>	

Miniature End Mills



Solid Carbide
General Purpose - Miniature

Recommended Speeds

Speed v_c (m/min)					
B_NTN2 Series					
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			Speed min. - max.
					PVD Micrograin
					SP4556
P	Unalloyed Steel	<600 N/mm ² <180 HB N	●	◎	125 - 180
		<950 N/mm ² <280 HBN	●	◎	100 - 170
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	●	◎	100 - 170
		950-1200 N/mm ² 280-355 HBN	●	◎	90 - 140
		1200-1400 N/mm ² 355-415 HBN	●	◎	80 - 120
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	85 - 120
		Martensitic 400 series	●	◎	65 - 90
	PH Stainless	Refractory P.H.	●		50 - 80
K	Cast Iron	Grey GG-Ft	●	◎	90 - 150
		Spheroidal-Ductile GGG-FGS	●	◎	60 - 120
		Malleable GTS - MN/MP	●	◎	50 - 100
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based	●	◎	40 - 90
		Cobalt Based	●	◎	20 - 40
		Nickel Based	●	◎	25 - 45
		Titanium Based	●	◎	30 - 60
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			

When calculating rotation speed (RPM), use v_c recommendations above.
If the RPM exceeds spindle capacity, use maximum spindle speed available.

When using rotation speeds above 25,000 RPM, ensure a balanced work holding assembly is utilised.

Miniature End Mills



Materials Application

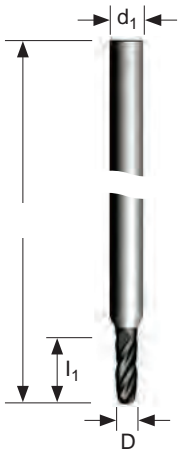
SP4060					
P	M	K	N	S	H
♦	♦	♦		♦	



Solid Carbide
General Purpose - Miniature

Metric Product		Dimensions (mm)								
EDP	Item Description	D	L	l ₁	d ₁	a _p max*	No. of Teeth	Helical Hole min - max		Trochoidal min
034720	B 010NTN4	1,00	38,00	3,00	3,00	3,00	4	-	-	-
034721	B 015NTN4	1,50	38,00	5,00	3,00	5,00	4	-	-	-
034722	B 020NTN4	2,00	38,00	6,00	3,00	6,00	4	-	-	-
034723	B 025NTN4	2,50	38,00	7,00	3,00	7,00	4	-	-	-

Miniature End Mills



4 - Flute Ball Nose End Mill

B_NTN4 - Radial a _e and Axial a _p depth of cut range		
Product	Dimensions (mm)	
	Shoulder Milling	
	a _e %	a _p %
SP4556	0,05 - 0,2 D	0,05 - 0,2 D



* When using a_p max, a_e should not exceed 0,05 D

Note: For copy milling & shoulder milling applications, refer to page B90.

See pages B93 - B102 for EDP - Description - Previous Part Number Cross Reference charts.



Solid Carbide
General Purpose - Miniature

Recommended Feeds

B_NTN4 Feeds fz (mm/tooth) - Slotting / Pocketing

D	Unalloyed Steel <600 N/mm ² <180 HBN	Unalloyed Steel 700-950N/mm ² 200-280 HBN	Alloyed Steel <600 N/mm ² <180 HBN	Alloyed Steel 950-1200N/mm ² 280-355 HBN	Alloyed Steel 1200-1400N/mm ² 355-415 HBN	Stainless Steel Austenitic + Ferritic 300 Series	Stainless Steel Martensitic 400 Series	Stainless Steel Refractory PH	Cast Irons Grey GG-FT	Cast Irons Spheroidal- Ductile GGG-FGS	Cast Irons Malleable GTS-MNMP	Aluminium & Alloys <16% Si/11.6 HBN	Aluminium & Silicon >16% Si/92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm ² >415 HBN	Chilled Cast Iron >1400 N/mm ² >400 HBN
	Range	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
1.0	0,010	0,010	0,010	0,010	0,010	0,010	0,010	0,010	0,010	0,010	0,010	-	-	0,010	0,010	0,010	0,010	-	-
1.5	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	-	-	0,015	0,015	0,015	0,015	-	-
2.0	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	-	-	0,015	0,015	0,015	0,015	-	-
2.5	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	0,015	-	-	0,015	0,015	0,015	0,015	-	-

Note: HTA = High Temperature Alloys

Note: Due to the small diameter of the miniature end mill line, the feed rate has been reduced to a starting value only.

Miniature End Mills

Copy Milling / Profiling	Feed Correction Parameters	
	a _e	Correction Factor
	<p>Note: For copy milling & shoulder milling applications, refer to page B90.</p>	



Solid Carbide
General Purpose - Miniature

Recommended Speeds



Miniature End Mills

Speed v_c (m/min)					
B_NTN4 Series					
Speed min. - max.					
Coolant Recommendation					
Recommended ● Possible ◎					
ISO	Materials	Rm and Hardness			PVD Micrograin
P	Unalloyed Steel	<600 N/mm ² <180 HBN	●	◎	125 - 180
		<950 N/mm ² <280 HBN	●	◎	100 - 170
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	●	◎	100 - 170
		950-1200 N/mm ² 280-355 HBN	●	◎	90 - 140
M	Stainless Steel	Austenitic + Ferritic 300 series	●	◎	85 - 120
		Martensitic 400 series	●	◎	65 - 90
	PH Stainless	Refractory P.H.	●		50 - 80
K	Cast Iron	Grey GG-FI	●	◎	90 - 150
		Spheroidal-Ductile GGG-FGS	●	◎	60 - 120
		Malleable GTS - MN/MP	●	◎	50 - 100
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based	●	◎	40 - 90
		Cobalt Based	●	◎	20 - 40
		Nickel Based	●	◎	25 - 45
		Titanium Based	●	◎	30 - 60
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN			
		Chilled Cast Iron >1400 N/mm ² > 400 HBN			

When calculating rotation speed (RPM), use v_c recommendations above.
If the RPM exceeds spindle capacity, use maximum spindle speed available.

When using rotation speeds above 25,000 RPM, ensure a balanced work holding assembly is utilised.



RSM Technical Information

Product		Dimensions (mm)																		
Family Description	Diameter	Z	Profiling					Facing					Chip Thickness		Profiling (mm/z)				Facing (mm/z)	
			a _e min	a _e max	a _p min	a _p max	a _d max mm ²	a _e min	a _e max	a _p min	a _p max	a _d max mm ²	h _m min	h _m max	for a _e min f _z min	for a _e min f _z max	for a _e max f _z min	for a _e max f _z max	f _z min	f _z max
RSM100	10.00	6	0.17	0.67	10.30	13.00	6.87	Radius +0.50	7.5	0.20	Radius +0.50	1.25	0.02	0.05	0.078	0.195	0.040	0.100	0.020	0.057
RSM120	12.00	6	0.20	0.80	12.80	15.60	10.24		9			1.80			0.078	0.195	0.040	0.100		
RSM160	16.00	6	0.27	1.07	17.80	20.80	18.99		12			3.20			0.078	0.195	0.040	0.100		
RSM160	16.00	8	0.20	0.80	12.00	20.80	9.60		12			3.20			0.090	0.225	0.046	0.115		
RSM200	20.00	6	0.33	1.33	23.00	26.00	30.67		15			5.00			0.078	0.195	0.040	0.100		
RSM200	20.00	8	0.25	1.00	16.00	26.00	16.00		15			5.00			0.090	0.225	0.046	0.115		
RSM250	25.00	8	0.31	1.25	20.50	32.50	25.63		18.75			7.81			0.090	0.225	0.046	0.115		
RSM250	25.00	10	0.25	1.00	15.50	32.50	15.50		18.75			7.81			0.101	0.251	0.051	0.128		

In the application of RSM end mills, it is vital that ad max mm² is not exceeded, for this, adjust a_e & a_p accordingly.

Example:

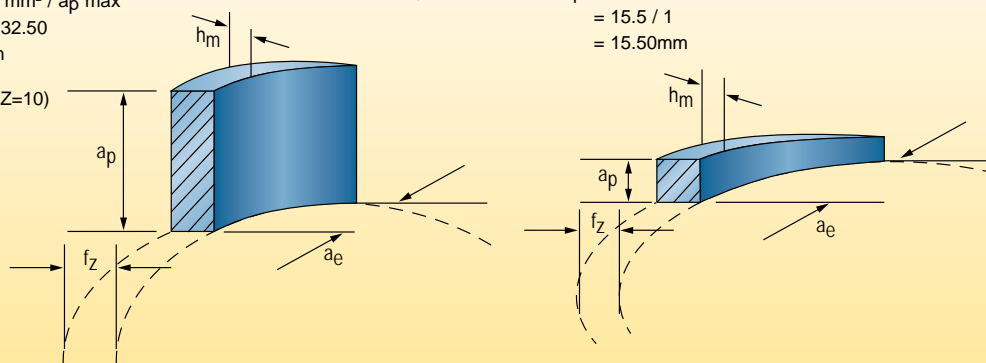
When using a_p max, then a_e = ad max mm² / a_p max
 = 15.50 / 32.50
 = 0.47mm

When using a_e (max), Then a_p = ad max mm² / a_e max
 = 15.5 / 1
 = 15.50mm

Example based on values for RSM250 (Z=10)

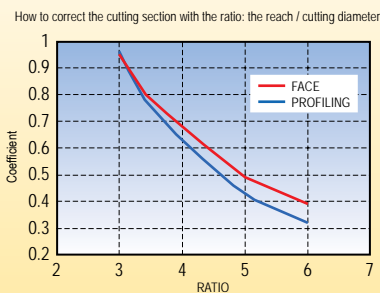
Key:

- a_e Radial depth of cut (mm)
- a_p Axial depth of cut (mm)
- a_d Cutting section (mm²)
- f_z Feed per tooth (mm/z)
- h_m Effective chip thickness (mm)



Cutting Section (a_d) and Speed (V_c) Correction Coefficients

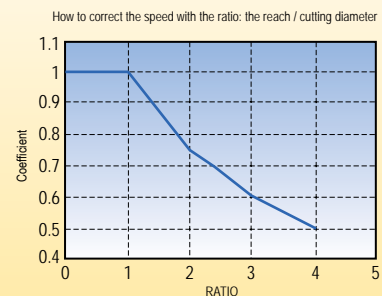
When the length to diameter (L_u:D) exceeds 3:1 the cutting section (a_d) should be reduced as per the following graph.



Example 1

Operation	Profile milling	a _d :	15.50mm ²
Cutter	RSM250LM10	Correction coefficient	0.64
L:D	4:1	Compensated a _d :	9.92mm ²

When the length to diameter (L_u:D) exceeds 3:1 the speed (V_c) should be reduced as per the following graph.



Example 2

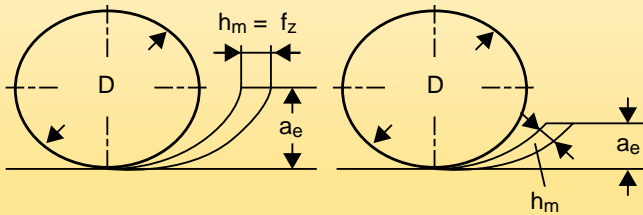
Material	ATI 6-4™	Correction coefficient	0.50
L:D	4:1	Compensated V _c :	35 m/min
V _c	70 m/min		





Feed Correction

When using a_e , less than a_e (max), use calculation, in combination with the given feed rate to correct feed.



$$h_m = 2 \times f_z \times \sqrt{(a_e / D) \times (1 - (a_e / D))} \text{ mm}$$

$$f_z = \frac{h_m}{2 \times \sqrt{(a_e / D) \times (1 - (a_e / D))}} \text{ (mm/Z)}$$

a_e max values can be found on all family pages in the tables "Radial a_e and Axial a_p depth of cut range"

Linear Ramping

For linear ramping, use the feed correction factors in the table below, in conjunction with the specified feeds for each family.



Ramping Angle Capacity

Cutter family	Number of flutes	Effective center cut: Zu for ramping	Max Ramping angle (°)	Feed Correction Calculation			
				45°	30°	10°	5°
E_NN2	2	2	45	0,6 x f_z	0,7 x f_z	0,85 x f_z	0,9 x f_z
EA							
HPA							
E_NN3	3	1	45	0,3 x f_z	0,5 x f_z	0,75 x f_z	0,85 x f_z
ERC							
XE	4	2	10	-	-	0,5 x f_z	0,75 x f_z
XER							

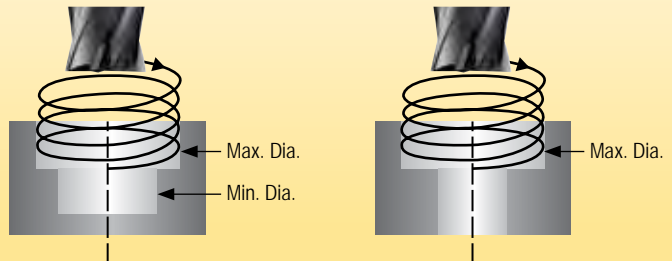


Helical Interpolation

Min. Hole Diameter from solid =
1,43 x Dia. cutter

Max. Hole Diameter from solid =
1,95 x (Dia. cutter - radius)

Max. Enlargement Diameter =
Hole size + ((Dia. cutter - radius) x 2)



Helical Ramping Angle Calculation:

The ramping angle is dependent on size of hole,
and the material being machined.

Example: XER 100NN4-C, machining a hole
18,53mm on Titanium Alloy.

Max depth of cut = 0,07 X 10,00
= 0,7mm

$$\text{Ramping angle} = \tan^{-1} \left(\frac{0,70}{18,53 \times \pi} \right)$$

$$= \tan^{-1} (0,012)$$

$$= 0,70^\circ$$

Maximum Depth of Cut Calculation

Material		ap (doc), max		
◆ P	Unalloyed Steel / Alloyed Steel	0,05	0,1	x Dia.
◆ M	Stainless Steel	0,05	0,08	x Dia.
◆ K	Cast Iron	0,08	0,10	x Dia.
◆ N	Aluminum	0,20		x Dia.
◆ S	Inconel	0,03		x Dia.
	Titanium	0,07		x Dia.

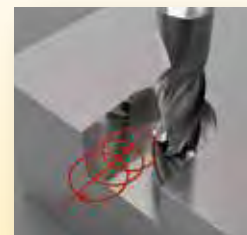
Drilling



Feed Correction

Number of Flutes	Drilling
2	0,5 x fz
3	0,1 x fz
4	N/A

Trochoidal Milling

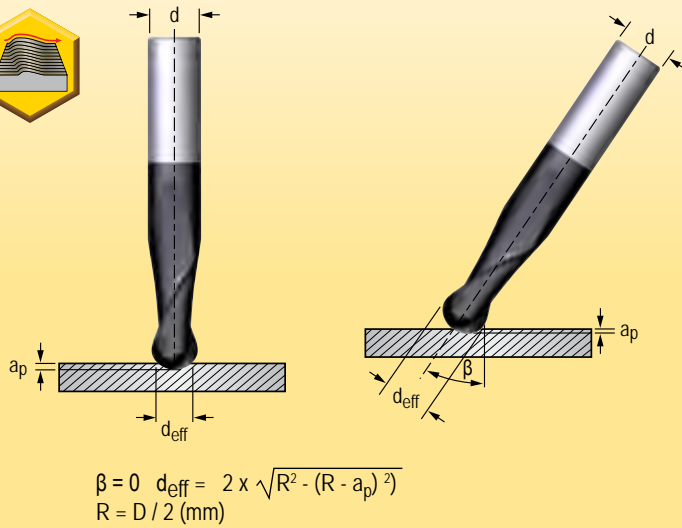


Capacity

End Mill Diameter (D)	Slot Width
	Min
1,00 - 6,00	1,43 D
8,00 - 12,00	1,43 D
16,00 - 20,00	1,43 D



Copy / 3D Milling

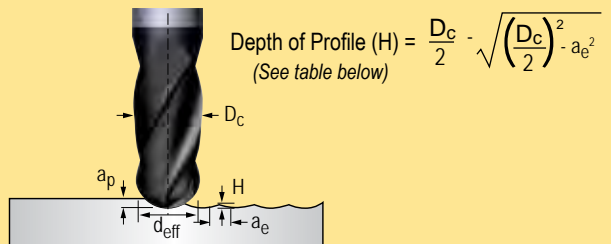


$$h_m = f_z \times \sqrt{((R^2 - (R - a_e)^2))} / R \times \sqrt{((R^2 - (R - a_p)^2))} / R$$

$$f_z = \frac{h_m}{\sqrt{((R^2 - (R - a_e)^2))} / R \times \sqrt{((R^2 - (R - a_p)^2))} / R} \quad (\text{mm/Z})$$

$$\beta < 0 \quad d_{\text{eff}} \text{ (mm)} = D \times \sin \left[\beta \pm \arccos \left(\frac{d - 2 \times a_p}{d} \right) \right]$$

Depth of profile / Diameter pitch correlation



Application Parameters / Depth of Profile (H) (mm)

diameter ae	20,00	16,00	12,00	10,00	8,00	6,00	5,00	4,00	3,00
10,00	10,00								
8,00	4,00	8,00							
6,00	2,00	2,71	6,00						
5,00	1,34	1,76	2,68	5,00					
4,00	0,83	1,07	1,53	2,00	4,00				
3,00	0,46	0,58	0,80	1,00	1,35	3,00			
2,50	0,32	0,40	0,55	0,67	0,88	1,34	2,50		
2,00	0,20	0,25	0,34	0,42	0,54	0,76	1,00	2,00	
1,50	0,11	0,14	0,19	0,23	0,29	0,40	0,50	0,68	1,50
0,75	0,03	0,04	0,05	0,06	0,07	0,10	0,12	0,15	0,20

Read across top row and down first column for chosen parameters to find resultant Depth of profile (H)

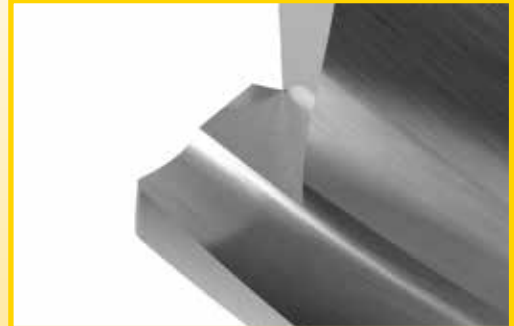
Technical



SU4000

Coating Type: Uncoated Submicron

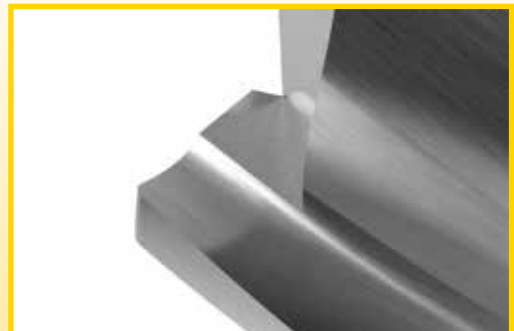
Our toughest and most wear resistant submicron substrate. Developed for machining Titanium and Titanium Alloys, whilst overcoming the problems associated with such materials.



SU0800

Coating Type: Uncoated Submicron

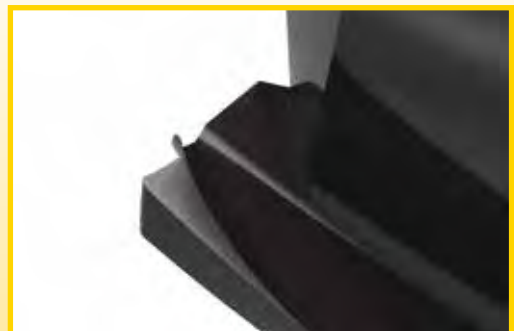
A tough and wear resistant Submicron Grade, developed for Aluminium and Aluminium Alloys.



SP4556

Coating Type: PVD, TiAlN

A versatile PVD TiAlN coated micrograin substrate suitable for a variety of applications. Primary use in Unalloyed Steels, Alloyed Steels, Stainless Steel and Cast Irons.

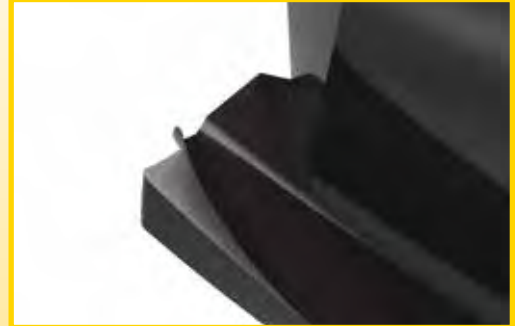




SP4035

Coating Type: PVD, TiAIN

A TiAIN PVD coated grade with a micrograin substrate offering high temperature stability and a low coefficient of friction, allowing the possibility of higher speeds and feeds, as well as dry machining. Primarily used in Steels, Stainless Steels, High Temperature Alloys, Cast Irons and Hard Materials.



SP4060

Coating Type: Advanced Nano PVD, TiAIN

Our toughest and most wear resistant submicron substrate, combined with an advanced nano composite TiAIN PVD coating, allowing tools to be used at elevated surface speeds. Primarily used in High Temperature Alloys and Stainless Steels. Also suitable for Alloyed Steels.



Technical



Part numbers for General Purpose milling & Rapide® milling ranges have now been allocated new EDP Numbers and descriptions, to fit in line with existing Stellram products and nomenclature.

Please use the following tables to cross reference the new EDP Numbers / Descriptions with the previous part numbers.

Part Number & Descriptions

PVD E						PVD E					
Definition	EDP	Description	Grade	Previous Part No	Page No.	Definition	EDP	Description	Grade	Previous Part No	Page No.
	034158	E 004NTN2		G11201570E			034191	E 010NTN3		G11303940TE	
	034159	E 005NTN2		G11201960E			034192	E 015NTN3		G11305910TE	B75
	034160	E 006NTN2		G11202360E			034193	E 020NTN3		G11307870TE	
	034161	E 007NTN2		G11202750E			034194	E 025NTN3		G11309840TE	
	034162	E 008NTN2		G11203150E			034195	E 030NN3		G11311810TE	
	034163	E 009NTN2		G11203540E	B72		034196	E 040NN3		G11315750TE	
	034164	E 010NTN2		G11203940TE			034197	E 050NN3	SP4556	G11319680TE	
	034165	E 012NTN2		G11204720E			034198	E 060NN3		G11323620TE	
	034166	E 015NTN2		G11205910TE			034199	E 080NN3		G11331500TE	B51
	034167	E 020NTN2	SP4556	G11207870TE			034200	E 100NN3		G11339370TE	
	034168	E 025NTN2		G11209840TE			034201	E 120NN3		G11347240TE	
	034169	E 030NN2		G11211810TE			034202	E 160NN3		G11362990TE	
	034170	E 040NN2		G11215750TE			034203	E 200NN3		G11378740TE	
	034171	E 050NN2		G11219680TE							
	034172	E 060NN2		G11223620TE							
	034173	E 080NN2		G11231500TE	B48						
	034174	E 100NN2		G11239370TE							
	034175	E 120NN2		G11247240TE							
	034176	E 160NN2		G11262990TE							
	034177	E 200NN2		G11278740TE							

Technical











Part Number & Descriptions

Technical

PVD E						PVD ER					
Definition	EDP	Description	Grade	Previous Part No	Page No.	Definition	EDP	Description	Grade	Previous Part No	Page No.
	034216	E 010NTN4	SP4556	G11403940TE	B78		034228	ER 030NN4-E	SP4556	G11411810E050	B57
	034217	E 015NTN4		G11405910TE			034229	ER 040NN4-E		G11415750E050	
	034218	E 020NTN4		G11407870TE			034230	ER 050NN4-E		G11419680E050	
	034219	E 030NN4		G11411810TE			034231	ER 060NN4-E		G11423620E050	
	034220	E 040NN4		G11415750TE			034232	ER 060NN4-G		G11423620E100	
	034221	E 050NN4	G11419680TE	B54		034233	ER 080NN4-E	G11431500E050	B57		
	034222	E 060NN4	G11423620TE			034234	ER 080NN4-G	G11431500E100			
	034223	E 080NN4	G11431500TE			034235	ER 100NN4-E	G11439370E050			
	034224	E 100NN4	G11439370TE	B54		034236	ER 100NN4-G	G11439370E100	B57		
	034225	E 120NN4	G11447240TE			034237	ER 100NN4-J	G11439370E150			
	034226	E 160NN4	G11462990TE			034238	ER 120NN4-E	G11447240E050			
	034227	E 200NN4	G11478740TE	B54		034239	ER 120NN4-G	G11447240E100	B57		
							034240	ER 120NN4-J		G11447240E150	
						034241	ER 120NN4-K	G11447240E200	B57		
						034242	ER 160NN4-G	G11462990E100			
						034243	ER 160NN4-J	G11462990E150	B57		
						034244	ER 160NN4-K	G11462990E200			



Part Number & Descriptions

 					
Definition	EDP	Description	Grade	Previous Part No	Page No.
	034317	E 060LL4		G14823620E	
	034318	E 080LL4		G14831500E	
	034319	E 100LL4	SP4556	G14839370E	B66
	034320	E 120LL4		G14847240E	
	034321	E 160LL4		G14862990E	
					
					
					
					
					

Technical

Part Number & Descriptions

Technical

PVD B						PVD B					
Definition	EDP	Description	Grade	Previous Part No	Page No.	Definition	EDP	Description	Grade	Previous Part No	Page No.
	034265	B 004NTN2		G12201570E			034720	B 010NTN4		G12403940E	
	034266	B 005NTN2		G12201960E			034721	B 015NTN4		G12405910E	B84
	034267	B 006NTN2		G12202360E			034722	B 020NTN4		G12407870E	
	034268	B 007NTN2		G12202750E			034723	B 025NTN4		G12409840E	
	034269	B 008NTN2		G12203150E			034724	B 030NN4		G12411810E	
	034270	B 009NTN2		G12203540E	B81		034725	B 040NN4	SP4556	G12415750E	
	034271	B 010NTN2		G12203940E			034726	B 050NN4		G12419680E	
	034272	B 012NTN2		G12204720E			034727	B 060NN4		G12423620E	B63
	034273	B 015NTN2		G12205910E			034728	B 080NN4		G12431500E	
	034274	B 020NTN2	SP4556	G12207870E			034729	B 100NN4		G12439370E	
	034275	B 025NTN2		G12209840E			034730	B 120NN4		G12447240E	
	034276	B 030NN2		G12211810E							
	034277	B 040NN2		G12215750E							
	034278	B 050NN2		G12219680E							
	034279	B 060NN2		G12223620E							
	034280	B 080NN2		G12231500E	B60						
	034281	B 100NN2		G12239370E							
	034282	B 120NN2		G12247240E							
	034283	B 160NN2		G12262990E							
	034284	B 200NN2		G12278740E							



Part Number & Descriptions



B

Definition	EDP	Description	Grade	Previous Part No	Page No.
	034738	B 040LL2		G12615750E	
	034739	B 060LL2		G12623620E	
	034740	B 060LXL2		G12623620E-XL	
	034741	B 080LL2		G12631500E	
	034742	B 080LXL2	SP4556	G12631500E-XL	B69
	034743	B 100LL2		G12639370E	
	034744	B 100LXL2		G12639370E-XL	
	034745	B 120LL2		G12647240E	
	034746	B 120LXL2		G12647240E-XL	



Technical










Part Number & Descriptions

Technical

PVD ERC						PVD HE					
Definition	EDP	Description	Grade	Previous Part No	Page No.	Definition	EDP	Description	Grade	Previous Part No	Page No.
	034343	ERC 030NT3		G16311810M6			034352	HE 020NT4		G16407870	
	034344	ERC 040NT3		G16315750M6			034353	HE 030NT4		G16411810	
	034345	ERC 050NT3		G16319680M6			034354	HE 040NT4		G16415750	
	034346	ERC 060NN3		G16323620M6			034355	HE 050NT4		G16419680	
	034347	ERC 080NN3	SP4035	G16331500	B20		034356	HE 060NN4	SP4035	G16423620	B23
	034348	ERC 100NN3		G16339370			034357	HE 080NN4		G16431500	
	034349	ERC 120NN3		G16347240			034358	HE 100NN4		G16439370	
	034839	ERC 160NN3		G16362990			034359	HE 120NN4		G16447240	
	034351	ERC 200NN3		G16378740			034360	HE 160NN4		G16462990	



Part Number & Descriptions

 HER					
Definition	EDP	Description	Grade	Previous Part No	Page No.
     	034361	HER 060NN4-E		G16823620-05	
	034362	HER 060NN4-G		G16823620-10	
	034363	HER 080NN4-E		G16831500-05	
	034364	HER 080NN4-G	SP4035	G16831500-10	B26
	034365	HER 100NN4-E		G16839370-05	
	034366	HER 100NN4-G		G16839370-10	
	034367	HER 120NN4-E		G16847240-05	
	034368	HER 120NN4-G		G16847240-10	





Part Number & Descriptions

Technical


PVD HB						PVD HMR					
Definition	EDP	Description	Grade	Previous Part No	Page No.	Definition	EDP	Description	Grade	Previous Part No	Page No.
	034375	HB 030LTL2		G17211810LF			034333	HMR 030NTN6-C		G16011810-025	
	034376	HB 040LTL2		G17215750LF			034334	HMR 040NTN6-C		G16015750-025	
	034377	HB 060LL2		G17223620LF			034335	HMR 050NTN6-C		G16019680-025	
	034378	HB 080LL2	SP4035	G17231500LF	B29		034336	HMR 060NN6-C		G16023620-025	
	034379	HB 100LL2		G17239370LF			034645	HMR 060NN6-E		G16023620-050	
	034380	HB 120LL2		G17247240LF			034337	HMR 080NN6-C		G16031500-025	
							034646	HMR 080NN6-E		G16031500-050	
							034338	HMR 100NN6-C	SP4035	G16039370-025	B32
							034339	HMR 100NN6-E		G16039370-050	
							034340	HMR 120NN6-C		G16047240-025	
							034647	HMR 120NN6-E		G16047240-050	
							034341	HMR 160NN6-C		G16062990-025	
							034648	HMR 160NN6-E		G16062990-050	
							034342	HMR 200NN6-C		G16078740-025	



Part Number & Descriptions



HMN

Definition	EDP	Description	Grade	Previous Part No	Page No.
	034369	HMN 060NN6		G16923620	
	034370	HMN 080NN6		G16931500	
	034371	HMN 100NN6	SP4035	G16939370	B37
	034372	HMN 120NN6		G16947240	
	034373	HMN 160NN6		G16962990	
	034374	HMN 200NN6		G16978740	



Technical



Part Number & Descriptions

Technical

Uncoated EA						Uncoated HPA					
Definition	EDP	Description	Grade	Previous Part No	Page No.	Definition	EDP	Description	Grade	Previous Part No	Page No.
	034322	EA 020NTN2		G15207870			034381	HPA 030NN2		G19211810	
	034323	EA 025NTN2		G15209840			034382	HPA 040NN2		G19215750	
	034324	EA 030NN2		G15211810			034383	HPA 050NN2		G19219680	
	034325	EA 040NN2		G15215750			034384	HPA 060NN2		G19223620	
	034326	EA 050NN2		G15219680			034385	HPA 080NN2	SU0800	G19231500	B43
	034327	EA 060NN2	SU0800	G15223620	B40		034386	HPA 100NN2		G19239370	
	034328	EA 080NN2		G15231500			034387	HPA 120NN2		G19247240	
	034329	EA 100NN2		G15239370			034388	HPA 160NN2		G19262990	
	034330	EA 120NN2		G15247240			034389	HPA 200NN2		G19278740	
	034331	EA 160NN2		G15262990							
	034332	EA 200NN2		G15278740							



TURNING

Turning





This product catalog highlights a broad range of tooling solutions ideal for turning, boring, threading, grooving and cutoff applications and features:

- A complete range of PVD and CVD “First Choice” grades that includes the advanced NL range of coatings, fine-tuned to specific materials and applications for optimum results.
- Geometries that also offer a “First Choice” range from finishing to roughing to meet the increasing demands of higher feed rates for greater chip control.
- Comprehensive threading programs available in a wide range of standard and customer licensed thread forms.
- A full line of toolholders and boring bars to support and compliment our elite grade and geometry programs.
- Application and customer service support from our technical sales engineers ready to address your on-site needs and backed by an experienced customer service team.

Rely on Kennametal to achieve “Best in Class” machining solutions for your high performance applications.

Please contact us for additional information on any of the products illustrated in this catalog or any other part of Kennametal’s comprehensive tooling program.

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Fax: 0800 807 701

SVIZZERA ITALIANA
Tel: 0800 807 722
Fax: 0800 807 701



Turning

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GRADES SELECTION	C24
GRADE DESCRIPTIONS	C25 - C29
GRADE GEOMETRY	C30 - C31
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The following Material Guide pages enable you to select the appropriate geometry and grade along with a suggested start point for speeds and feeds. Simply select the material to be machined and type of machining operation.

1st Choice

- 1 Select your material.
- 2 Select your machining operation from finishing to roughing.
- 3 Recommended geometry for the operation.
- 4 Maximum and minimum depth of cut for this geometry.
- 5 Maximum and minimum feed for this geometry.
- 6 Choose the machining condition as below:

Interrupted cut



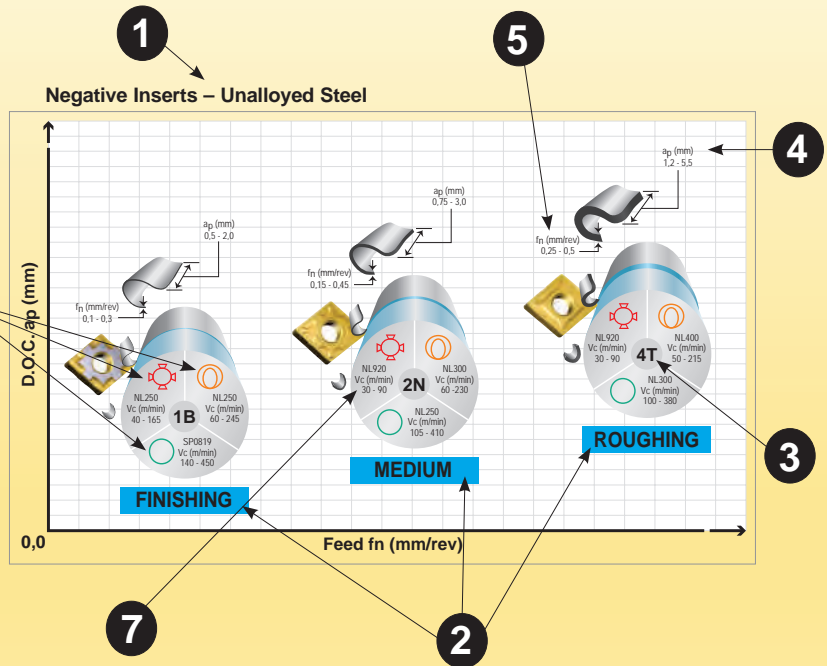
Varying depth of cut

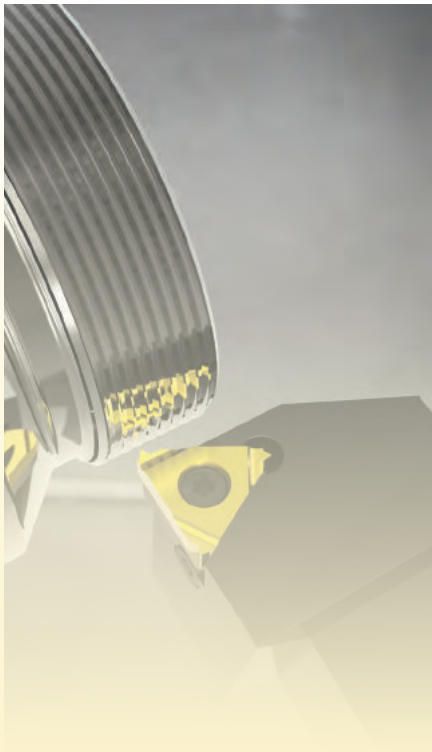


Good condition



- 7 Recommended grade and cutting speeds for this condition.





Unalloyed Steels



Alloyed Steels



Stainless Steels



M

PH Stainless



Cast Irons



K

Aluminum & Alloys



N

High Temperature Alloys



S

Hard Materials (52-56 HRC)

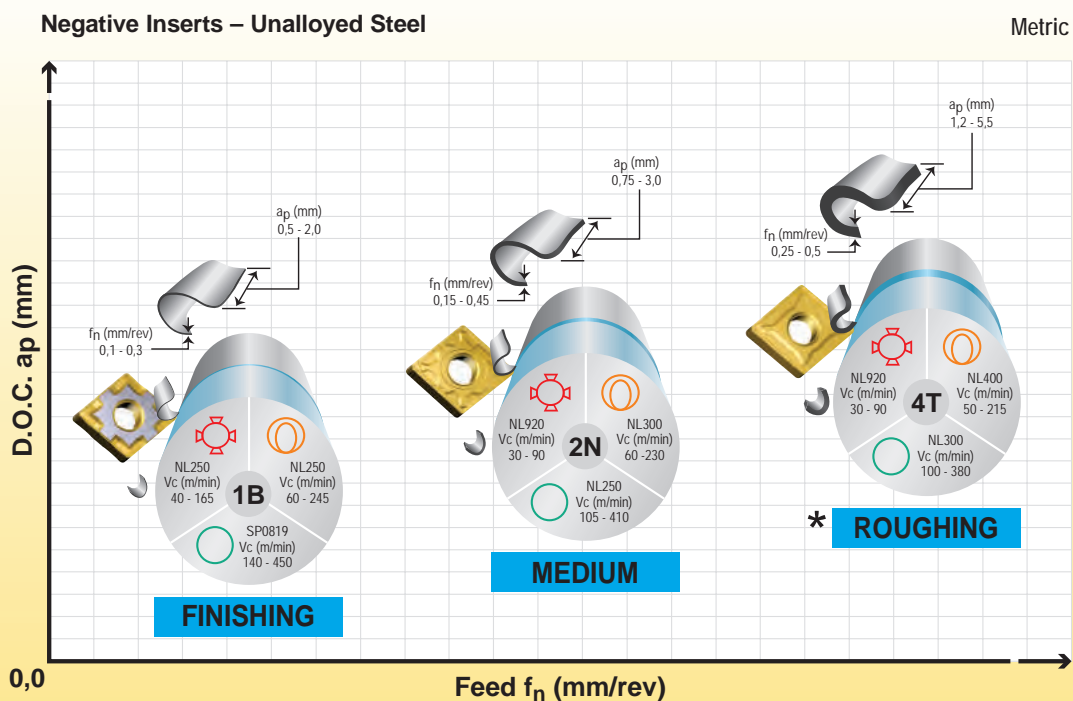


H

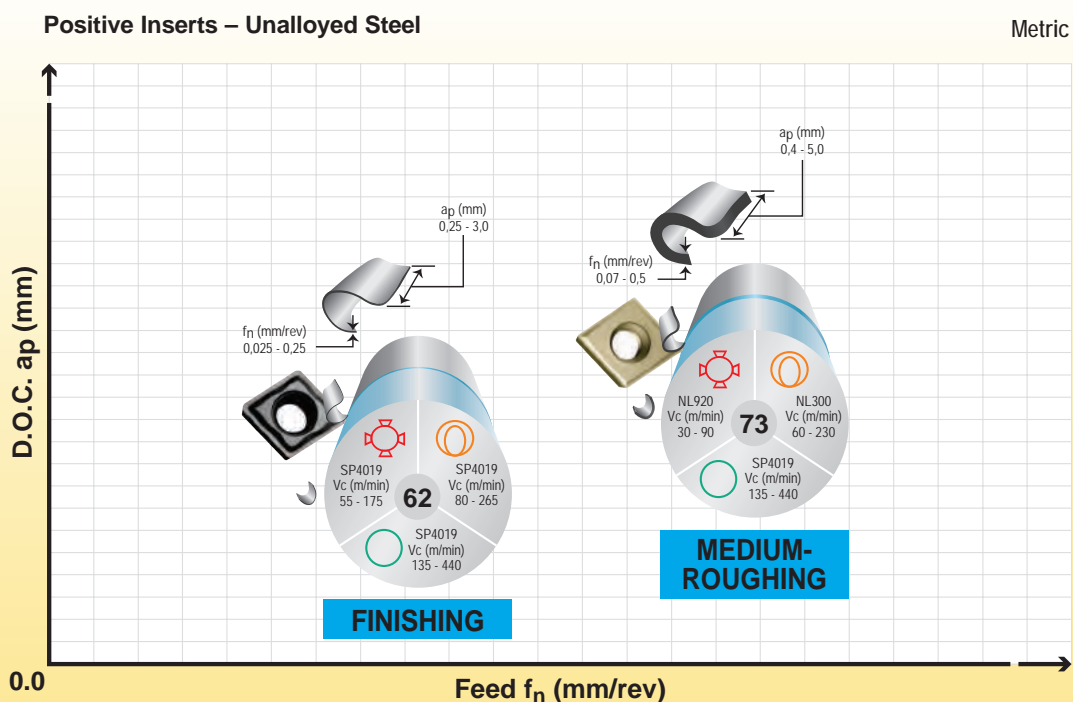
Material Guide – Key to Recommended Inserts

Material Designation

Unalloyed Steels
 Alloyed Steels
 Stainless Steels
 PH Stainless
 Cast Irons
 Aluminum & Alloys
 High Temp. Alloys
 Hard Materials

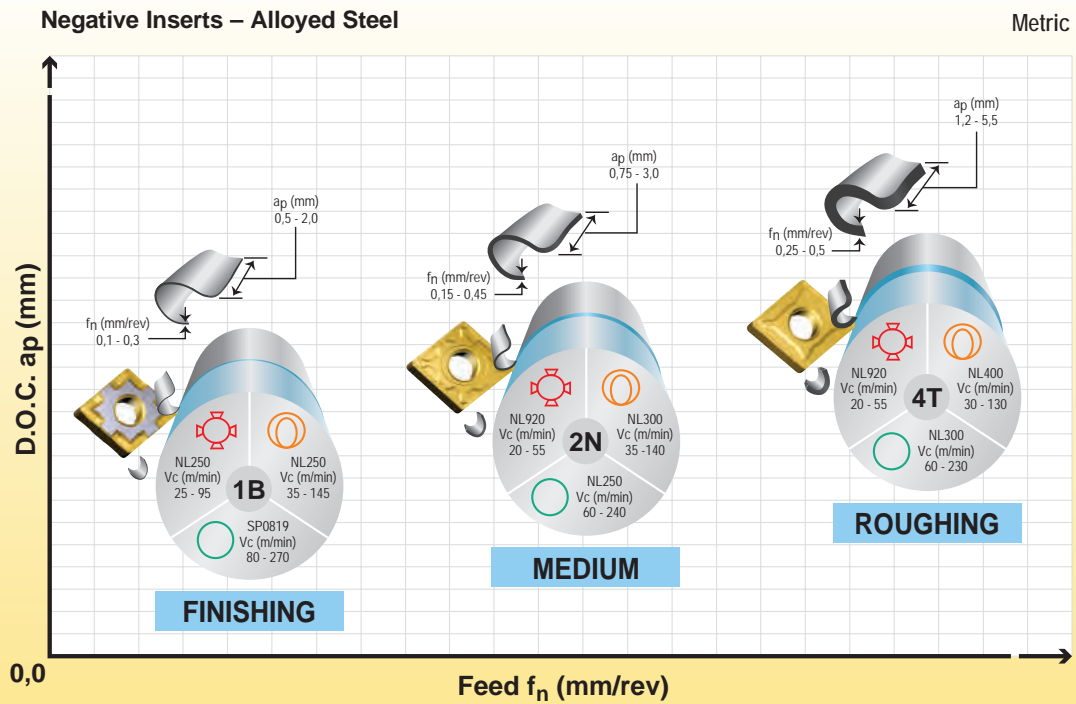


*Note: For Heavy Roughing applications see 5R geometry, page C17.

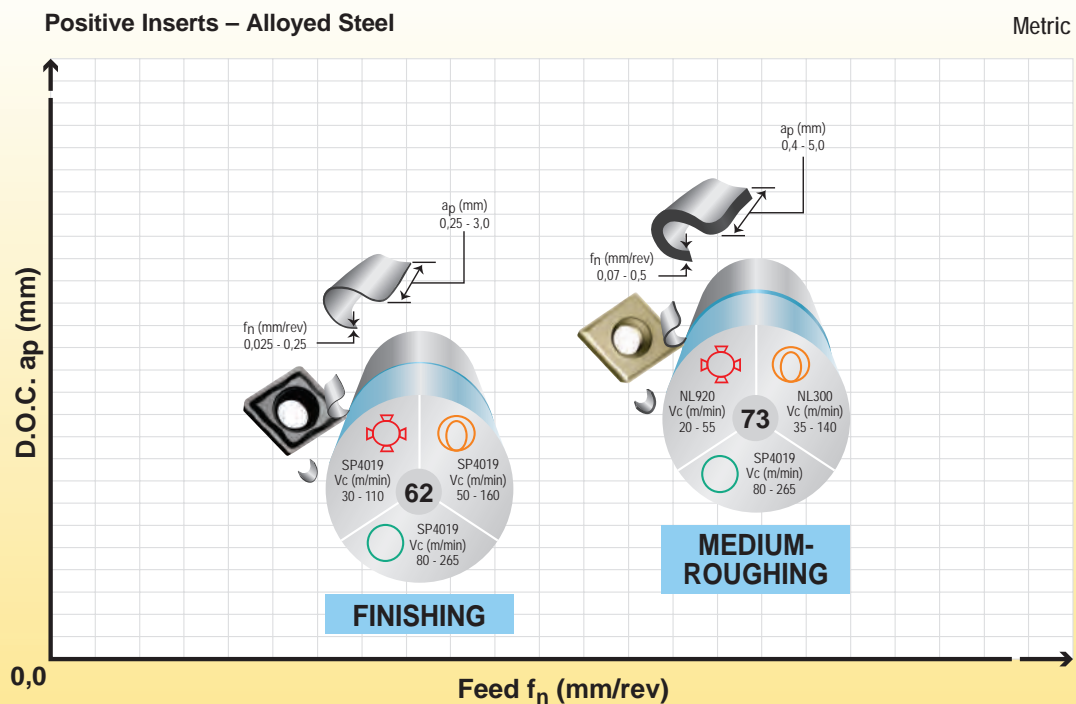


Please note the above recommended cutting speeds, geometries and grades are for guidance only.
For more detailed information, see pages C12 - C23 (geometry technical information & grade technical information).

Key	Interrupted cut	Varying depth of cut	Good condition

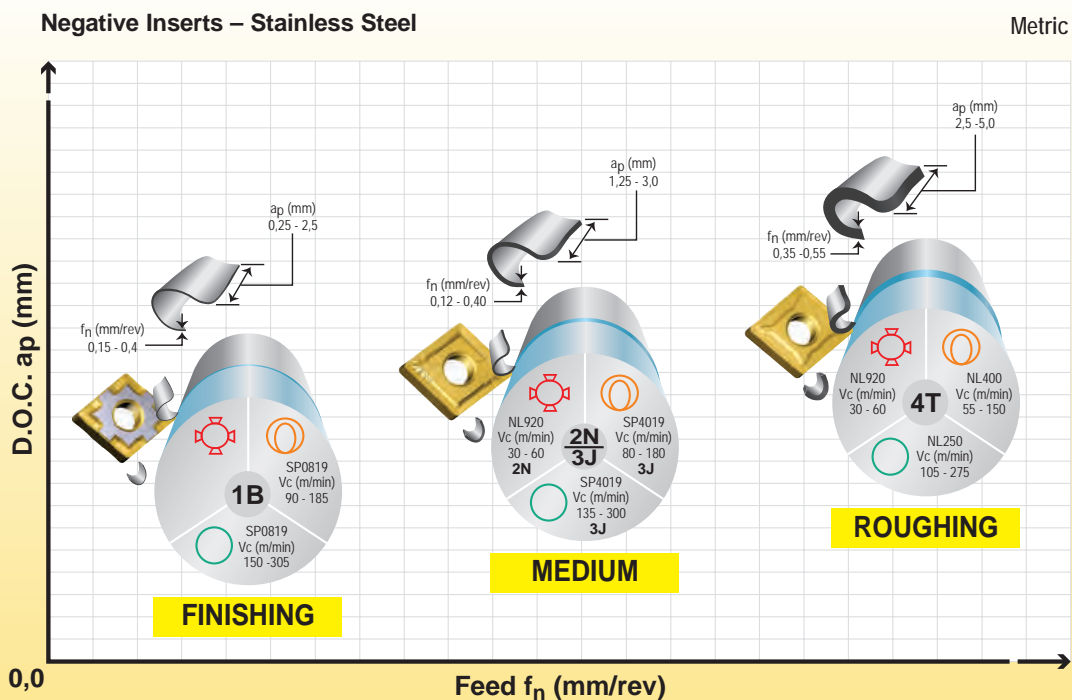


*Note: For Heavy Roughing applications see 5R geometry, page C17.

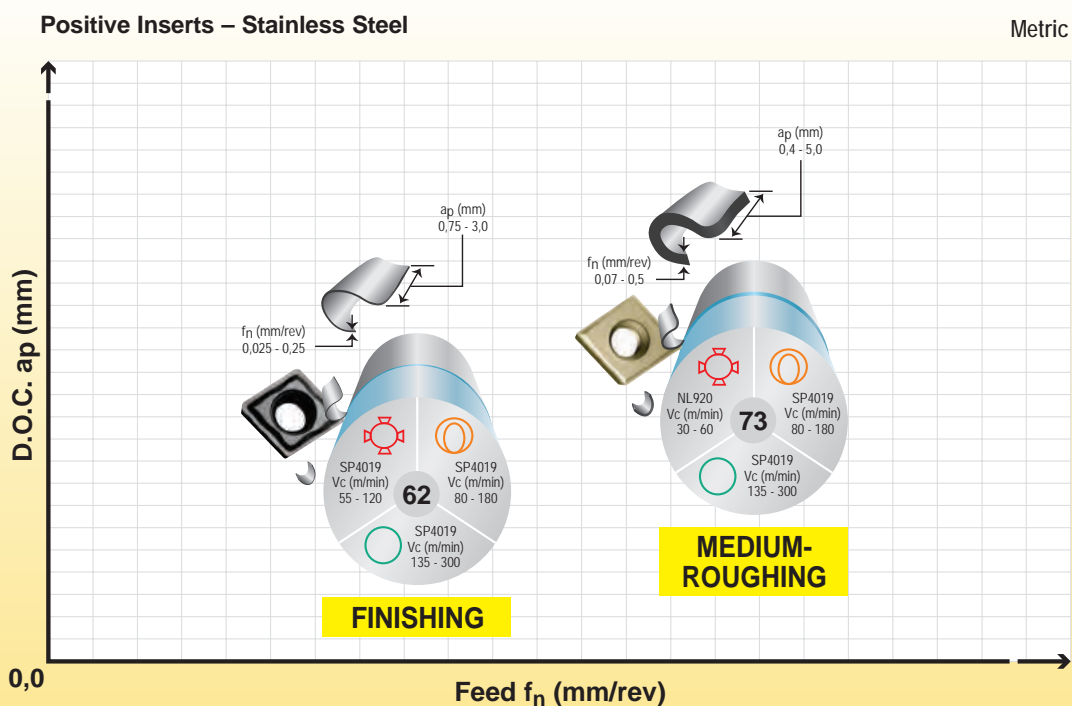


Please note the above recommended cutting speeds, geometries and grades are for guidance only. For more detailed information, see pages C12 - C23 (geometry technical information & grade technical information).

Key		Interrupted cut		Varying depth of cut		Good condition
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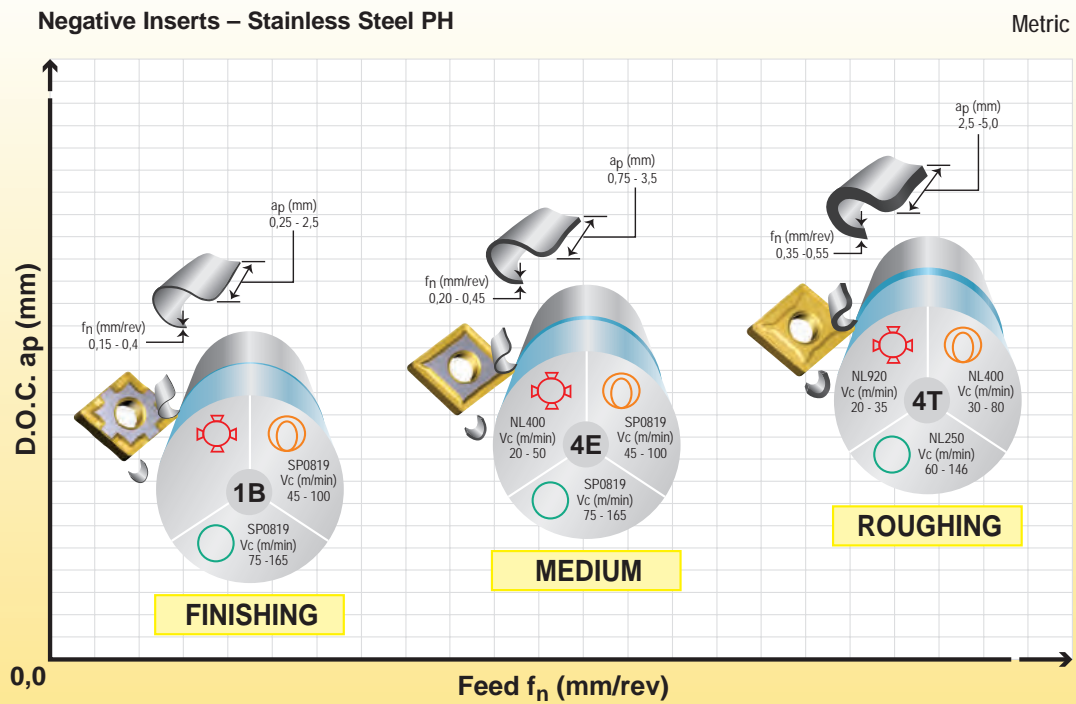


*Note: For Heavy Roughing applications see 5R geometry, page C17.

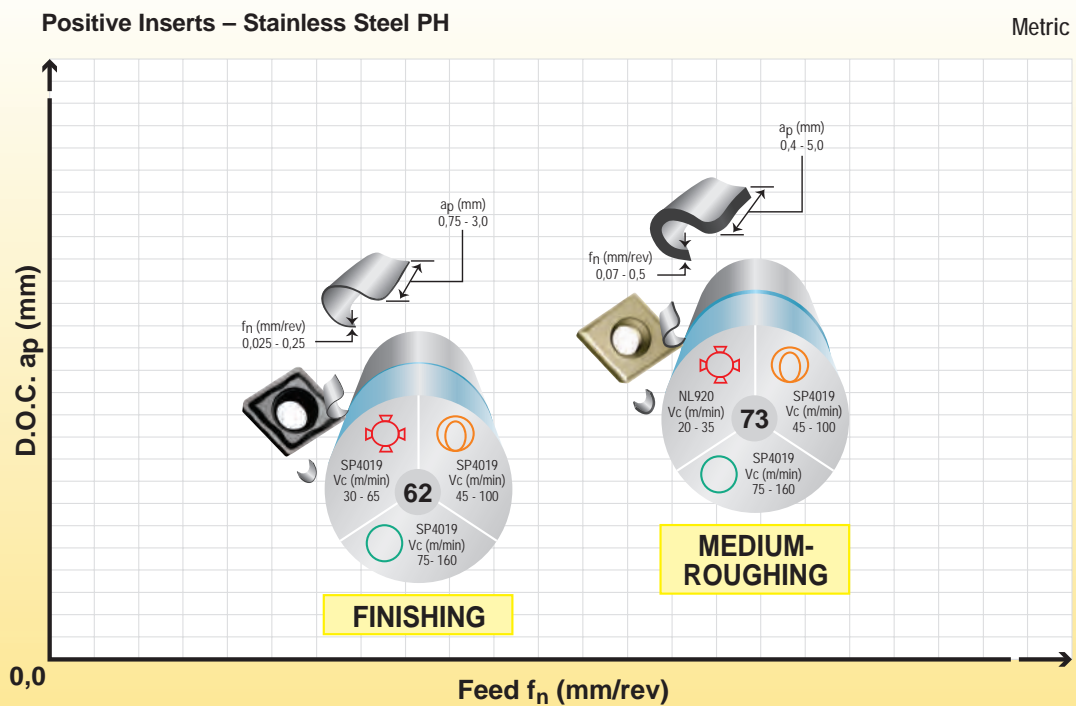


Please note the above recommended cutting speeds, geometries and grades are for guidance only.
 For more detailed information, see pages C12 - C23 (geometry technical information & grade technical information).

Key		Interrupted cut		Varying depth of cut		Good condition
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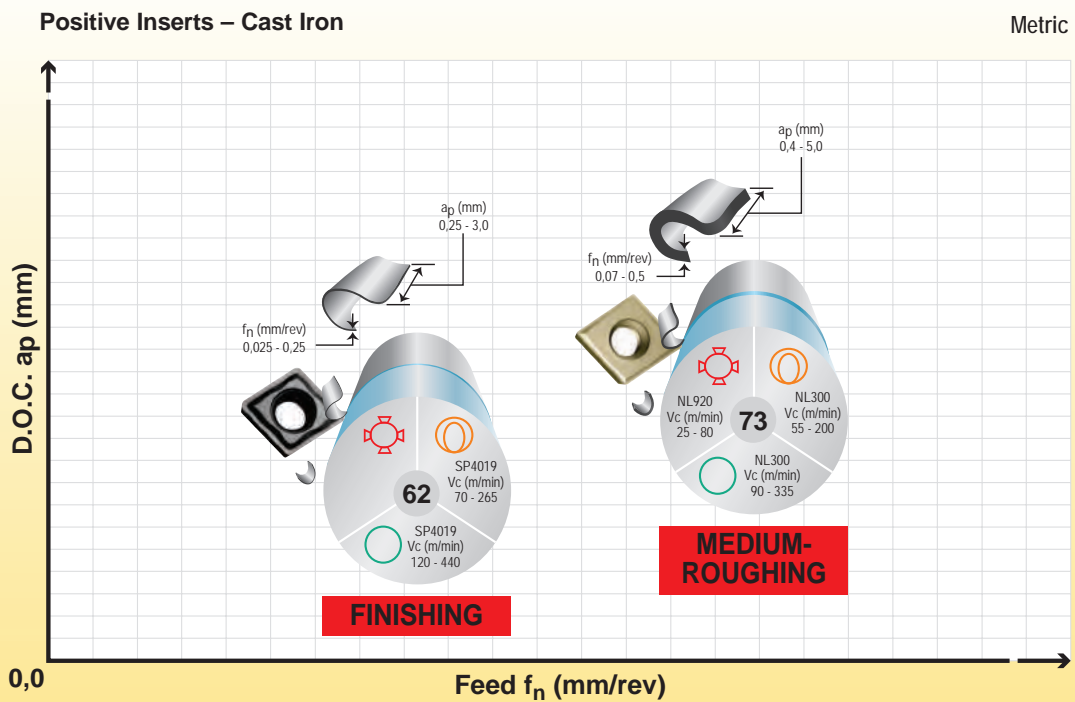
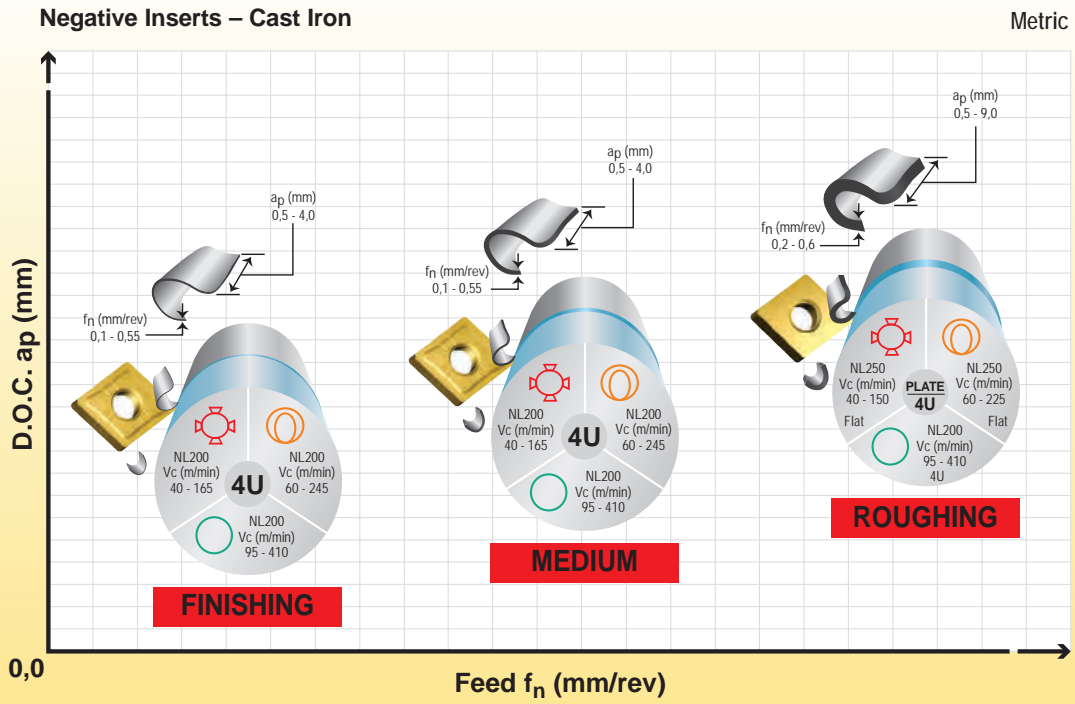


*Note: For Heavy Roughing applications see 5R geometry, page C17.



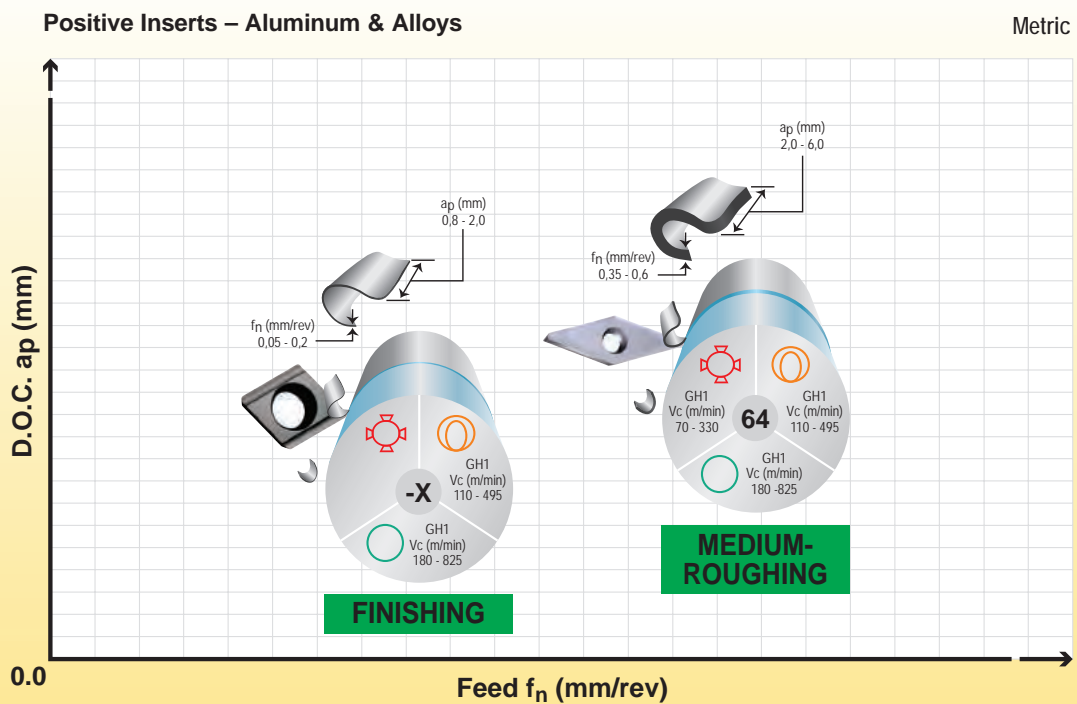
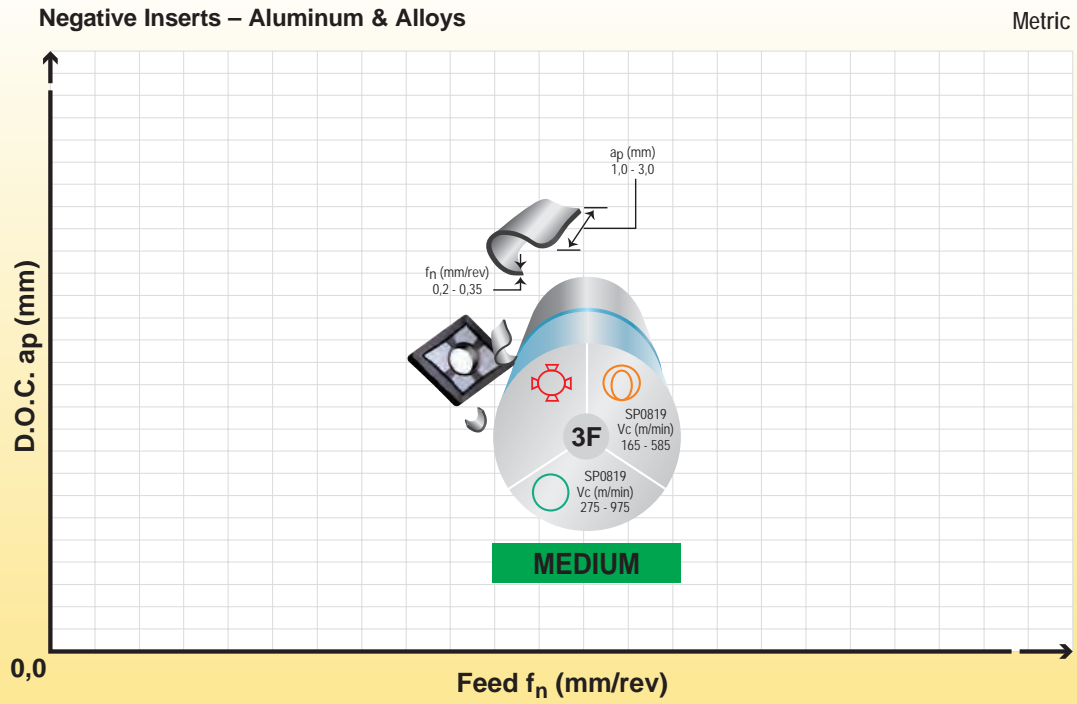
Please note the above recommended cutting speeds, geometries and grades are for guidance only.
 For more detailed information, see pages C12 - C23 (geometry technical information & grade technical information).

Key		Interrupted cut		Varying depth of cut		Good condition
------------	--	-----------------	--	----------------------	--	----------------



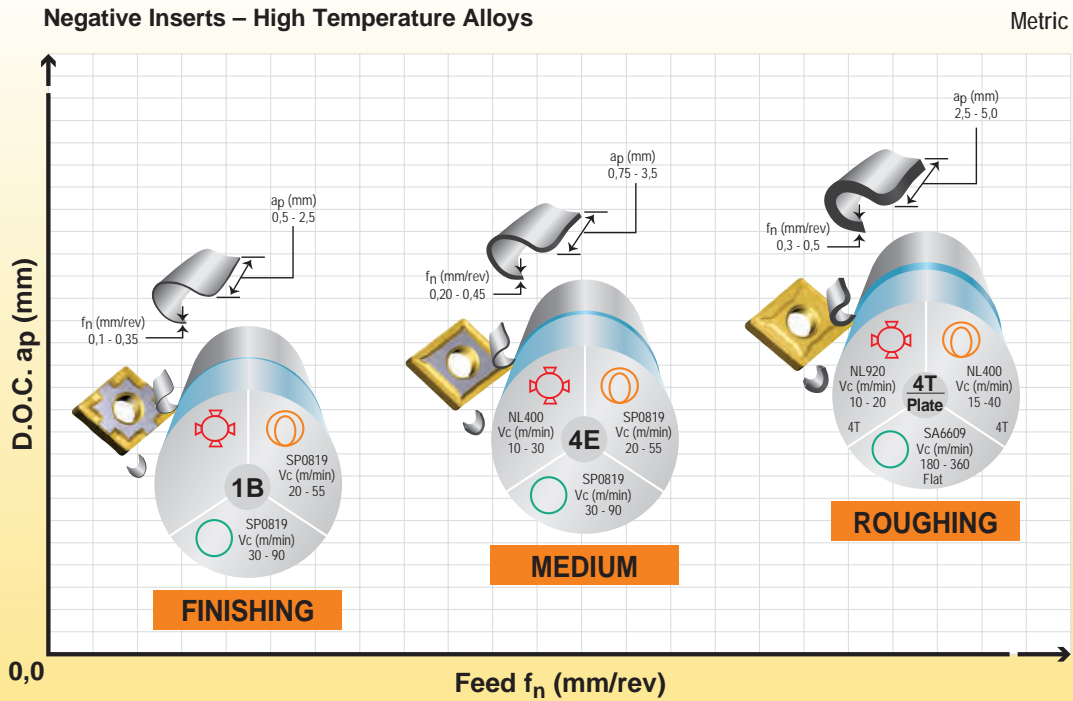
Please note the above recommended cutting speeds, geometries and grades are for guidance only.
For more detailed information, see pages C12 - C23 (geometry technical information & grade technical information).

Key	Interrupted cut	Varying depth of cut	Good condition

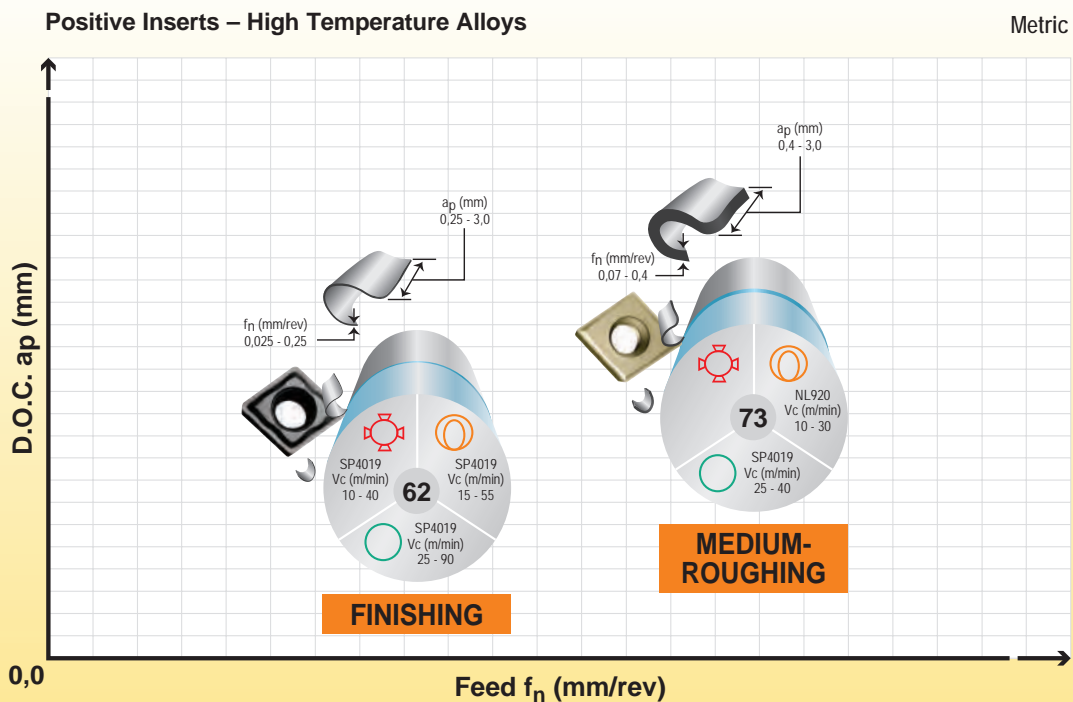


Please note the above recommended cutting speeds, geometries and grades are for guidance only. For more detailed information, see pages C12 - C23 (geometry technical information & grade technical information).

Key		Interrupted cut		Varying depth of cut		Good condition
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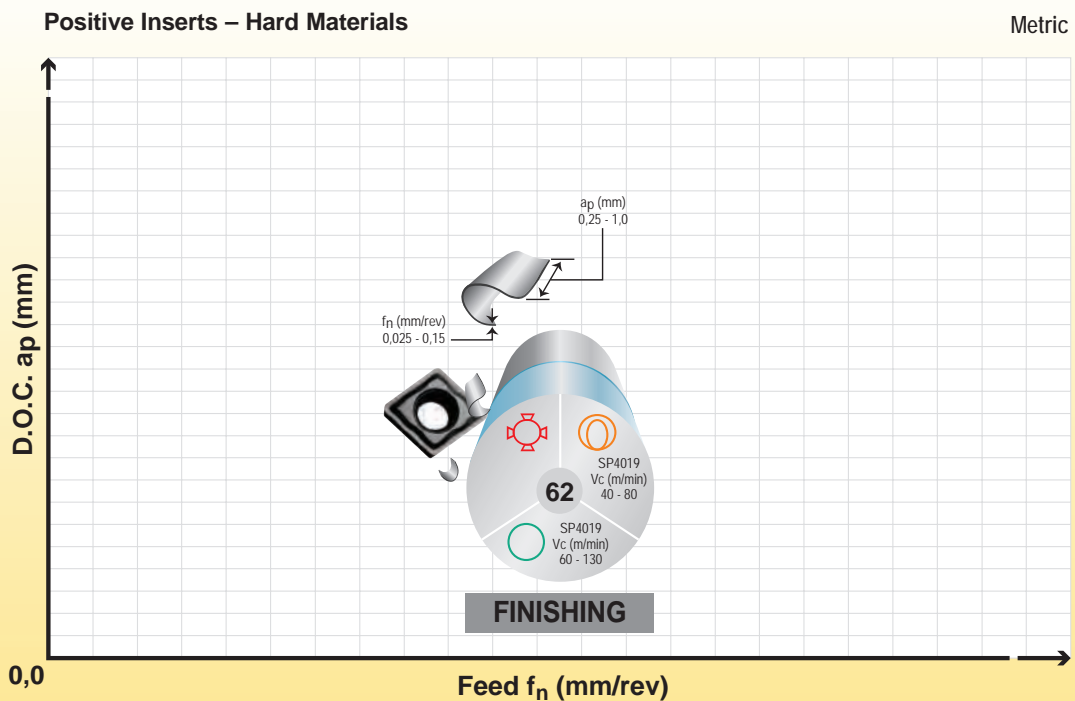
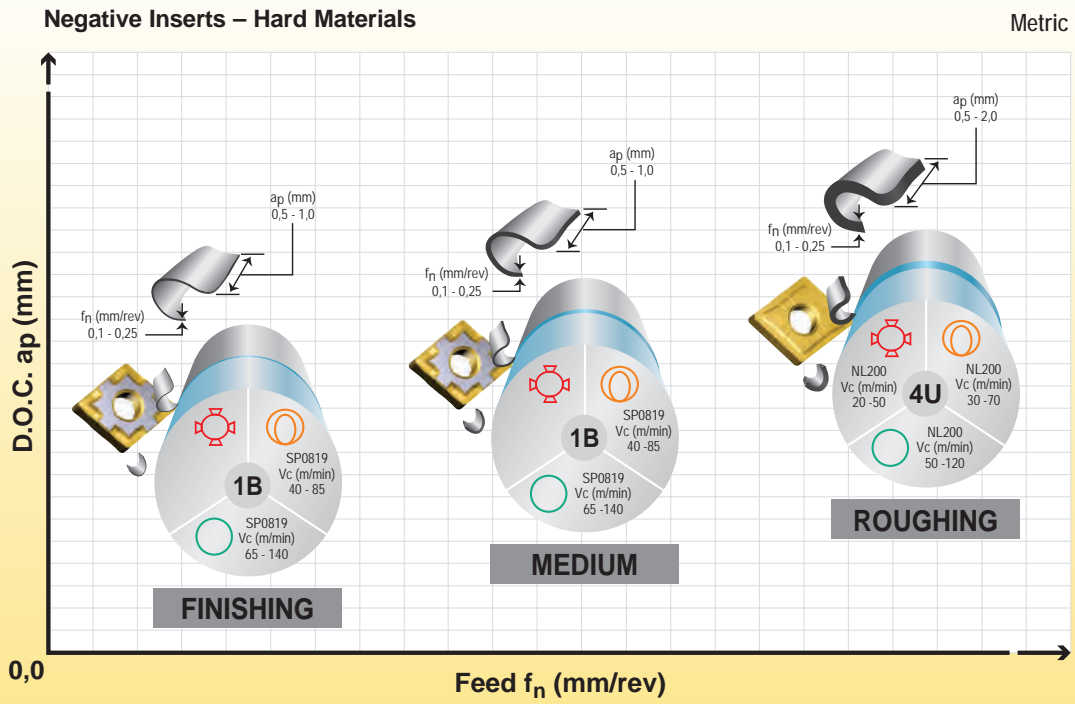


*Note: For Heavy Roughing applications see 5R geometry, page C17.



Please note the above recommended cutting speeds, geometries and grades are for guidance only.
 For more detailed information, see pages C12 - C23 (geometry technical information & grade technical information).

Key	Interrupted cut	Varying depth of cut	Good condition
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Please note the above recommended cutting speeds, geometries and grades are for guidance only.
For more detailed information, see pages C12 - C23 (geometry technical information & grade technical information).

Key		Interrupted cut		Varying depth of cut		Good condition
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1st Choice



Diamond will indicate the recommended insert for each material. Stellram's Material Guide enables you to find the right insert for your machining requirements.

- 1 Application information
- 2 Material Guide information – diamond indicates the recommended materials related to the geometry.
- 3 Detailed outline of geometry profile.
- 4 Identifies depth of cut (D.O.C) and feed rate range applicable to the geometry.
- 5 Cutting condition applicable to geometry.

2N Inserts

2N Geometry Technical Information

Light to Medium Roughing:

The 2N Geometry's positive rake angle, provides a positive cutting action with reduced cutting pressure, making it an excellent first choice for a wide range of applications and materials.

Available in Grades: NL250, NL300 & NL920

Materials Application

NL250					
P	M	K	N	S	H
♦	♦				

NL300					
P	M	K	N	S	H
♦	♦				

NL920					
P	M	K	N	S	H
♦	♦				

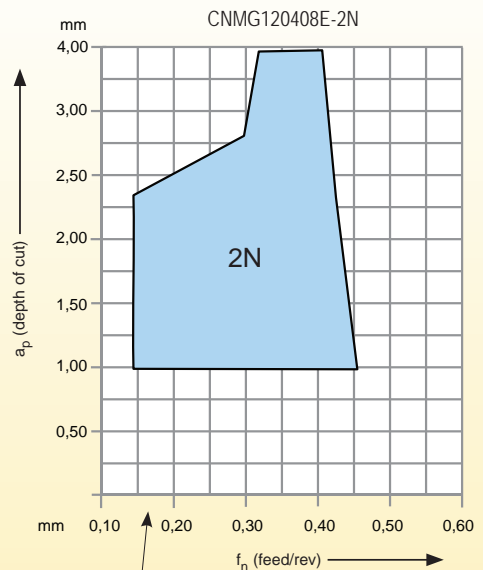
Cutting Condition



Profile



Alloyed Steel: 900 - 1200 N/mm² HBN 260 - 340



2

3

4

1B Geometry Technical Information

Finishing:

The 1B Geometry is ideal for the finish machining of Steels, Stainless Steels, and High Temperature Alloys. The precisely controlled cutting edge and nose profile removes material cleanly and efficiently, leaving a superior surface finish. **Available in Grades: SP0819 & NL250**

Materials Application

SP0819					
P	M	K	N	S	H
◆	◆			◆	◆

NL400					
P	M	K	N	S	H
◆	◆			◆	

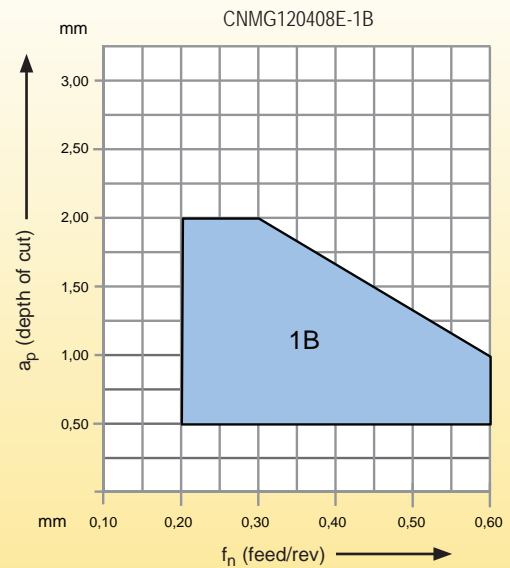
Cutting Condition



Profile



Alloyed Steel: 4140 (41CrMo4)



2N Inserts

2N Geometry Technical Information

Light to Medium Roughing:

The 2N Geometry's positive rake angle, provides a positive cutting action with reduced cutting pressure, making it an excellent first choice for a wide range of applications and materials.

Available in Grades: NL250, NL300 & NL920

Materials Application

NL250					
P	M	K	N	S	H
◆	◆				

NL300					
P	M	K	N	S	H
◆	◆				

NL920					
P	M	K	N	S	H
◆	◆				

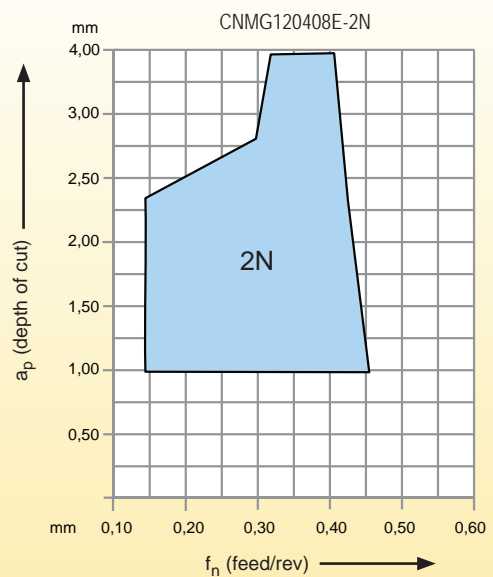
Cutting Condition



Profile



Alloyed Steel: 900 - 1200 N/mm² HBN 260 - 340



Material Guide – Key to Recommended Inserts

Material Designation

- ◆ Unalloyed Steels
- ◆ Alloyed Steels
- ◆ Stainless Steels
- ◆ PH Stainless
- ◆ Cast Irons
- ◆ Aluminum & Alloys
- ◆ High Temp. Alloys
- ◆ Hard Materials

3F Geometry Technical Information

Finishing to Light Roughing:

The 3F Geometry has a precision ground periphery to ensure a precise cutting edge profile, with accurate indexability. The micro edge conditioning reduces the cutting pressure, built-up edge and improves the surface finish in difficult to machine materials. **Available in Grade: SP0819**

Materials Application

SP0819					
P	M	K	N	S	H
	◆		◆	◆	

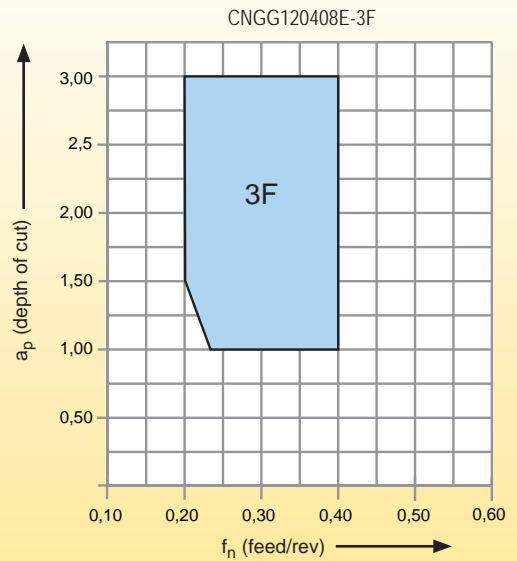
Cutting Condition



Profile



Stainless Steel: ATI 316™



3J Inserts

3J Geometry Technical Information

Medium to Light Roughing:

The 3J Geometry has a smooth cutting action which reduces cutting forces, improves surface finishes and increases the tool life, making it ideal for the machining of Stainless Steels. **Available in Grade: SP4019**

Materials Application

SP4019					
P	M	K	N	S	H
	◆			◆	

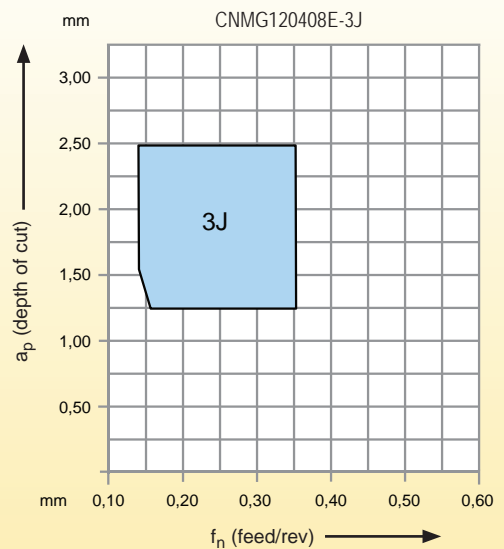
Cutting Condition



Profile



Stainless Steel: ATI 316™



Material Guide – Key to Recommended Inserts

Material Designation

- ◆ Unalloyed Steels
- ◆ Alloyed Steels
- ◆ Stainless Steels
- ◆ PH Stainless
- ◆ Cast Irons
- ◆ Aluminum & Alloys
- ◆ High Temp. Alloys
- ◆ Hard Materials

4E Geometry Technical Information

Semi-Finishing to Light Roughing:

The 4E Geometry was designed specifically for the machining of High Nickel, High Cobalt, and Titanium based alloys. It's reinforced chip-breaker and precision edge condition enhances the performance of this geometry. **Available in Grades: SP0819 & NL400**

Materials Application

SP0819					
P	M	K	N	S	H
◆	◆			◆	

NL400					
P	M	K	N	S	H
◆	◆			◆	

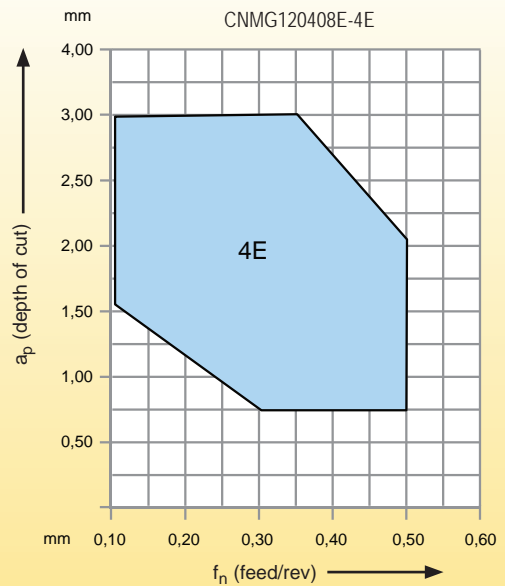
Cutting Condition



Profile



Titanium Alloy: ATI 6-4™



4T Inserts

4T Geometry Technical Information

General Purpose Roughing:

The 4T Geometry is the first choice for general purpose machining of all Steels, Stainless Steels and Cast Irons.

Available in Grades: NL250, NL300, NL400 & NL920

Materials Application

NL250					
P	M	K	N	S	H
◆	◆	◆			

NL300					
P	M	K	N	S	H
◆	◆	◆			

NL400					
P	M	K	N	S	H
◆	◆				

NL920					
P	M	K	N	S	H
◆	◆	◆			

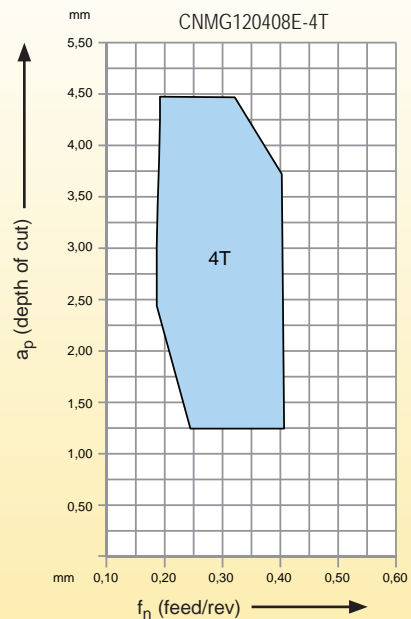
Cutting Condition



Profile



Alloyed Steel: 800 - 1200 N/mm² HBN 230 - 340



Material Guide – Key to Recommended Inserts

Material Designation

- ◆ P Unalloyed Steels
- ◆ P Alloyed Steels
- ◆ M Stainless Steels
- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials

4U Geometry Technical Information

Medium to Roughing:

The 4U Geometry was designed specifically for roughing applications in Grey, Ductile and Malleable Irons. The geometry design produces low cutting pressure with excellent chip control, enhancing the tool life.
Available in Grade: NL200

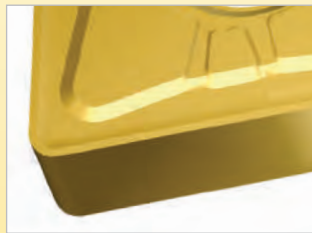
Materials Application

NL200					
P	M	K	N	S	H
♦		♦			♦

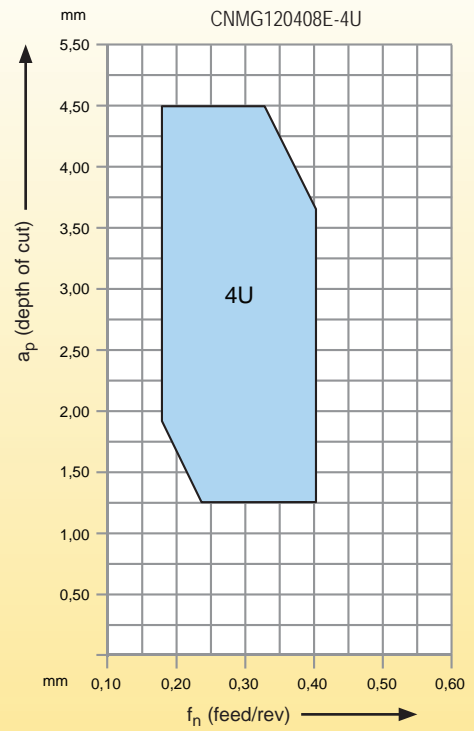
Cutting Condition



Profile



Ductile Iron: HBN 170



Material Guide – Key to Recommended Inserts

Material Designation

♦ Unalloyed Steels
 ♦ Alloyed Steels
 ♦ Stainless Steels
 ♦ PH Stainless
 ♦ Cast Irons
 ♦ Aluminum & Alloys
 ♦ High Temp. Alloys
 ♦ Hard Materials

5R Geometry Technical Information

Single Sided Heavy Roughing:

The 5R Geometry was designed specifically for the heavy, rough machining of Steels, Stainless Steels, High Nickel, High Cobalt and Titanium based alloys. It is the first choice when stability, high feed rates and strong edge conditions are required.

Available in Grades: NL300, NL400 & NL920

Materials Application

NL300					
P	M	K	N	S	H
◆	◆				

NL400					
P	M	K	N	S	H
◆	◆			◆	

NL920					
P	M	K	N	S	H
◆	◆			◆	

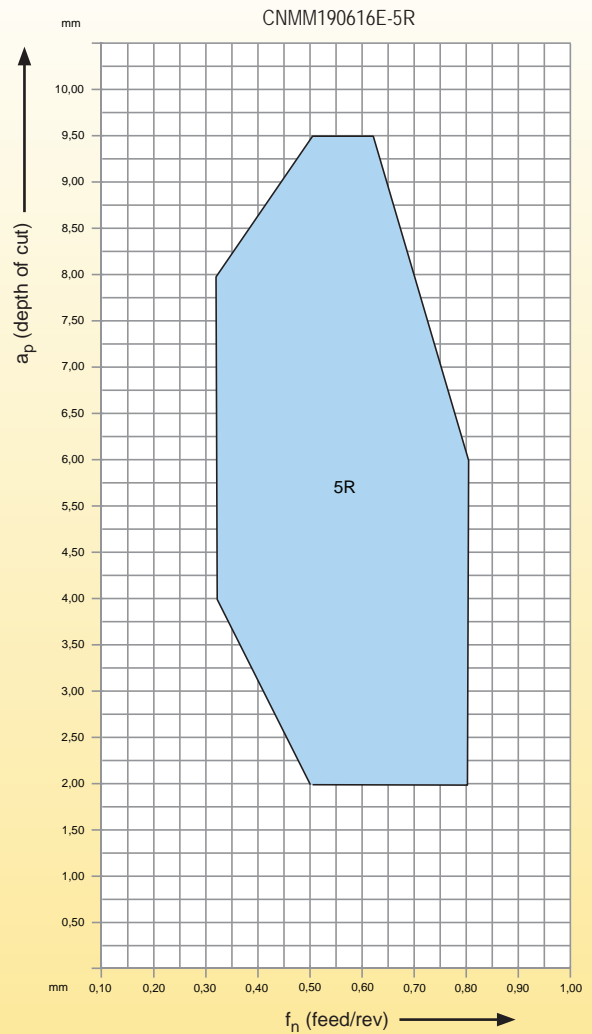
Cutting Condition



Profile



Stainless Steel: ATI 316™



Material Guide – Key to Recommended Inserts

Material Designation

- ◆ Unalloyed Steels
- ◆ Alloyed Steels
- ◆ Stainless Steels
- ◆ PH Stainless
- ◆ Cast Irons
- ◆ Aluminum & Alloys
- ◆ High Temp. Alloys
- ◆ Hard Materials

-15 Geometry Technical Information

Medium to Finishing:

The -15 Geometry is ideally suited to applications which require light depths of cut and feeds, and where vibration could be an issue. This geometry is ground and has a sharp edge condition.

Available in Grades: **SP4019 & GH1**

Materials Application

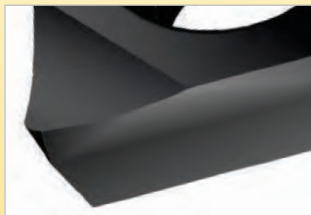
SP4019					
P	M	K	N	S	H
♦	♦			♦	

GH1					
P	M	K	N	S	H
			♦		

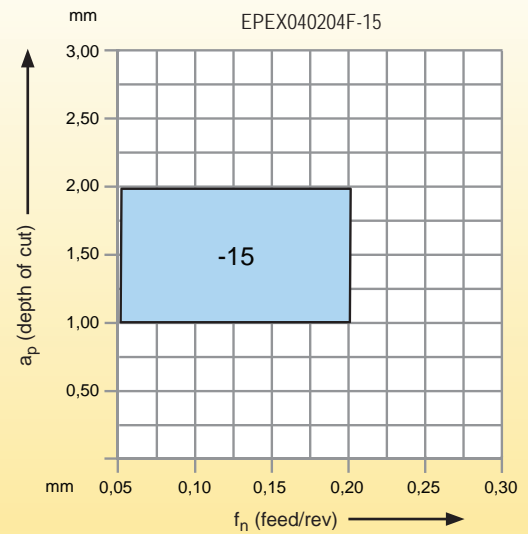
Cutting Condition



Profile



Aluminium: <16% Si HBN 116



-61 Inserts

-61 Geometry Technical Information

Finishing:

The -61 Geometry has 6 cutting edges and is one of the most economical inserts for small part machining. The chip-breaker provides good chip control and surface finish.

Available in Grade: **SP4019**

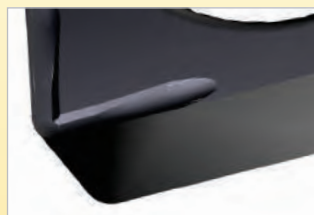
Materials Application

SP4019					
P	M	K	N	S	H
♦	♦	♦			

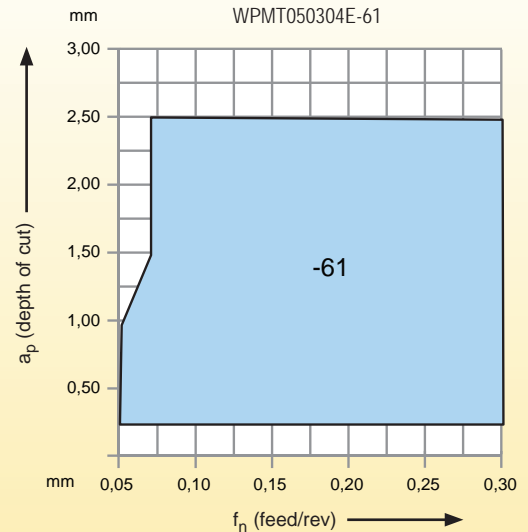
Cutting Condition



Profile



Unalloyed Steel: 750 - 950 N/mm² HBN 220 - 270



Material Guide – Key to Recommended Inserts

Material Designation

- ♦ Unalloyed Steels
- ♦ Alloyed Steels
- ♦ Stainless Steels
- ♦ PH Stainless
- ♦ Cast Irons
- ♦ Aluminum & Alloys
- ♦ High Temp. Alloys
- ♦ Hard Materials

-62 Geometry Technical Information

Finishing:

The -62 Geometry is one of the most versatile geometries for the machining of Steels, Stainless Steels, High Nickel, High Cobalt and Titanium based alloys. This positive geometry was designed for a wide variety of finishing applications.

Available in Grade: **SP4019**

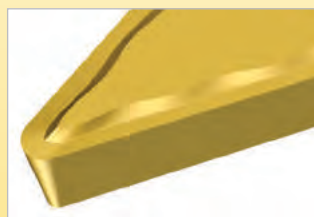
Materials Application

SP0819					
P	M	K	N	S	H
◆	◆	◆		◆	◆

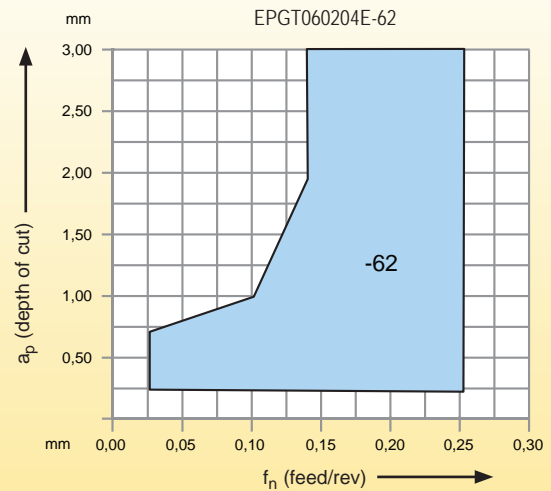
Cutting Condition



Profile



Unalloyed Steel: 750 - 950 N/mm² HBN 220 - 270



-64 Inserts

-64 Geometry Technical Information

Medium to Roughing:

The -64 Geometry is a very positive geometry, with polished top rake and ground periphery. Specifically designed for the machining of Aluminum, Plastics and Soft Alloys.

Available in Grade: **GH1**

Materials Application

GH1					
P	M	K	N	S	H
			◆		

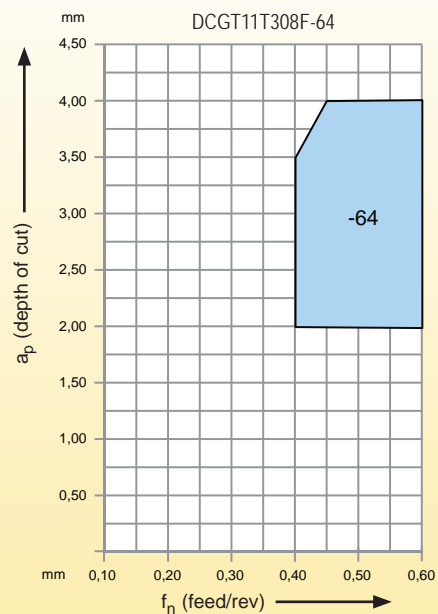
Cutting Condition



Profile



Aluminium: <16% Si HBN 116



Material Guide – Key to Recommended Inserts

Material Designation

- ◆ Unalloyed Steels
- ◆ Alloyed Steels
- ◆ Stainless Steels
- ◆ PH Stainless
- ◆ Cast Irons
- ◆ Aluminum & Alloys
- ◆ High Temp. Alloys
- ◆ Hard Materials

-66 Geometry Technical Information

Medium to Finishing:

The -66 Geometry has a precision ground periphery and pressed in chip-breaker, with a sharp edge condition, ideally suited for fine chip control when machining medical and small precision components.

Available in Grade: **GH1**

Materials Application

GH1					
P	M	K	N	S	H
♦			♦		

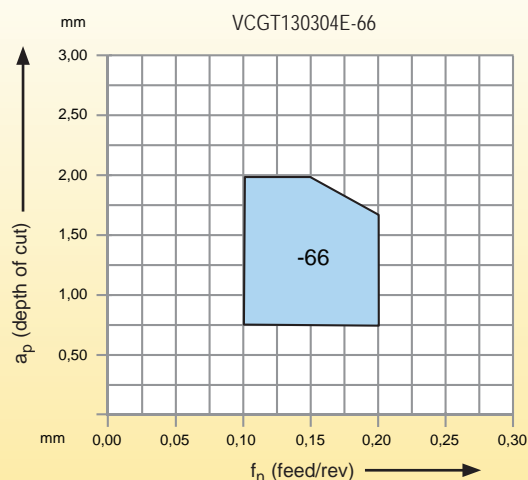
Cutting Condition



Profile



Stainless Steel: 450 - 700 N/mm² HBN 120 - 180



-73 Inserts

-73 Geometry Technical Information

Medium to Roughing:

The -73 Geometry is an as pressed geometry, covering a wide range of applications and materials, making it the ideal first choice for most medium to roughing, machining applications.

Available in Grades: **SP4019, NL300 & NL920**

Materials Application

SP4019					
P	M	K	N	S	H
♦	♦			♦	

NL300					
P	M	K	N	S	H
♦	♦				

NL920					
P	M	K	N	S	H
♦	♦			♦	

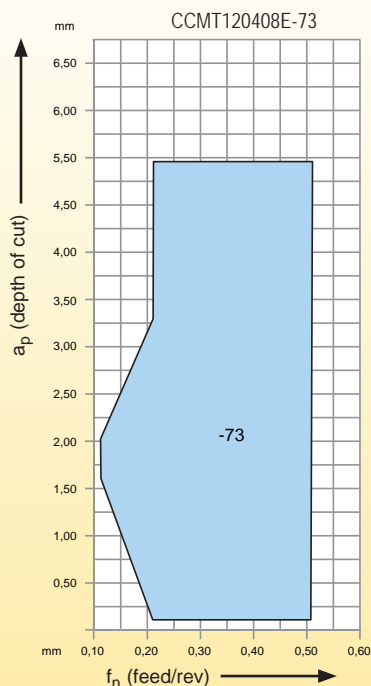
Cutting Condition



Profile



Alloyed Steel: 900 - 1200 N/mm² HBN 260 - 340



Material Guide – Key to Recommended Inserts

Material Designation

- ♦ Unalloyed Steels
- ♦ Alloyed Steels
- ♦ Stainless Steels
- ♦ PH Stainless
- ♦ Cast Irons
- ♦ Aluminum & Alloys
- ♦ High Temp. Alloys
- ♦ Hard Materials

-M Geometry Technical Information

Medium to Finishing:

The -M Geometry has a small, well defined chip-breaker for a soft cutting action, resulting in very little stress being produced, when machining small diameter components.

Available in Grades: SP4019 & GH1

Materials Application

SP4019					
P	M	K	N	S	H
◆	◆				◆

GH1					
P	M	K	N	S	H
	◆				◆

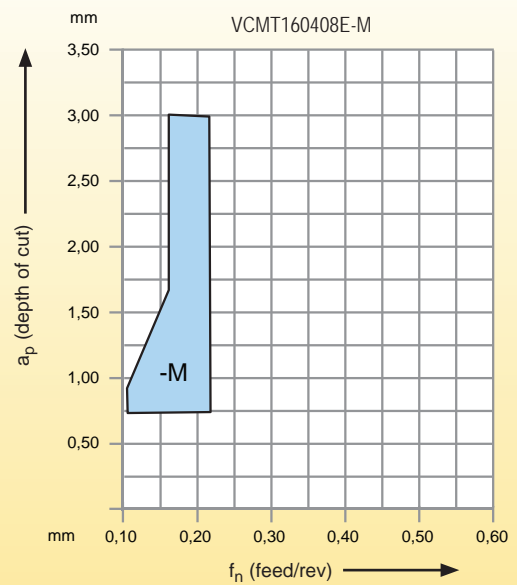
Cutting Condition



Profile



Unalloyed Steel: 750 - 950 N/mm² HBN 220 - 270



Material Guide – Key to Recommended Inserts

Material Designation

◆ Unalloyed Steels
 ◆ Alloyed Steels
 ◆ Stainless Steels
 ◆ PH Stainless
 ◆ Cast Irons
 ◆ Aluminum & Alloys
 ◆ High Temp. Alloys
 ◆ Hard Materials

-T Geometry Technical Information

Medium to Roughing:

The -T Geometry is a utility geometry giving a stable cutting action in a wide variety of demanding applications.

Available in Grades: SP4019, NL250, NL300, NL400 & NL920

Materials Application

SP4019					
P	M	K	N	S	H
◆	◆			◆	

NL250					
P	M	K	N	S	H
◆	◆				

NL300					
P	M	K	N	S	H
◆	◆				

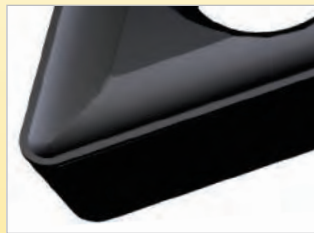
NL400					
P	M	K	N	S	H
◆	◆			◆	

NL920					
P	M	K	N	S	H
◆	◆			◆	

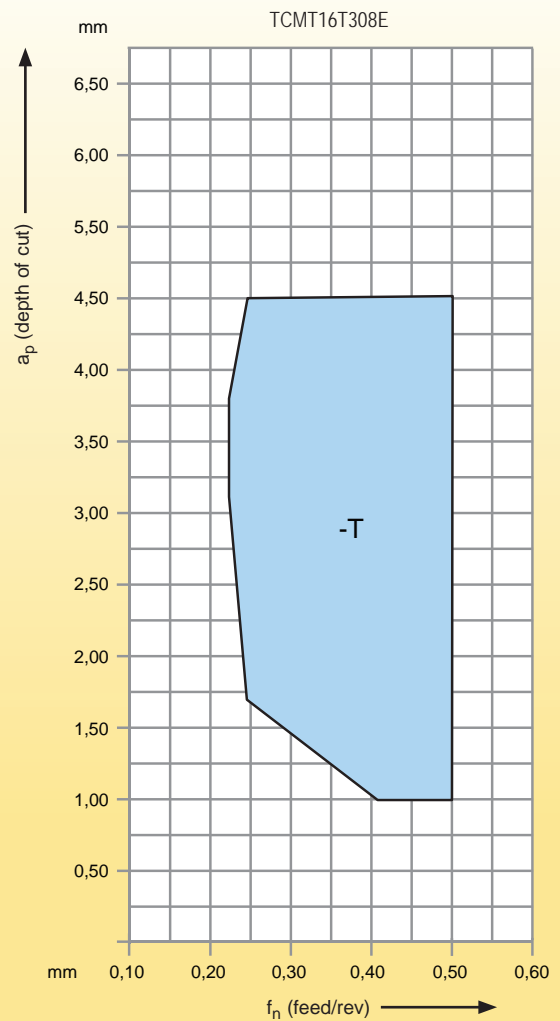
Cutting Condition



Profile



Unalloyed Steel: 750 - 950 N/mm² HBN 220 - 270



Material Guide – Key to Recommended Inserts

Material Designation

◆ P	Unalloyed Steels	◆ P	Alloyed Steels	◆ M	Stainless Steels	◆ M	PH Stainless	◆ K	Cast Irons	◆ N	Aluminum & Alloys	◆ S	High Temp. Alloys	◆ H	Hard Materials
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-X Geometry Technical Information

Medium to Roughing:

The -X Geometry has a precision ground parallel chip groove, available with a fully ground periphery or as pressed, both with a sharp edge condition. Ideal for the machining of components which have vibration sensitive applications.

Available in Grades: **SP4019 & GH1**

Materials Application

SP4019					
P	M	K	N	S	H
◆				◆	

GH1					
P	M	K	N	S	H
			◆		

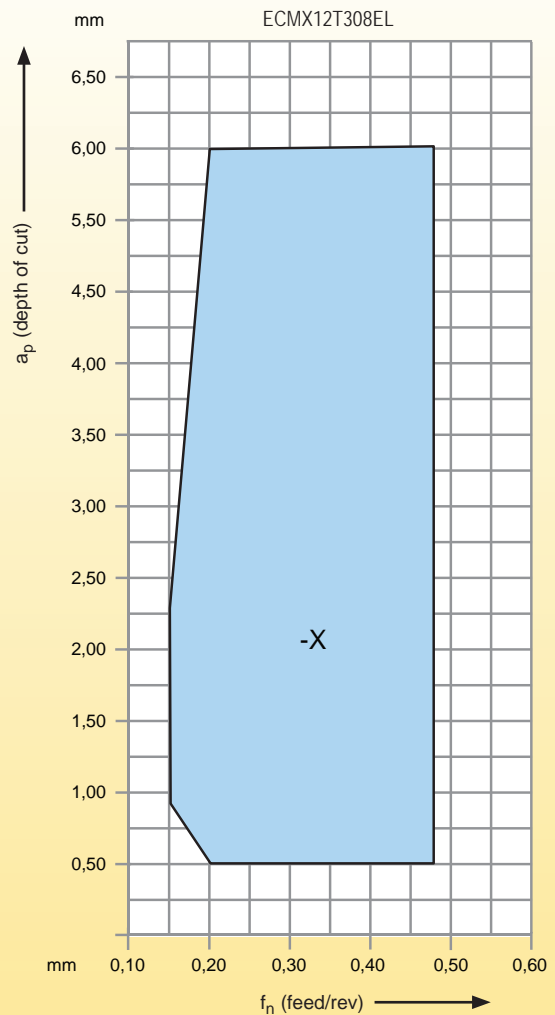
Cutting Condition



Profile



Aluminium: <16% Si HBN 116



Material Guide – Key to Recommended Inserts

Material Designation

- ◆ Unalloyed Steels
- ◆ Alloyed Steels
- ◆ Stainless Steels
- ◆ PH Stainless
- ◆ Cast Irons
- ◆ Aluminum & Alloys
- ◆ High Temp. Alloys
- ◆ Hard Materials



Stellram's range of carbide and ceramic grades offer solutions to suit all material groups.

Cutting Material Groups

Uncoated Grade

WEAR RESISTANCE

TOUGHNESS

GH1

Stellram's uncoated GH1 grade is a micro-gain carbide offering excellent wear resistance at high cutting speeds, in various materials and applications.

NL = CVD Coated Grades

WEAR RESISTANCE

TOUGHNESS

NL200

NL250

NL300

NL400

NL920

The **NL** range of CVD coated grades with enhanced surface layering have been specifically developed and engineered to machine at elevated cutting conditions, in a broad range of materials.

SP = PVD Coated Grades

WEAR RESISTANCE

TOUGHNESS

SP0819

SP4019

These PVD coated grades can be applied to varying applications and materials, but primarily designed to machine stainless steels, and high temperature alloys.

SA = Ceramic Grade

WEAR RESISTANCE

TOUGHNESS

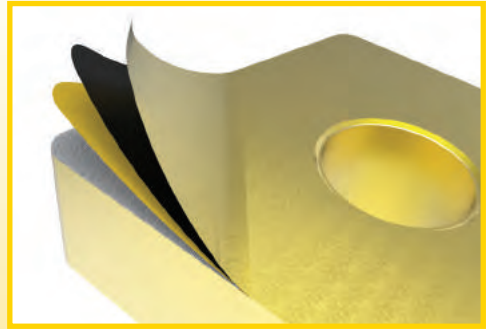
SA6609

SA6609 is an advanced silicon-carbide whisker reinforced ceramic grade, which makes it very resistant to edge fracture and notch wear, especially when machining high nickel, and high cobalt based alloys.

NL200

Coating Type: CVD

First choice to machine Cast Iron, this grade has a very good resistance to wear and deformation, suitable for medium and finishing applications on gray and malleable cast irons.



Available in the following geometries:
Medium – Roughing: 4U

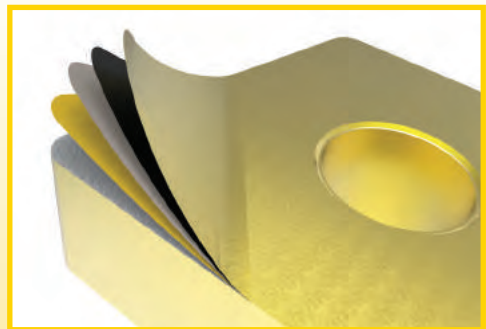
NL200	Application Range											MAX	DRY	Cutting speed	
	01	05	10	15	20	25	30	35	40	45	50			m/min	
	Vc min		Vc max												
◆◆ P			●	●	●							●	●	60	415
◆◆ M															
◆ K		●	●	●								●	●	95	410
◆ N															
◆ S															
◆ H	●	●										●		45	125

Recommended ● Acceptable ◎

NL250

Coating Type: CVD

Wear resistant grade for semi-finishing and finishing applications. Suitable for stable conditions with limited interrupted machining.



Available in the following geometries:
Finishing: 1B
Light-Medium Roughing: 2N
Roughing: 4T
Flat Top: Roughing

NL250	Application Range											MAX	DRY	Cutting speed	
	01	05	10	15	20	25	30	35	40	45	50			m/min	
	Vc min		Vc max												
◆◆ P			●	●	●	●						●	●	60	405
◆◆ M		●	●	●	●							●		60	275
◆ K		●	●	●	●							●	●	95	375
◆ N															
◆ S		●	●	●								●		20	80
◆ H															

Recommended ● Acceptable ◎

NL300

Coating Type: CVD

A tough but wear resistant grade for medium and rough machining with light scale but, no interruption. General purpose for Steels and Cast Iron materials.

Available in the following geometries:

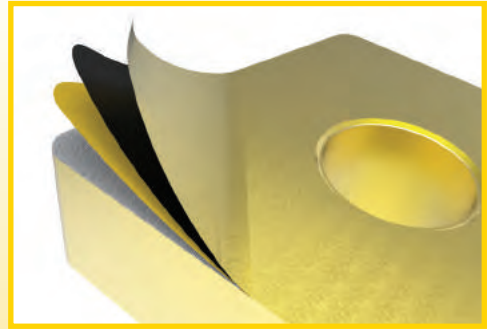
Medium roughing: -73

Light-Medium Roughing: 2N

Roughing: 4T

Single Sided Heavy Roughing: 5R

Medium – Roughing:-T



NL300	Application Range											MAX	DRY	Cutting speed	
	01	05	10	15	20	25	30	35	40	45	50			m/min	
	Vc min		Vc max												
◆◆ P			●	●	●	●	●					●	●	60	380
◆◆ M				●	●	●						●		60	255
◆ K			●	●	●	●						●	●	90	335
◆ N															
◆ S															
◆ H															

Recommended ● Acceptable ◎

NL400

Coating Type: CVD

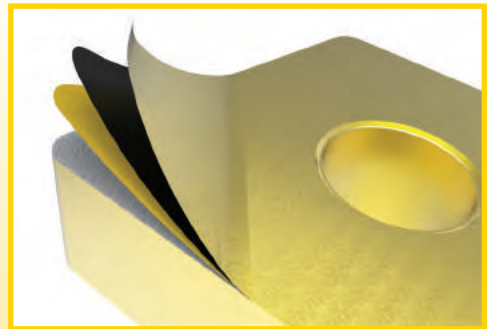
A very tough grade for medium and rough machining, primarily on Stainless Steel and Exotic Alloys. Good resistance to thermal diffusion, and accepts light interruption.

Available in the following geometries:

Light Roughing – Semi-Finishing: 4E

Roughing: 4T

Single Sided Heavy Roughing: 5R



NL400	Application Range											MAX	DRY	Cutting speed	
	01	05	10	15	20	25	30	35	40	45	50			m/min	
	Vc min		Vc max												
◆◆ P					●	●	●	●				●	●	50	360
◆◆ M			●	●	●	●	●					●		50	245
◆ K															
◆ N															
◆ S			●	●	●	●						●		15	70
◆ H															

Recommended ● Acceptable ◎

NL920



Coating Type: CVD

A fine grain but tough grade, with a high degree of edge security on Steels and Stainless Steels. Performs well on rough and heavy machining applications, including interrupted applications.

Available in the following geometries:

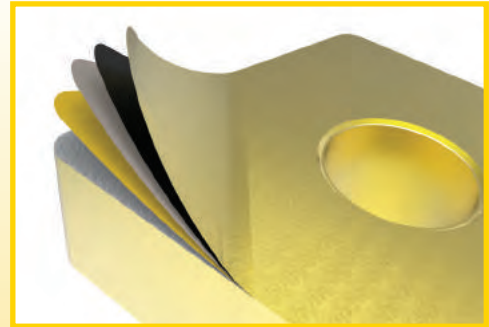
Light-Medium: 2N

Roughing: 4T

Sing Sided Heavy Roughing: 5R

Medium –Roughing: -73

Medium –Roughing: -T



NL920	Application Range											MAX	DRY	Cutting speed	
	01	05	10	15	20	25	30	35	40	45	50			m/min	
														Vc min	Vc max
P							●	●	●	●		●	●	45	225
M							●	●	●			●		40	155
K							●	●	●			●	●	70	225
N															
S					●	●	●					●		15	45
H															

Recommended ● Acceptable ◎

SP0819



Coating Type: PVD

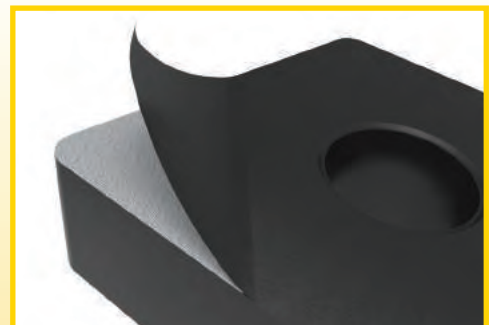
A very wear resistant micro grain substrate with a new generation of TiAlN coating. First choice to machine difficult to machine materials, including PH Stainless Steel. Requires higher cutting speeds in finishing and medium operations, with stable conditions and clean material.

Available in the following geometries:

Finishing: 1B

Finishing-Light Roughing: 3F

Semi Finishing – Light Roughing: 4E



SP0819	Application Range											MAX	DRY	Cutting speed	
	01	05	10	15	20	25	30	35	40	45	50			m/min	
														Vc min	Vc max
P	●	●										●	●	80	450
M		●	●									●		75	315
K															
N												●	●	275	975
S					●	●						●		25	90
H												●		65	140

Recommended ● Acceptable ◎

SP4019



Coating Type: PVD

A tough micro-grain substrate with new generation TiAlN coating, renders this PVD grade extremely hard for unmatched performance in all materials.

Available in the following geometries:

Finishing: -62 (positive)

Finishing – Light Roughing: 3J

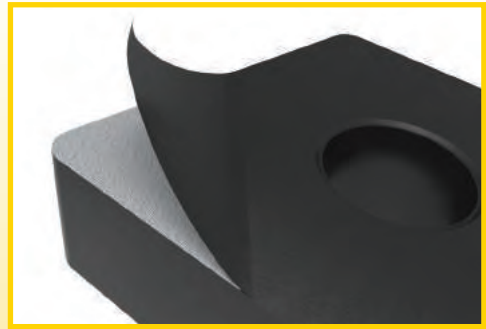
Medium -Roughing: -73 (positive)

Medium – Finishing: -15

Medium – Roughing: -X

Finishing: -61

Medium- Roughing: -T



SP4019	Application Range											MAX	DRY	Cutting speed	
	01	05	10	15	20	25	30	35	40	45	50			m/min	
														Vc min	Vc max
◆◆ P			●	●	●	●						●	●	80	440
◆◆ M		●	●	●	●							●		75	300
◆ K				●	●	●	●					●	●	120	440
◆ N			●	●	●	●						●	●	365	975
◆ S		●	●									●		25	90
◆ H			●	●	●	●						●		60	130

Recommended ● Acceptable ◎

GH1



Coating Type: Uncoated

A very wear resistant uncoated micrograin for Cast Irons, Hardened Steel to 58 HRC and non ferrous alloys. Produces a low cutting pressure at high speed due to sharp cutting edge definition.

Available in the following positive geometries:

Medium – Roughing: X

Medium – Finishing: -64

Medium – Finishing: -66

Medium – Finishing: M



GH1	Application Range											MAX	DRY	Cutting speed	
	01	05	10	15	20	25	30	35	40	45	50			m/min	
														Vc min	Vc max
◆◆ P															
◆◆ M															
◆ K			●	●	●	●	●	●				●	●	70	225
◆ N		●	●	●								●	●	185	825
◆ S															
◆ H															

Recommended ● Acceptable ◎

SA6609

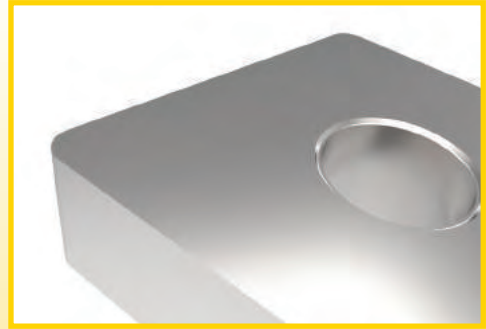
Coating Type: Uncoated

A whisker ceramic grade for roughing and medium machining applications, on High Temperature Alloys. Excellent wear resistance with elevated cutting surface speeds.

Available in two edge preparation:

Finishing to medium: E010

Medium to roughing: E030

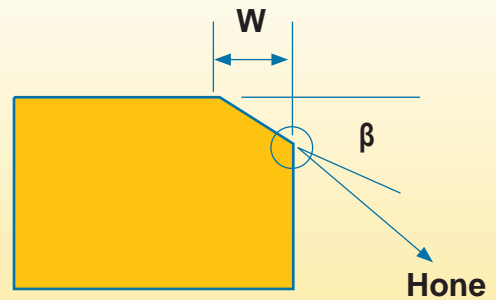


Introduction

SA6609	Application Range												MAX	DRY	Cutting speed	
	01	05	10	15	20	25	30	35	40	45	50	m/min				
												Vc min			Vc max	
◆◆ P																
◆◆ M																
◆ K																
◆ N																
◆ S													●		180	450
◆ H																

Recommended ● Acceptable ◎

Edge Condition	W	β	Hone
	mm	mm	mm
E010	0.05	20°	0
E030	0.15	20°	0





Negative Turning: Geometry, Grade and Material Selection

Geometry	Grade																							
	SP0819						SP4019						NL200						NL250					
	P	M	K	N	S	H	P	M	K	N	S	H	P	M	K	N	S	H	P	M	K	N	S	H
1B	◆◆	◆◆			◆	◆															◆◆	◆◆		◆
2N																					◆◆	◆◆		
3F		◆◆		◆	◆																			
3J								◆◆			◆													
4E		◆◆			◆																			
4T																					◆◆	◆◆	◆	
4U															◆◆		◆							◆
Flat-Top																								◆
5R																								

Negative Turning: Geometry, Grade and Material Selection

Geometry	Grade																							
	NL300						NL400						NL920											
	P	M	K	N	S	H	P	M	K	N	S	H	P	M	K	N	S	H						
1B																								
2N	◆◆	◆◆																			◆◆	◆◆		
3F																								
3J																								
4E											◆◆		◆											
4T	◆◆	◆◆	◆				◆◆	◆◆													◆◆	◆◆	◆	
4U																								
Flat-Top																								
5R	◆◆	◆◆					◆◆	◆◆			◆										◆◆	◆◆		◆

Material Guide – Key to Recommended Inserts

Material Designation

- ◆ Unalloyed Steels
- ◆ Alloyed Steels
- ◆ Stainless Steels
- ◆ PH Stainless
- ◆ Cast Irons
- ◆ Aluminum & Alloys
- ◆ High Temp. Alloys
- ◆ Hard Materials



Positive Turning: Geometry, Grade and Material Selection

Geometry	Grade																	
	SP4019						NL250						NL300					
	P	M	K	N	S	H	P	M	K	N	S	H	P	M	K	N	S	H
15	◆	◆	◆			◆												
X	◆	◆				◆												
61	◆	◆	◆															
62	◆	◆	◆			◆	◆											
64																		
66																		
73	◆	◆	◆			◆							◆	◆				
M	◆	◆	◆			◆												
T	◆	◆	◆			◆	◆	◆					◆	◆				

Positive Turning: Geometry, Grade and Material Selection

Geometry	Grade																	
	NL400						NL920						GH1					
	P	M	K	N	S	H	P	M	K	N	S	H	P	M	K	N	S	H
15																	◆	
X																	◆	
61																		
62																		
64																	◆	
66													◆	◆			◆	
73							◆	◆				◆						
M													◆	◆				◆
T	◆	◆	◆			◆	◆	◆				◆						

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- ◆ Hard Materials



Introduction

Cutting Speed (v _c) m/min							
ISO	Materials	Rm and Hardness	CVD Coated				
			NL200	NL250	NL300	NL400	NL920
			min. - max.	min. - max.	min. - max.	min. - max.	min. - max.
P	Unalloyed Steel	<600 N/mm ² <180 HBN	167 - 415	162 - 406	158 - 381	135 - 361	117 - 226
		<950 N/mm ² <280 HBN	108 - 269	105 - 263	102 - 244	88 - 234	76 - 146
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	99 - 247	97 - 241	94 - 229	80 - 215	70 - 134
		950-1200 N/mm ² 280-355 HBN	90 - 224	88 - 220	85 - 201	73 - 195	63 - 122
		1200-1400 N/mm ² 355-415 HBN	62 - 153	60 - 150	58 - 134	50 - 133	43 - 83
M	Stainless Steel	Austenitic + Ferritic 300 series		110 - 274	110 - 255	91 - 244	79 - 152
		Martensitic 400 series		105 - 263	105 - 245	88 - 234	76 - 146
	PH Stainless	Refractory P.H.		59 - 146	60 - 135	49 - 130	42 - 81
K	Cast Iron	Grey GG-Ft	165 - 411	161 - 373	157 - 335		116 - 224
		Spheroidal-Ductile GGG-FGS	143 - 355	139 - 322	135 - 290		100 - 193
		Malleable GTS - MN/MP	96 - 239	94 - 217	91 - 195		68 - 130
N	Aluminium & Alloys	Aluminium & Alloys < 16% 116 HB					
		Aluminium + Silicon > 16% 92 HB					
S	High Temperature Alloys	Iron Based		23 - 59		20 - 52	17 - 33
		Cobalt Based		19 - 48		16 - 42	14 - 26
		Nickel Based		20 - 51		17 - 46	15 - 28
		Titanium Based		32 - 80		27 - 72	23 - 45
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	45 - 125				
		Chilled Cast Iron >1400 N/mm ² >400 HBN	50 - 120				

Material Guide – Key to Recommended Inserts

Material Designation

◆ P Unalloyed Steels
 ◆ P Alloyed Steels
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 ◆ M PH Stainless
 ◆ K Cast Irons
 ◆ N Aluminum & Alloys
 ◆ S High Temp. Alloys
 ◆ H Hard Materials



Introduction

Cutting Speed (v_c) m/min

ISO	Materials	Rm and Hardness	PVD				Uncoated	Ceramic
			SP0819	SP4019	SP4030 (Grooving)	SP4066 (Threading)	GH1 Micrograin	SA6609
P	Unalloyed Steel	<600 N/mm ² <180 HBN	212 - 451	208 - 442	135 - 271	230 - 485		
		<950 N/mm ² <280 HBN	138 - 293	135 - 287	88 - 176	150 - 315		
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	126 - 268	123 - 263	80 - 161	135 - 290		
		950-1200 N/mm ² 280-355 HBN	115 - 244	112 - 239	73 - 146	125 - 265		
		1200-1400 N/mm ² 355-415 HBN	78 - 167	77 - 163	50 - 100	85 - 180		
M	Stainless Steel	Austenitic + Ferritic 300 series	143 - 305	140 - 299	107 - 229	154 - 329	80 - 150	
		Martensitic 400 series	149 - 317	135 - 287	102 - 220	160 - 342	80 - 160	
	PH Stainless	Refractory P.H.	76 - 163	75 - 159	57 - 122	82 - 175	40 - 80	
K	Cast Iron	Grey GG-Ft		206 - 438	134 - 268	226 - 482	116 - 224	
		Spheroidal-Ductile GGG-FGS		178 - 378	116 - 232	195 - 416	100 - 193	
		Malleable GTS - MN/MP		120 - 255	78 - 156	132 - 280	60 - 130	
N	Aluminium & Alloys	Aluminium & Alloys < 16% 116 HB	396 - 976	365 - 975	366 - 915		335 - 823	
		Aluminium + Silicon > 16% 92 HB	274 - 671		244 - 610		183 - 549	
S	High Temperature Alloys	Iron Based	31 - 65	30 - 64	20 - 39	33 - 70	15 - 35	180 - 450
		Cobalt Based	25 - 53	24 - 52	16 - 32	27 - 57	15 - 25	180 - 400
		Nickel Based	27 - 57	26 - 56	17 - 34	29 - 61	15 - 30	180 - 360
		Titanium Based	42 - 89	41 - 88	27 - 54	45 - 96	25 - 45	
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	70 - 140	62 - 131				
		Chilled Cast Iron >1400 N/mm ² >400 HBN	65 - 135	60 - 127				

Material Guide – Key to Recommended Inserts
Material Designation

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 ◆ S High Temp. Alloys
 ◆ H Hard Materials



Introduction

Optimum Grade Performance

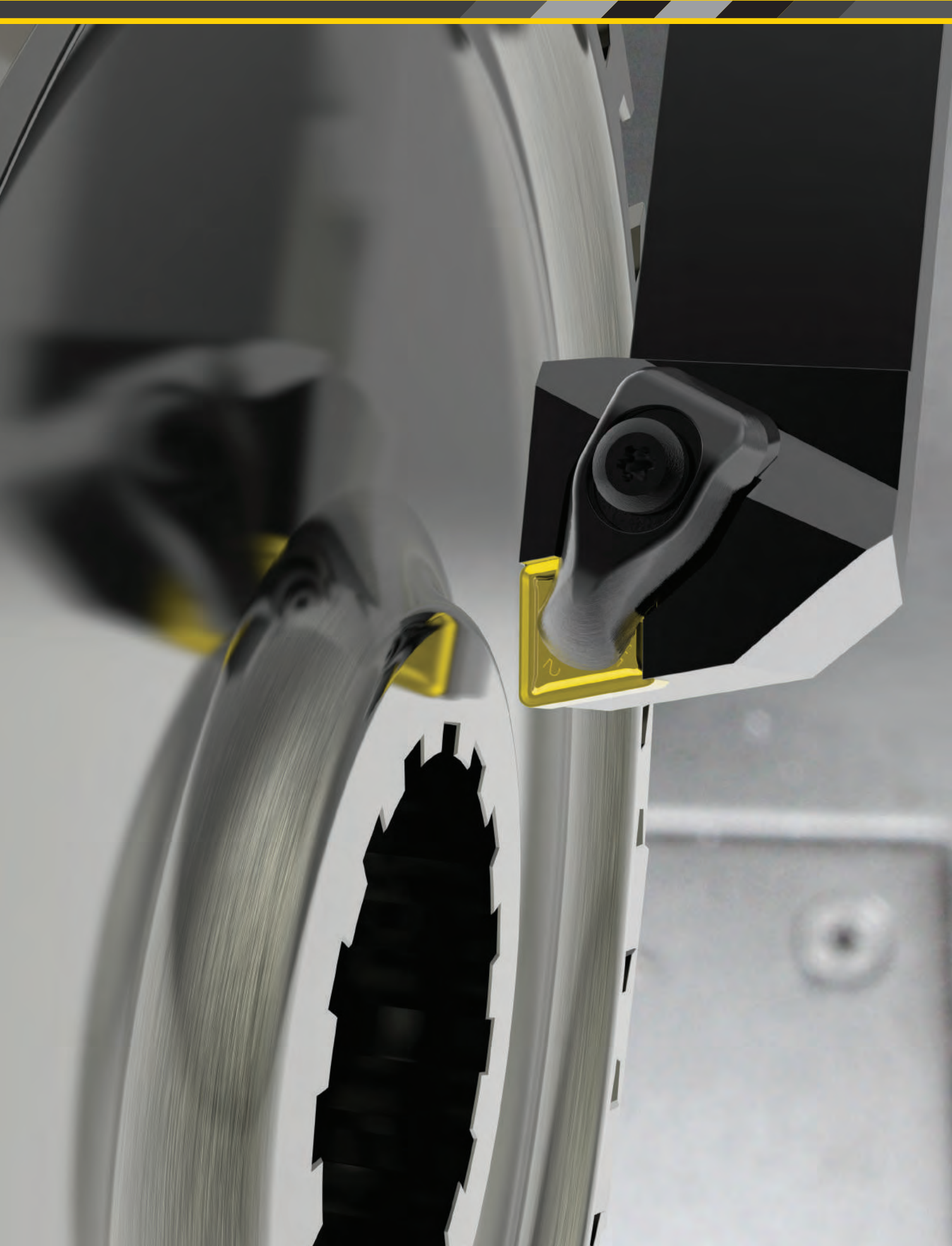
ISO Grade Classification												
Groups	Materials	Code	CVD Grades					PVD Grades		Uncoated Grade GH1	Whisker Ceramic SA6609	
			NL200	NL250	NL300	NL400	NL920	SP0819	SP4019			
P	Unalloyed and Alloyed Steels	P01										
		P05										
		P10										
		P15										
		P20										
		P25										
		P30										
		P35										
		P40										
		P45										
		P50										
M	Stainless Steels	M01										
		M05										
		M10										
		M15										
		M20										
		M25										
		M30										
		M35										
		M40										
K	Cast Irons	K01										
		K05										
		K10										
		K15										
		K20										
		K25										
		K30										
		K35										
		K40										
N	Aluminum & Alloys	N01										
		N05										
		N10										
		N15										
		N20										
		N25										
		N30										
S	High Temperature Alloys	S01										
		S05										
		S10										
		S15										
		S20										
		S25										
		S30										
H	Hard Materials	H01										
		H05										
		H10										
		H15										
		H20										
		H25										
		H30										

↑ Increasing - wear resistance - Increasing cutting speed
 ↓ Increasing - shock resistance - Increasing - feed

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S

1

N

2

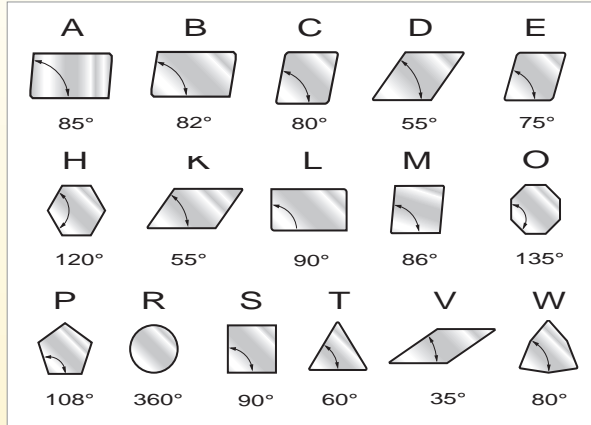
M

3

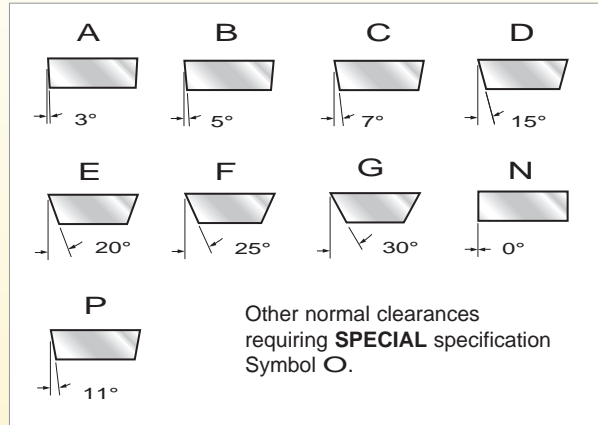
G

4

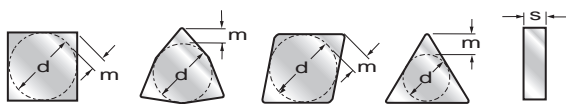
1 Shape



2 Clearance



3 Tolerance



Class		d	m	s
A	mm	±0,025	±0,005	±0,025
C	mm	±0,025	±0,013	±0,025
E	mm	±0,025	±0,025	±0,025
F	mm	±0,013	±0,005	±0,025
G	mm	±0,025	±0,025	±0,13
H	mm	±0,013	±0,013	±0,025
J	mm	*	±0,005	±0,025
K	mm	*	±0,013	±0,025
L	mm	*	±0,025	±0,025
M	mm	*	*	±0,127
U	mm	*	*	±0,127
N	mm	*	*	±0,025

* See tables below.

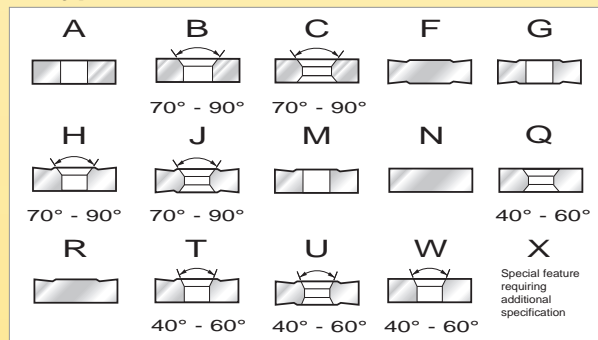
Valid for shapes:
C, E, H, M, O, P, S, T, R, W

IC	d		m	
	J, K, L, M, N	U	M, N	U
4,76	±0,05	±0,08	±0,08	±0,13
5,56	±0,05	±0,08	±0,08	±0,13
6	±0,05	±0,08	±0,08	±0,13
6,35	±0,05	±0,08	±0,08	±0,13
7,94	±0,05	±0,08	±0,08	±0,13
8	±0,05	±0,08	±0,08	±0,13
9,525	±0,05	±0,08	±0,08	±0,13
10	±0,05	±0,08	±0,08	±0,13
12	±0,08	±0,13	±0,13	±0,2
12,7	±0,08	±0,13	±0,13	±0,2
15,875	±0,1	±0,18	±0,15	±0,27
16	±0,1	±0,18	±0,15	±0,27
19,05	±0,1	±0,18	±0,15	±0,27
20	±0,1	±0,18	±0,15	±0,27
25	±0,13	±0,25	±0,18	±0,38
25,4	±0,13	±0,25	±0,18	±0,38
31,75	±0,15	±0,25	±0,2	±0,38
32	±0,15	±0,25	±0,2	±0,38

Valid for shape D only (M & N Tolerance)

IC	d	m
5,56	±0,05	±0,11
6,35	±0,05	±0,11
7,94	±0,05	±0,11
9,525	±0,05	±0,11
12,7	±0,08	±0,15
15,875	±0,10	±0,18
19,05	±0,10	±0,18

4 Type



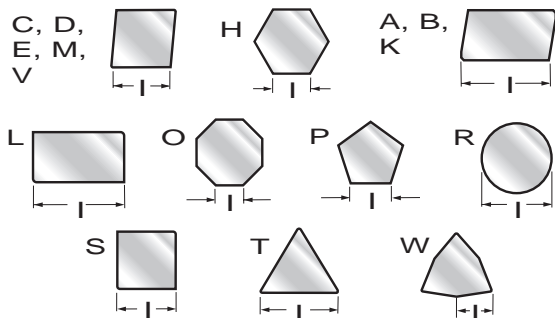
12
5

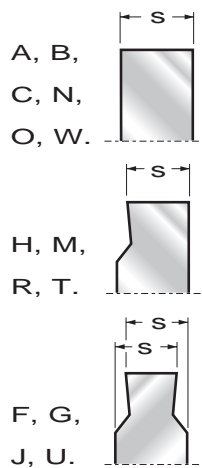
04
6

08
7

E
8

5 Size

 Integers to be preceded by a 0 (zero).
Disregard any decimals. e.g. 9.525 = **09**

6 Thickness

 Integers to be preceded by a 0 (zero) or the letter T.
Disregard any decimals.

Examples:

01	= 1,588
T1	= 1,984
02	= 2,381
03	= 3,175
T3	= 3,969
04	= 4,763
05	= 5,556
06	= 6,350
07	= 7,938
09	= 9,525
11	= 11,113
12	= 12,700
14	= 14,288
15	= 15,875

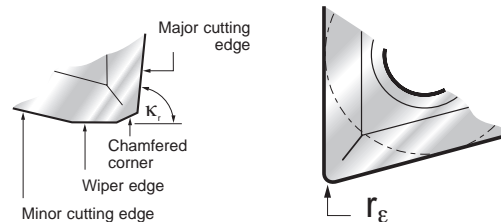
7 Corner
Inserts with wiper edges

Cutting edge Angle (K_r) 1st letter:	Wiper edge normal Clearance 2nd letter: (α_n)
A = 45°	A = 3°
D = 60°	B = 5°
E = 75°	C = 7°
F = 85°	D = 15°
G = 87°	E = 20°
P = 90°	F = 25°
Z = ANY OTHER	G = 30°
	N = 0°
	P = 11°
	Z = ANY OTHER

7 Corner continued
Inserts with rounded corners. The corner radius is indicated in 0.1mm. Integers to be preceded by a 0 (zero). If the corner is not rounded, use the symbol of designation 00 (zero zero).

Examples:

00	= SHARP CORNER	24	= 2,4
01	= 0,1	28	= 2,8
02	= 0,2	32	= 3,2
04	= 0,4	40	= 4,0
08	= 0,8	48	= 4,8
12	= 1,2	56	= 5,6
16	= 1,6	64	= 6,4
20	= 2,0	X	= ANY OTHER


8 Edge Condition

	Symbol
Sharp	F
Honed (Rounded)	E
Chamfered (Negative Land)	T
Chamfered + Honed	S

P

1

D

2

J

3

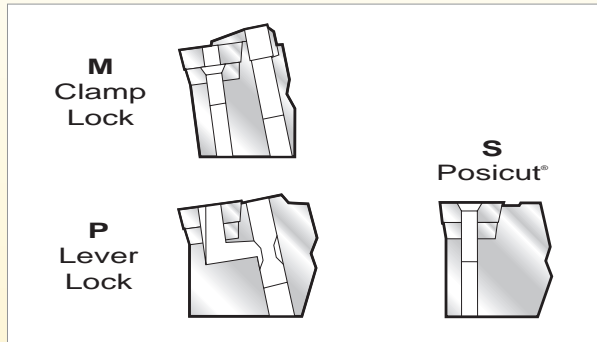
N

4

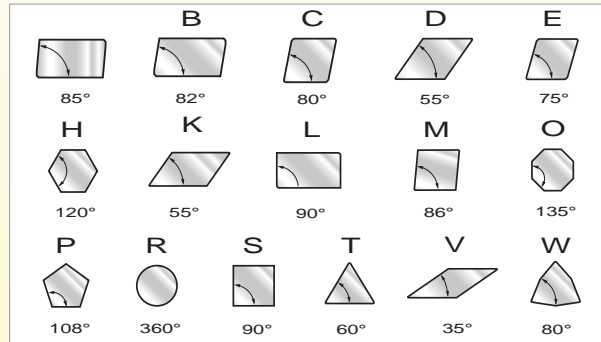
R

5

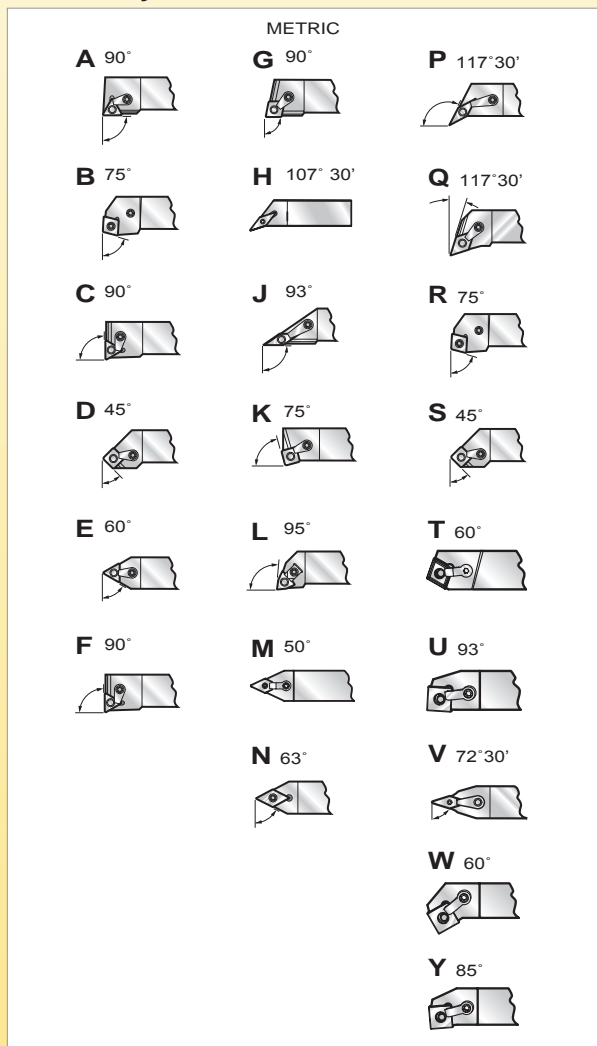
1 Assembly



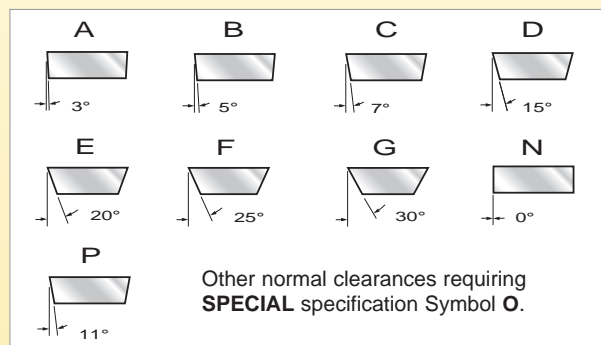
2 Insert Shape



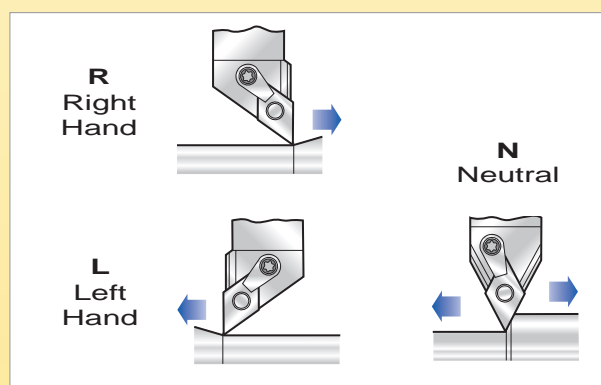
3 Tool Style



4 Clearance



5 Hand



20
6

20
7

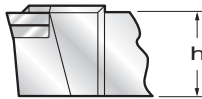
K
8

12
9

-
10

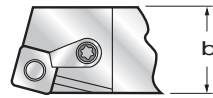
-
11

6 Tool Height



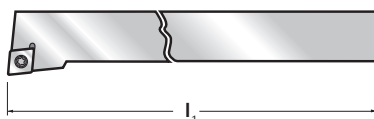
06	= 6
08	= 8
10	= 10
12	= 12
14	= 14
16	= 16
20	= 20
25	= 25
32	= 32
40	= 40
50	= 50

7 Tool Width



06	= 6
08	= 8
10	= 10
12	= 12
14	= 14
16	= 16
20	= 20
25	= 25
32	= 32
40	= 40
50	= 50

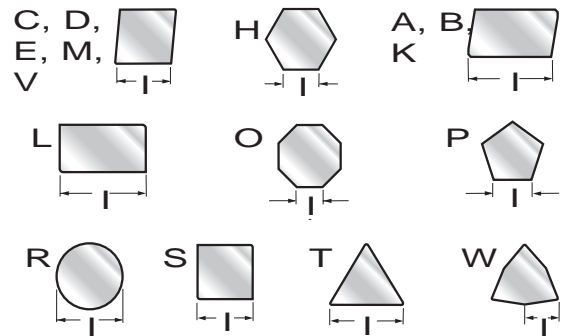
8 Tool Length



A	= 32
B	= 40
C	= 50
D	= 60
E	= 70
F	= 80
G	= 90
H	= 100
J	= 110
K	= 125
L	= 140
M	= 150
N	= 160
P	= 170
Q	= 180
R	= 200
S	= 250
T	= 300
U	= 350
V	= 400
W	= 450
Y	= 500
X	= SPECIAL

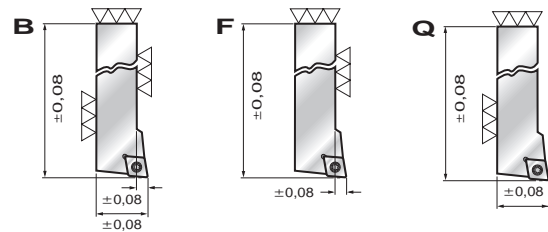
9 Insert Size

Integers to be preceded by a **0** (zero).
Disregard any decimals. e.g. 9,525 = **09**



10 Optional

Qualified tools.



11 Optional

Supplementary optional symbol (numbers or letters) added by the manufacturer.

Must be separated from the standardised designation by a dash (-).

A
1

25
2

R
3

-

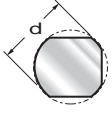
P
4

C
5

1 Bar Type

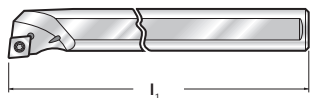
A Steel shank and coolant hole.	F Cemented carbide shank with steel head and anti-vibration device.
B Steel shank and anti-vibration device.	G Cemented carbide shank with steel head, coolant hole and anti-vibration device.
C Cemented carbide shank with steel head.	H Heavy metal shank.
D Steel shank, anti-vibration device and coolant hole.	J Heavy metal shank and coolant hole.
E Cemented carbide shank with steel head and coolant hole.	S Steel shank.

2 Bar Ø



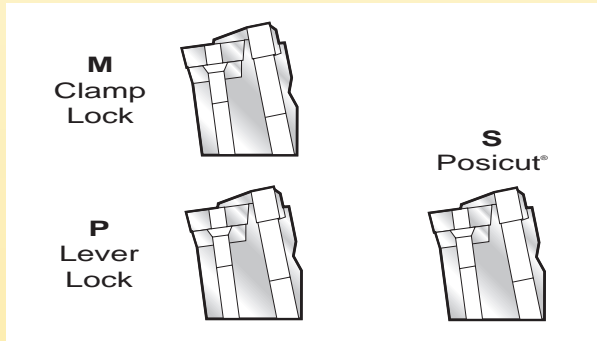
METRIC	
06	= 6
08	= 8
10	= 10
12	= 12
16	= 16
20	= 20
25	= 25
32	= 32
40	= 40
50	= 50

3 Bar Length

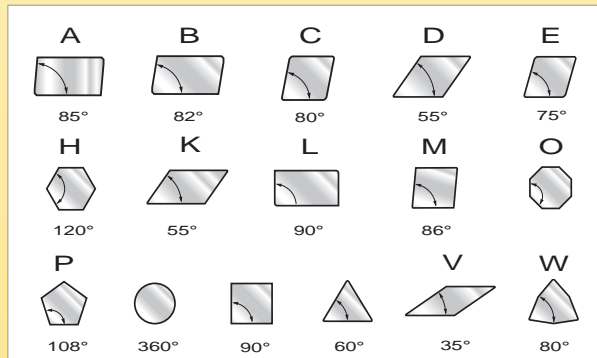


METRIC	
F	= 80
H	= 100
K	= 125
M	= 150
P	= 170
Q	= 180
R	= 200
S	= 250
T	= 300
U	= 350
V	= 400
W	= 450
Y	= 500
X	= SPECIAL

4 Assembly



5 Insert Shape



L

N

R

12

-

7

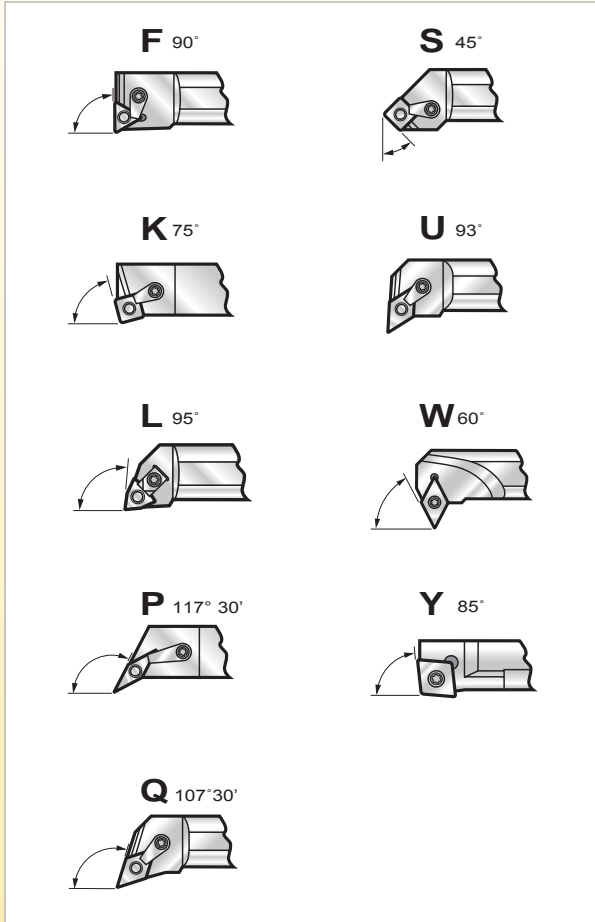
8

9

10

10

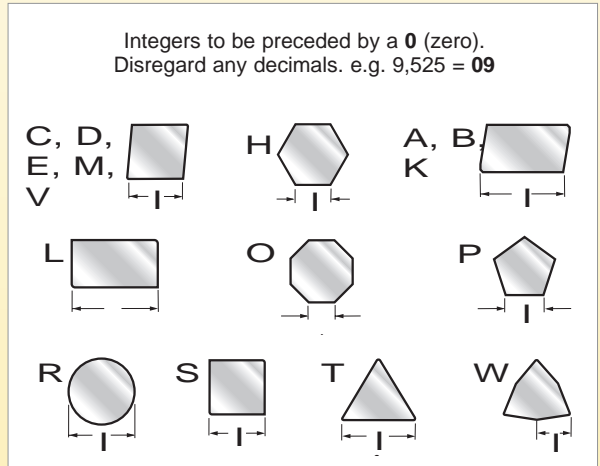
6 Tool Style



8 Hand



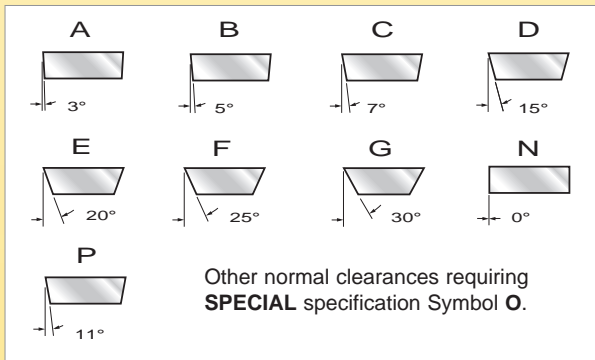
9 Insert Size



10 Optional

Supplementary optional symbol (numbers or letters) added by the manufacturer.
Must be separated from the standardised designation by a dash (-).

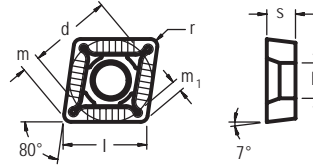
7 Clearance





Turning Inserts

CCGT
-62 Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
031243	CCGT060200E-62	SP4019	6,35	6,45	2,38	0,00	2,80		Finishing
030568	CCGT060201E-62	SP4019	6,35	6,45	2,38	0,10	2,80		Finishing
030569	CCGT060202E-62	SP4019	6,35	6,45	2,38	0,20	2,80		Finishing
030570	CCGT060204E-62	SP4019	6,35	6,45	2,38	0,40	2,80		Finishing
030571	CCGT09T300E-62	SP4019	9,52	9,57	3,97	0,00	4,40		Finishing
030572	CCGT09T301E-62	SP4019	9,52	9,57	3,97	0,10	4,40		Finishing
030573	CCGT09T302E-62	SP4019	9,52	9,57	3,97	0,20	4,40		Finishing
030574	CCGT09T304E-62	SP4019	9,52	9,57	3,97	0,40	4,40		Finishing
030575	CCGT09T308E-62	SP4019	9,52	9,57	3,97	0,80	4,40		Finishing

For Toolholders External: see page C44 | Internal: see page C45

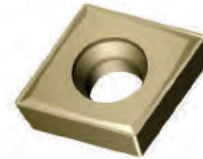
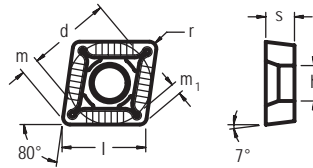
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



CCMT
-73 Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032365	CCMT060202E-73	SP4019	6,35	6,45	2,38	0,20	2,80	◆◆◆◆	Medium
032366	CCMT060204E-73	SP4019	6,35	6,45	2,38	0,40	2,80	◆◆◆◆	Medium
032367	CCMT060204E-73	NL300	6,35	6,45	2,38	0,40	2,80	◆◆◆◆	Medium
032368	CCMT060208E-73	SP4019	6,35	6,45	2,38	0,80	2,80	◆◆◆◆	Medium
032369	CCMT060208E-73	NL300	6,35	6,45	2,38	0,80	2,80	◆◆◆◆	Medium
032370	CCMT09T304E-73	SP4019	9,52	9,57	3,97	0,40	4,40	◆◆◆◆	Medium
032371	CCMT09T304E-73	NL300	9,52	9,57	3,97	0,40	4,40	◆◆◆◆	Medium
032372	CCMT09T304E-73	NL920	9,52	9,57	3,97	0,40	4,40	◆◆◆◆	Medium
032373	CCMT09T308E-73	SP4019	9,52	9,57	3,97	0,80	4,40	◆◆◆◆	Medium
032374	CCMT09T308E-73	NL300	9,52	9,57	3,97	0,80	4,40	◆◆◆◆	Medium
032375	CCMT09T308E-73	NL920	9,52	9,57	3,97	0,80	4,40	◆◆◆◆	Medium
032376	CCMT120404E-73	SP4019	12,70	12,90	2,38	0,40	5,16	◆◆◆◆	Medium
032377	CCMT120404E-73	NL300	12,70	12,90	2,38	0,40	5,16	◆◆◆◆	Medium
032378	CCMT120404E-73	NL920	12,70	12,90	2,38	0,40	5,16	◆◆◆◆	Medium
032379	CCMT120408E-73	SP4019	12,70	12,90	4,76	0,80	5,16	◆◆◆◆	Medium
032380	CCMT120408E-73	NL300	12,70	12,90	4,76	0,80	5,16	◆◆◆◆	Medium
032381	CCMT120408E-73	NL920	12,70	12,90	4,76	0,80	5,16	◆◆◆◆	Medium
032382	CCMT120412E-73	SP4019	12,70	12,90	4,76	1,20	5,16	◆◆◆◆	Medium
032383	CCMT120412E-73	NL300	12,70	12,90	4,76	1,20	5,16	◆◆◆◆	Medium
032384	CCMT120412E-73	NL920	12,70	12,90	4,76	1,20	5,16	◆◆◆◆	Medium

For Toolholders External: see page C44 | Internal: see page C45

Material Guide – Key to Recommended Inserts

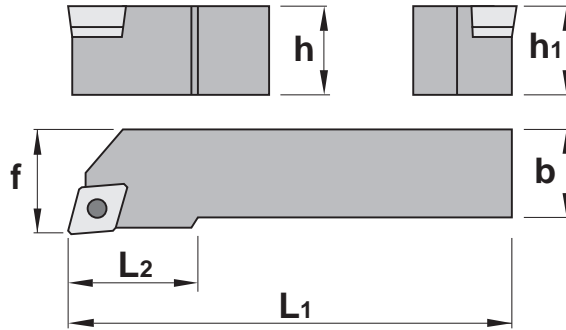
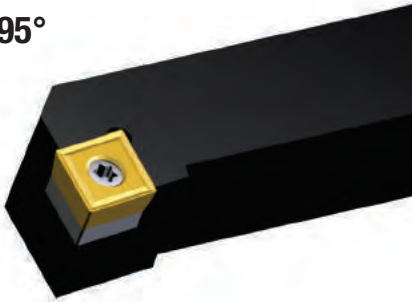
Material Designation

- ◆ P Unalloyed Steels
- ◆ P Alloyed Steels
- ◆ M Stainless Steels
- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials



Turning Inserts

SCLC 95°



SCLC LH & RH External Square Shank Toolholders

EDP	ISO Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h1	b	f	L1	L2
028507	SCLCL 1010 E06	LH	CC_0602	10	10	12	70	10
028513	SCLCR 1010 E06	RH	CC_0602	10	10	12	70	10
028508	SCLCL 1212 F09	LH	CC_09T3	12	12	16	80	16
028509	SCLCL 1616 H09	LH	CC_09T3	16	16	20	100	18
028510	SCLCL 2020 K09	LH	CC_09T3	20	20	25	125	22
028514	SCLCR 1212 F09	RH	CC_09T3	12	12	16	80	16
028515	SCLCR 1616 H09	RH	CC_09T3	16	16	20	100	18
028516	SCLCR 2020 K09	RH	CC_09T3	20	20	25	125	22
028512	SCLCL 2525 M12	LH	CC_1204	25	25	32	150	25
028518	SCLCR 2525 M12	RH	CC_1204	25	25	32	150	25



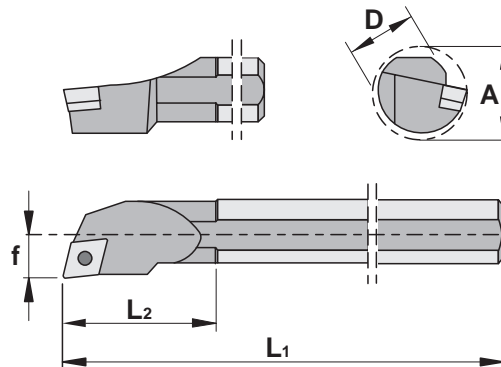
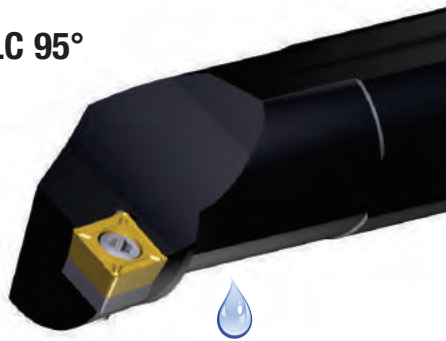
S Style External Toolholder
for Positive Inserts:
CC_06, CC_09, and CC_12
Application: Face and Turn O/D
Approach 95°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 0^\circ$
RH Holder Shown

SCLCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SCLCL/R 1010 E06	015061	F2507T	018488	T7	-	-	-	-
SCLCL/R 1212 F09	015262	D4010T	015240	T15	-	-	-	-
SCLCL/R 1616 H09								
SCLCL/R 2020 K09	034500	1540	034577	K5517	028571	SA3614	028739	SAS1760
SCLCL/R 2525 M12								



A.. SCLC 95°



Turning Inserts

A.. SCLC LH & RH Internal Boring Bars

EDP	ISO Description	Hand	Insert Sizes	Dimensions (mm)					
				Min Bore Ø A	ØD	f	L1	L2	Through Coolant
033481	A08F SCLCL 06	LH	CC_0602	11	8	5	80	20	
033903	A10H SCLCL 06	LH	CC_0602	13	10	7	100	21	
018349	A12K SCLCL 06	LH	CC_0602	16	12	9	125	23	
033482	A08F SCLCR 06	RH	CC_0602	11	8	5	80	20	
033483	A10H SCLCR 06	RH	CC_0602	13	10	7	100	21	
018350	A12K SCLCR 06	RH	CC_0602	16	12	9	125	23	
018351	A16M SCLCL 09	LH	CC_09T3	20	16	11	150	31	
018353	A20Q SCLCL 09	LH	CC_09T3	24	20	13	180	36	
018355	A25R SCLCL 09	LH	CC_09T3	31	25	17	200	42	
018352	A16M SCLCR 09	RH	CC_09T3	20	16	11	150	31	
018354	A20Q SCLCR 09	RH	CC_09T3	24	20	13	180	36	
018356	A25R SCLCR 09	RH	CC_09T3	31	25	17	200	42	
033904	A32S SCLCL 12	LH	CC_1204	39	32	22	250	45	
033905	A32S SCLCR 12	RH	CC_1204	39	32	22	250	45	



S Style Internal Boring Bar for Positive Inserts:
 CC_06, CC_09, and CC_1204
 Application: I/D Boring
 Approach 95°
 Axial 0°
 Radial -6°
 Profiling Clearance Angle $\beta = 0^\circ$
 RH Bar shown

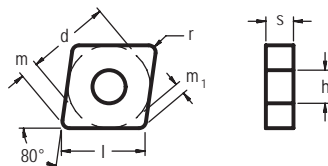
A.. SCLCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
A08F SCLCL/R 06	034498	1425	018488	T7	-	-	-	-
A10H SCLCL/R 06								
A12K SCLCL/R 06								
A16M SCLCL/R 09	034499	1440	015240	T15	-	-	-	-
A20Q SCLCL/R 09								
A25R SCLCL/R 09								
A32S SCLCL/R 12	034500	1540	034577	K5517	028571	SA3614	028739	SAS1760



Turning Inserts

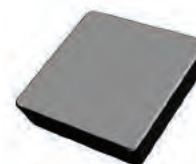
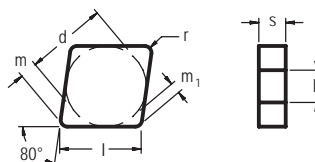
CNGG
3F Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
031580	CNGG120401F-3F	SP0819	12,70	12,90	4,76	0,10	5,16		Medium
031543	CNGG120402F-3F	SP0819	12,70	12,90	4,76	0,20	5,16		Medium
031544	CNGG120404F-3F	SP0819	12,70	12,90	4,76	0,40	5,16		Medium
031545	CNGG120408F-3F	SP0819	12,70	12,90	4,76	0,80	5,16		Medium
031546	CNGG120412F-3F	SP0819	12,70	12,90	4,76	0,80	5,16		Medium

For Toolholders External: see pages C59 - C63 | Internal: see page C64

CNGN
Ceramics



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032314	CNGN120404 E010	SA6609	12,70	12,90	4,76	0,40	5,16		Roughing
032315	CNGN120408 E010	SA6609	12,70	12,90	4,76	0,80	5,16		Roughing
032316	CNGN120408 E030	SA6609	12,70	12,90	4,76	0,80	5,16		Roughing
032317	CNGN120412 E010	SA6609	12,70	12,90	4,76	1,20	5,16		Roughing
032318	CNGN120412 E030	SA6609	12,70	12,90	4,76	1,20	5,16		Roughing
032319	CNGN120416 E030	SA6609	12,70	12,90	4,76	1,60	5,16		Roughing
032320	CNGN120708 E010	SA6609	12,70	12,90	7,94	0,80	5,16		Roughing
032321	CNGN120712 E010	SA6609	12,70	12,90	7,94	1,20	5,16		Roughing
032322	CNGN120716 E030	SA6609	12,70	12,90	7,94	1,60	5,16		Roughing
032323	CNGN160612 E010	SA6609	15,88	16,10	6,35	1,20	6,35		Roughing

Note: For edge condition refer to Grade page C29

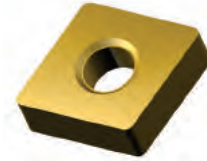
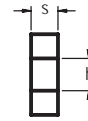
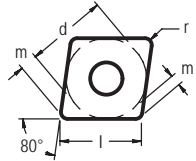
Material Guide – Key to Recommended Inserts

Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



CNMA
Flat Top



Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032385	CNMA120404E	NL250	12,70	12,90	4,76	0,40	5,16	◆	Heavy Roughing
032386	CNMA120408E	NL250	12,70	12,90	4,76	0,80	5,16	◆	Heavy Roughing
032387	CNMA120412E	NL250	12,70	12,90	4,76	1,20	5,16	◆	Heavy Roughing
032388	CNMA120416E	NL250	12,70	12,90	4,76	1,60	5,16	◆	Heavy Roughing
032389	CNMA160612E	NL250	15,88	16,10	6,35	1,20	6,35	◆	Heavy Roughing
032390	CNMA160616E	NL250	15,88	16,10	6,35	1,60	6,35	◆	Heavy Roughing
032391	CNMA160632E	NL250	15,88	16,10	6,35	3,20	6,35	◆	Heavy Roughing
032392	CNMA190612E	NL250	19,05	19,40	6,35	1,20	7,92	◆	Heavy Roughing
032393	CNMA190616E	NL250	19,05	19,40	6,35	1,60	7,92	◆	Heavy Roughing
032394	CNMA190632E	NL250	19,05	19,40	6,35	3,20	7,92	◆	Heavy Roughing

For Toolholders External: see pages C59 - C63 | Internal: see page C64

Material Guide – Key to Recommended Inserts

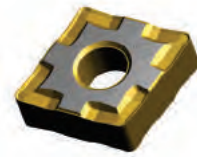
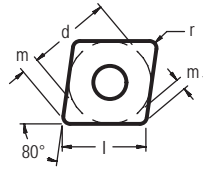
Material Designation

- ◆ P Unalloyed Steels
- ◆ P Alloyed Steels
- ◆ M Stainless Steels
- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials



Turning Inserts

CNMG
1B Geometry



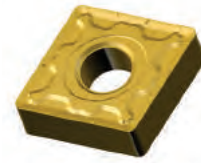
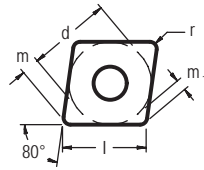
EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032395	CNMG120404E-1B	NL250	12,70	12,90	4,76	0,40	5,16		Finishing
030864	CNMG120404E-1B	SP0819	12,70	12,90	4,76	0,40	5,16		Finishing
030865	CNMG120408E-1B	SP0819	12,70	12,90	4,76	0,80	5,16		Finishing
032396	CNMG120408E-1B	NL250	12,70	12,90	4,76	0,80	5,16		Finishing
032397	CNMG120412E-1B	NL250	12,70	12,90	4,76	1,20	5,16		Finishing
030866	CNMG120412E-1B	SP0819	12,70	12,90	4,76	1,20	5,16		Finishing

For Toolholders External: see pages C59 - C63 | Internal: see page C64

Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials


CNMG
2N Geometry


EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032398	CNMG120404E-2N	NL250	12,70	12,90	4,76	0,40	5,16		Medium
032399	CNMG120404E-2N	NL300	12,70	12,90	4,76	0,40	5,16		Medium
032400	CNMG120404E-2N	NL920	12,70	12,90	4,76	0,40	5,16		Medium
032401	CNMG120408E-2N	NL250	12,70	12,90	4,76	0,80	5,16		Medium
032402	CNMG120408E-2N	NL300	12,70	12,90	4,76	0,80	5,16		Medium
032403	CNMG120408E-2N	NL920	12,70	12,90	4,76	0,80	5,16		Medium
032404	CNMG120412E-2N	NL250	12,70	12,90	4,76	1,20	5,16		Medium
032405	CNMG120412E-2N	NL300	12,70	12,90	4,76	1,20	5,16		Medium
032406	CNMG120412E-2N	NL920	12,70	12,90	4,76	1,20	5,16		Medium
032407	CNMG120416E-2N	NL250	12,70	12,90	4,76	1,60	5,16		Medium
032408	CNMG120416E-2N	NL300	12,70	12,90	4,76	1,60	5,16		Medium
032409	CNMG120416E-2N	NL920	12,70	12,90	4,76	1,60	5,16		Medium

For Toolholders External: see pages C59 - C63 | Internal: see page C64

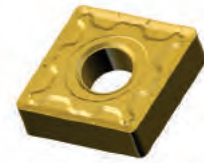
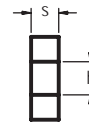
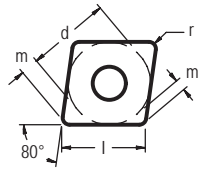
Material Guide – Key to Recommended Inserts
Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



Turning Inserts

CNMG
2N Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032410	CNMG160608E-2N	NL250	15,88	16,10	6,35	0,80	6,35		Medium
032411	CNMG160608E-2N	NL300	15,88	16,10	6,35	0,80	6,35		Medium
032412	CNMG160608E-2N	NL920	15,88	16,10	6,35	0,80	6,35		Medium
032413	CNMG160612E-2N	NL250	15,88	16,10	6,35	1,20	6,35		Medium
032414	CNMG160612E-2N	NL300	15,88	16,10	6,35	1,20	6,35		Medium
032415	CNMG160612E-2N	NL920	15,88	16,10	6,35	1,20	6,35		Medium
032416	CNMG160616E-2N	NL250	15,88	16,10	6,35	1,60	6,35		Medium
032417	CNMG160616E-2N	NL300	15,88	16,10	6,35	1,60	6,35		Medium
032418	CNMG160616E-2N	NL920	15,88	16,10	6,35	1,60	6,35		Medium
032419	CNMG190612E-2N	NL300	19,05	19,40	6,35	1,20	7,92		Medium
032420	CNMG190612E-2N	NL920	19,05	19,40	6,35	1,20	7,92		Medium
032421	CNMG190616E-2N	NL300	19,05	19,40	6,35	1,60	7,92		Medium
032422	CNMG190616E-2N	NL920	19,05	19,40	6,35	1,60	7,92		Medium

For Toolholders External: see pages C59 - C63 | Internal: see page C64

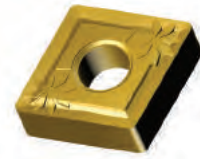
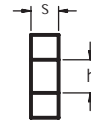
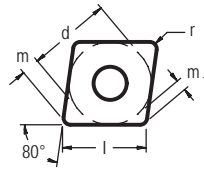
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



CNMG
3J Geometry



Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032423	CNMG120404E-3J	SP4019	12,70	12,90	4,76	0,40	5,16		Medium
032424	CNMG120408E-3J	SP4019	12,70	12,90	4,76	0,80	5,16		Medium
032425	CNMG120412E-3J	SP4019	12,70	12,90	4,76	1,20	5,16		Medium
032426	CNMG120416E-3J	SP4019	12,70	12,90	4,76	1,60	5,16		Medium
032427	CNMG160612E-3J	SP4019	15,88	16,10	6,35	1,20	6,35		Medium
032428	CNMG160616E-3J	SP4019	15,88	16,10	6,35	1,60	6,35		Medium
032429	CNMG190612E-3J	SP4019	19,05	19,40	6,35	1,20	7,92		Medium
032430	CNMG190616E-3J	SP4019	19,05	19,40	6,35	1,60	7,92		Medium

For Toolholders External: see pages C59 - C63 | Internal: see page C64

Material Guide – Key to Recommended Inserts

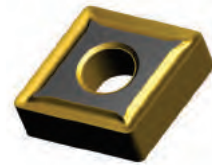
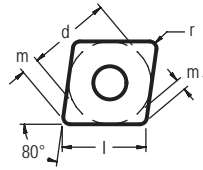
Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



Turning Inserts

CNMG
4E Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
030506	CNMG120404E-4E	SP0819	12,70	12,90	4,76	0,40	5,16		Medium-Roughing
032431	CNMG120404E-4E	NL400	12,70	12,90	4,76	0,40	5,16		Medium-Roughing
030507	CNMG120408E-4E	SP0819	12,70	12,90	4,76	0,80	5,16		Medium-Roughing
032432	CNMG120408E-4E	NL400	12,70	12,90	4,76	0,80	5,16		Medium-Roughing
030507	CNMG120408E-4E	SP0819	12,70	12,90	4,76	0,80	5,16		Medium-Roughing
032433	CNMG120412E-4E	NL400	12,70	12,90	4,76	1,20	5,16		Medium-Roughing
030508	CNMG120412E-4E	SP0819	12,70	12,90	4,76	1,20	5,16		Medium-Roughing
032434	CNMG160608E-4E	NL400	15,88	16,10	6,35	0,80	6,35		Medium-Roughing
030509	CNMG160608E-4E	SP0819	15,88	16,10	6,35	0,80	6,35		Medium-Roughing
030510	CNMG160612E-4E	SP0819	15,88	16,10	6,35	1,20	6,35		Medium-Roughing
032435	CNMG160612E-4E	NL400	15,88	16,10	6,35	1,20	6,35		Medium-Roughing
032436	CNMG160616E-4E	NL400	15,88	16,10	6,35	1,60	6,35		Medium-Roughing
030511	CNMG160616E-4E	SP0819	15,88	16,10	6,35	1,60	6,35		Medium-Roughing

For Toolholders External: see pages C59 - C63 | Internal: see page C64

CNMG1906 See page C53

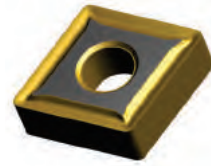
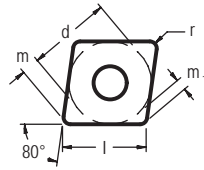
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



CNMG
4E Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032437	CNMG190608E-4E	NL400	19,05	19,40	6,35	0,80	7,92		Medium-Roughing
030512	CNMG190608E-4E	SP0819	19,05	19,40	6,35	0,80	7,92		Medium-Roughing
030513	CNMG190612E-4E	SP0819	19,05	19,40	6,35	1,20	7,92		Medium-Roughing
032438	CNMG190612E-4E	NL400	19,05	19,40	6,35	1,20	7,92		Medium-Roughing
032439	CNMG190616E-4E	NL400	19,05	19,40	6,35	1,60	7,92		Medium-Roughing
030514	CNMG190616E-4E	SP0819	19,05	19,40	6,35	1,60	7,92		Medium-Roughing
032440	CNMG190624E-4E	NL400	19,05	19,40	6,35	2,40	7,92		Medium-Roughing
030515	CNMG190624E-4E	SP0819	19,05	19,40	6,35	2,40	7,92		Medium-Roughing

For Toolholders External: see pages C59 - C63 | Internal: see page C64

Material Guide – Key to Recommended Inserts

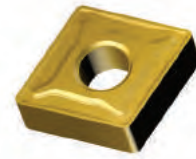
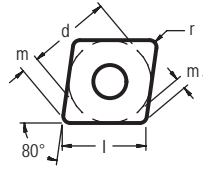
Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



Turning Inserts

CNMG
4T Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032442	CNMG120404E-4T	NL250	12,70	12,90	4,76	0,40	5,16		Roughing
032443	CNMG120404E-4T	NL300	12,70	12,90	4,76	0,40	5,16		Roughing
032444	CNMG120404E-4T	NL400	12,70	12,90	4,76	0,40	5,16		Roughing
032445	CNMG120404E-4T	NL920	12,70	12,90	4,76	0,40	5,16		Roughing
032446	CNMG120408E-4T	NL250	12,70	12,90	4,76	0,80	5,16		Roughing
032447	CNMG120408E-4T	NL300	12,70	12,90	4,76	0,80	5,16		Roughing
032448	CNMG120408E-4T	NL400	12,70	12,90	4,76	0,80	5,16		Roughing
032449	CNMG120408E-4T	NL920	12,70	12,90	4,76	0,80	5,16		Roughing
032450	CNMG120412E-4T	NL250	12,70	12,90	4,76	1,20	5,16		Roughing
032451	CNMG120412E-4T	NL300	12,70	12,90	4,76	1,20	5,16		Roughing
032452	CNMG120412E-4T	NL400	12,70	12,90	4,76	1,20	5,16		Roughing
032453	CNMG120412E-4T	NL920	12,70	12,90	4,76	1,20	5,16		Roughing
032454	CNMG120416E-4T	NL250	12,70	12,90	4,76	1,60	5,16		Roughing
032455	CNMG120416E-4T	NL300	12,70	12,90	4,76	1,60	5,16		Roughing
032456	CNMG120416E-4T	NL400	12,70	12,90	4,76	1,60	5,16		Roughing
032457	CNMG120416E-4T	NL920	12,70	12,90	4,76	1,60	5,16		Roughing

For Toolholders External: see pages C59 - C63 | Internal: see page C64

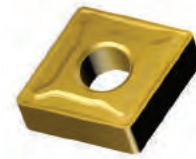
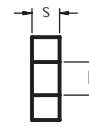
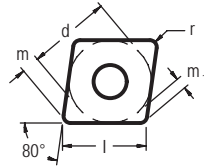
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



CNMG
4T Geometry



Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032458	CNMG160608E-4T	NL250	15,88	16,10	6,35	0,80	6,35		Roughing
032459	CNMG160608E-4T	NL300	15,88	16,10	6,35	0,80	6,35		Roughing
032460	CNMG160608E-4T	NL400	15,88	16,10	6,35	0,80	6,35		Roughing
032461	CNMG160608E-4T	NL920	15,88	16,10	6,35	0,80	6,35		Roughing
032462	CNMG160612E-4T	NL250	15,88	16,10	6,35	1,20	6,35		Roughing
032463	CNMG160612E-4T	NL300	15,88	16,10	6,35	1,20	6,35		Roughing
032464	CNMG160612E-4T	NL400	15,88	16,10	6,35	1,20	6,35		Roughing
032465	CNMG160612E-4T	NL920	15,88	16,10	6,35	1,20	6,35		Roughing
032466	CNMG160616E-4T	NL250	15,88	16,10	6,35	1,60	6,35		Roughing
032467	CNMG160616E-4T	NL300	15,88	16,10	6,35	1,60	6,35		Roughing
032468	CNMG160616E-4T	NL400	15,88	16,10	6,35	1,60	6,35		Roughing
032469	CNMG160616E-4T	NL920	15,88	16,10	6,35	1,60	6,35		Roughing

For Toolholders External: see pages C59 - C63 | Internal: see page C64

Material Guide – Key to Recommended Inserts

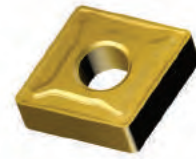
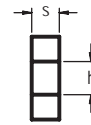
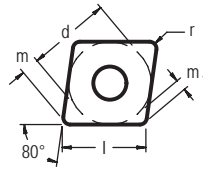
Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



Turning Inserts

CNMG
4T Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032470	CNMG190608E-4T	NL250	19,05	19,40	6,35	0,80	7,92		Roughing
032471	CNMG190608E-4T	NL300	19,05	19,40	6,35	0,80	7,92		Roughing
032472	CNMG190608E-4T	NL400	19,05	19,40	6,35	0,80	7,92		Roughing
032473	CNMG190608E-4T	NL920	19,05	19,40	6,35	0,80	7,92		Roughing
032474	CNMG190612E-4T	NL250	19,05	19,40	6,35	1,20	7,92		Roughing
032475	CNMG190612E-4T	NL300	19,05	19,40	6,35	1,20	7,92		Roughing
032476	CNMG190612E-4T	NL400	19,05	19,40	6,35	1,20	7,92		Roughing
032477	CNMG190612E-4T	NL920	19,05	19,40	6,35	1,20	7,92		Roughing
032478	CNMG190616E-4T	NL250	19,05	19,40	6,35	1,60	7,92		Roughing
032479	CNMG190616E-4T	NL300	19,05	19,40	6,35	1,60	7,92		Roughing
032480	CNMG190616E-4T	NL400	19,05	19,40	6,35	1,60	7,92		Roughing
032481	CNMG190616E-4T	NL920	19,05	19,40	6,35	1,60	7,92		Roughing
032482	CNMG250924E-4T	NL300	25,40	25,79	9,53	2,40	9,12		Roughing
032483	CNMG250924E-4T	NL400	25,40	25,79	9,53	2,40	9,12		Roughing
032484	CNMG250924E-4T	NL920	25,40	25,79	9,53	2,40	9,12		Roughing

For Toolholders External: see pages C59 - C63 | Internal: see page C64

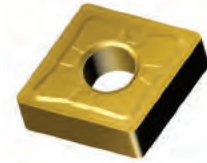
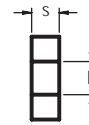
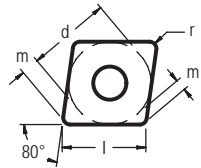
Material Guide – Key to Recommended Inserts

Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



CNMG
4U Geometry



Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032485	CNMG120404E-4U	NL200	12,70	12,90	4,76	0,40	5,16		Roughing
032486	CNMG120408E-4U	NL200	12,70	12,90	4,76	0,80	5,16		Roughing
032487	CNMG120412E-4U	NL200	12,70	12,90	4,76	1,20	5,16		Roughing
032488	CNMG120416E-4U	NL200	12,70	12,90	4,76	1,60	5,16		Roughing
032489	CNMG160608E-4U	NL200	15,88	16,10	6,35	0,80	6,35		Roughing
032490	CNMG160612E-4U	NL200	15,88	16,10	6,35	1,20	6,35		Roughing
032491	CNMG160616E-4U	NL200	15,88	16,10	6,35	1,60	6,35		Roughing
032492	CNMG190612E-4U	NL200	19,05	19,40	6,35	1,20	7,92		Roughing
032493	CNMG190616E-4U	NL200	19,05	19,40	6,35	1,60	7,92		Roughing
032494	CNMG190624E-4U	NL200	19,05	19,40	6,35	2,40	7,92		Roughing

For Toolholders External: see pages C59 - C63 | Internal: see page C64

Material Guide – Key to Recommended Inserts

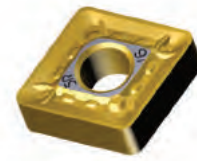
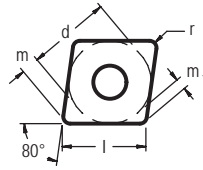
Material Designation

- P Unalloyed Steels
- P Alloyed Steels
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- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



Turning Inserts

CNMM
5R Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
031684	CNMM160612E-5R	NL300	15,88	16,10	6,35	1,20	6,35		Heavy Roughing
031668	CNMM160612E-5R	NL400	15,88	16,10	6,35	1,20	6,35		Heavy Roughing
031685	CNMM160616E-5R	NL300	15,88	16,10	6,35	1,60	6,35		Heavy Roughing
031669	CNMM160616E-5R	NL400	15,88	16,10	6,35	1,60	6,35		Heavy Roughing
031686	CNMM160624E-5R	NL300	15,88	16,10	6,35	2,40	6,35		Heavy Roughing
031670	CNMM160624E-5R	NL400	15,88	16,10	6,35	2,40	6,35		Heavy Roughing
031687	CNMM190612E-5R	NL300	19,05	19,40	6,35	1,20	7,92		Heavy Roughing
031671	CNMM190612E-5R	NL400	19,05	19,40	6,35	1,20	7,92		Heavy Roughing
031688	CNMM190616E-5R	NL300	19,05	19,40	6,35	1,60	7,92		Heavy Roughing
031672	CNMM190616E-5R	NL400	19,05	19,40	6,35	1,60	7,92		Heavy Roughing
031689	CNMM190624E-5R	NL300	19,05	19,40	6,35	2,40	7,92		Heavy Roughing
031673	CNMM190624E-5R	NL400	19,05	19,40	6,35	2,40	7,92		Heavy Roughing
031683	CNMM250924E-5R	NL300	25,40	25,78	9,53	2,40	9,12		Heavy Roughing
031682	CNMM250924E-5R	NL920	25,40	25,78	9,53	2,40	9,12		Heavy Roughing

For Toolholders External: see pages C59 - C63 | Internal: see page C64

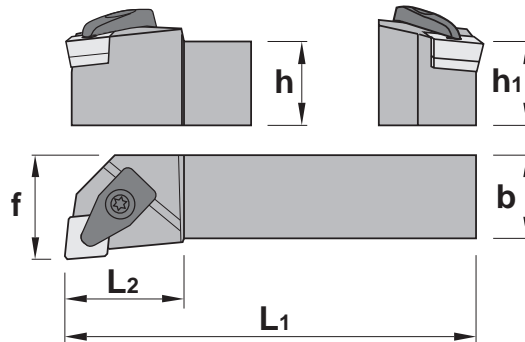
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



DCLN 95°



Turning Inserts

DCLN LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
033245	DCLNL 2020 K12	LH	CN_1204	20	20	25	125	34
033246	DCLNL 2525 M12	LH	CN_1204	25	25	32	150	34
033247	DCLNL 3232 P12	LH	CN_1204	32	32	40	170	34
033248	DCLNR 2020 K12	RH	CN_1204	20	20	25	125	34
033249	DCLNR 2525 M12	RH	CN_1204	25	25	32	150	34
033250	DCLNR 3232 P12	RH	CN_1204	32	32	40	170	34
033251	DCLNL 2525 M16	LH	CN_1606	25	25	32	150	36
033252	DCLNL 3232 P16	LH	CN_1606	32	32	40	170	40
033253	DCLNR 2525 M16	RH	CN_1606	25	25	32	150	36
033254	DCLNR 3232 P16	RH	CN_1606	32	32	40	170	40
033255	DCLNL 3232 P19	LH	CN_1906	32	32	40	170	42
033256	DCLNL 4040 S19	LH	CN_1906	40	40	50	250	42
033257	DCLNR 3232 P19	RH	CN_1906	32	32	40	170	42
033258	DCLNR 4040 S19	RH	CN_1906	40	40	50	250	42



D style External Toolholder for Negative Inserts:
 CN_1204, CN_1606 & CN_1906
 Application: Face and Turn O/D
 Approach 95°
 Axial -6°
 Radial -6°
 Profiling Clearance Angle $\beta = 0^\circ$
 RH Holder Shown

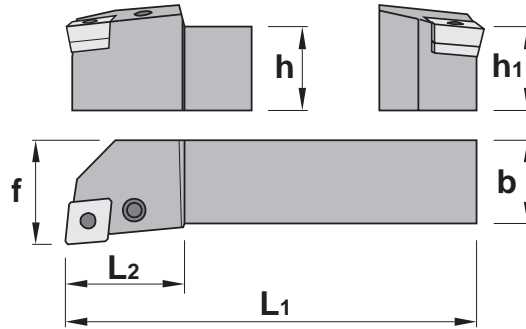
DCLNL/R Spare Parts

Item Description	Clamp Screw EDP	Clamp EDP	Clamp Spring EDP	Anvil EDP	Anvil Screw EDP	Clamp & Anvil Screw Key					
DCLNL/R 2020 K12	033710	1696	033707	DC2712	033712	ICSN442	033716	1766			
DCLNL/R 2525 M12											
DCLNL/R 3232 P12											
DCLNL/R 2525 M16			033719	4295	001685	ICSN533			034509	018287	KH5004
DCLNL/R 3232 P16											
DCLNL/R 3232 P19											
DCLNL/R 4040 S19	033708	DC2719	001686	ICSN633	033717	1770					



Turning Inserts

PCLN 95°



PCLN LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
033273	*PCLNL 4040 S25	LH	CN_2509	40	40	50	250	45
033274	*PCLNL 5050 T25	LH	CN_2509	50	50	60	300	50
033275	*PCLNR 4040 S25	RH	CN_2509	40	40	50	250	45
033276	*PCLNR 5050 T25	RH	CN_2509	50	50	60	300	50

* Non Stock Items, subject to extended delivery time



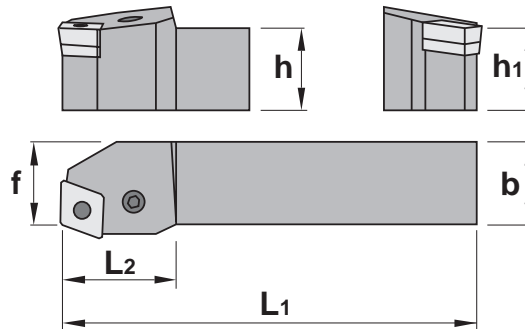
P Style External Toolholder
for Negative Inserts: CN_2509
Application: Face and Turn O/D
Approach 95°
Axial -6°
Radial -6°
Profiling Clearance Angle $\beta = 0^\circ$
RH Holder Shown

PCLNL/R Spare Parts

Item Description	Lever EDP	Lever Screw EDP	Anvil EDP	Anvil Clip EDP	Clip Punch EDP	Key EDP						
PCLNL/R 4040 S25	028408	PL8025	028409	PLS1612	034483	PA3625	028418	PC4125	034506	PCP0025	018285	KH5005
PCLNL/R 5050 T25												



PCBN 75°



Turning Inserts

PCBN LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
017118	PCBNL 2020 K12	LH	CN_1204	20	20	17	125	28
017120	PCBNL 2525 M12	LH	CN_1204	25	25	22	150	28
017119	PCBNR 2020 K12	RH	CN_1204	20	20	17	125	28
017121	PCBNR 2525 M12	RH	CN_1204	25	25	22	150	28
028373	PCBNL 3232 P16	LH	CN_1606	32	32	27	170	34
017127	PCBNR 3232 P16	RH	CN_1606	32	32	27	170	34



P Style External Toolholder
for Negative Inserts:
CN_1204 & CN_1606
Application: Turn O/D
Approach 75°
Axial -7,25°
Radial -4,25°
RH Holder Shown

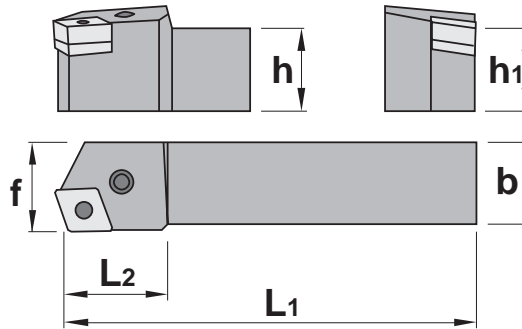
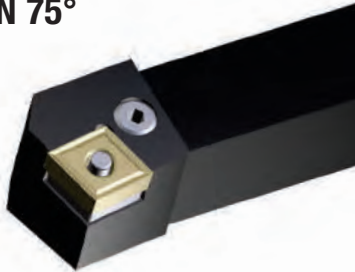
PCBNL/R Spare Parts

Item Description	Lever EDP	Lever Screw EDP	Anvil EDP	Anvil Clip EDP	Clip Punch EDP	Key EDP						
PCBNL/R 2020 K12	017443	PL8012	017448	PLS1608	017456	PA3612	017453	PC4112	028054	PCP0012	018286	KH5003
PCBNL/R 2525 M12		PL8016	017450	PLS1618	017457	PA3616	028051	PC4115	034505	PCP0015		
PCBNL/R 3232 P16		017445	PL8016	017450	PLS1618	017457	PA3616	028051	PC4115	034505		



Turning Inserts

PCKN 75°



PCKN LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
017130	PCKNL 2020 K 12	LH	CN_1204	20	20	25	125	28
017132	PCKNL 2525 M 12	LH	CN_1204	25	25	32	150	28
033280	PCKNL 3225 P 12	LH	CN_1204	32	25	32	170	28
017131	PCKNR 2020 K 12	RH	CN_1204	20	20	25	125	28
017133	PCKNR 2525 M 12	RH	CN_1204	25	25	32	150	28
033281	PCKNR 3225 P 12	RH	CN_1204	32	25	32	170	28



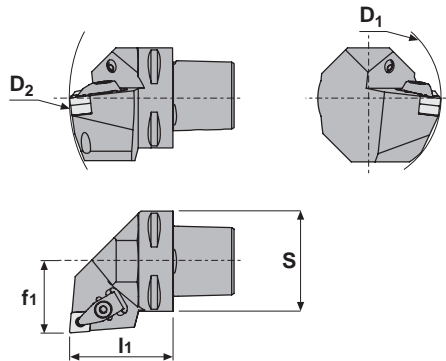
P Style External Toolholder
for Negative Inserts: CN_1204
Application: Facing
Approach 75°
Axial -6,5°
Radial -5,5°
RH Holder Shown

PCKNL/R Spare Parts

Item Description	Lever EDP	Lever Screw EDP	Anvil EDP	Anvil Clip EDP	Clip Punch EDP	Key EDP						
PCKNL/R 2020 K12	017443	PL8012	017448	PLS1608	017456	PA3612	017453	PC4112	028054	PCP0012	018286	KH5003
PCKNL/R 2525 M12												
PCKNL/R 3225 P12												



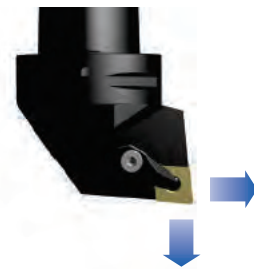
DCLN 95°



Turning Inserts

DCLN LH & RH External PSC Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				S	D1	D2	f1	l1
033691	C5-50-DCLNL35060-12	LH	CN_1204	50	110	165	35	60
033692	C5-50-DCLNR35060-12	RH	CN_1204	50	110	165	35	60
033693	C6-63-DCLNL45065-12	LH	CN_1204	63	110	190	45	65
033694	C6-63-DCLNR45065-12	RH	CN_1204	63	110	190	45	65
033695	C8-80-DCLNL55080-19	LH	CN_1906	80	125	250	55	80
033696	C8-80-DCLNR55080-19	RH	CN_1906	80	125	250	55	80



D Style External Toolholder
for Negative Inserts:
CN_1204 & CN_1906
Application: External Face, Turn O/D
Approach 95°
Axial -5°
Radial -6°
Profiling Clearance Angle $\beta = 0^\circ$
RH Holder Shown

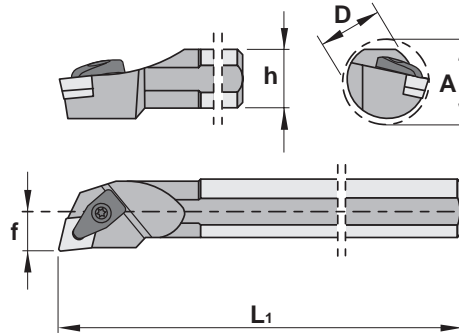
DCLNL/R Spare Parts

Item Description	Clamp EDP	Clamp Screw EDP	Anvil EDP	Anvil Screw EDP	Clamp Spring EDP	Screw Key EDP						
C5-50-DCLNL/R 35060-12	033707	2712	033710	1696	033712	ICSN442	033716	1766	033719	4295	018287	KH5004
C6-63-DCLNL/R 45065-12												
C8-80-DCLNL/R 55080-19	033708	2719	033710	1696	001686	ICSN633	033717	1770				



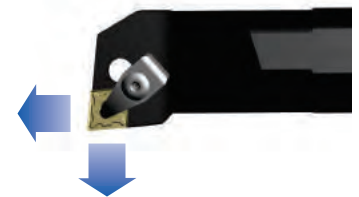
Turning Inserts

S..DCLN 95°



S..DCLN LH & RH Internal Boring Bars

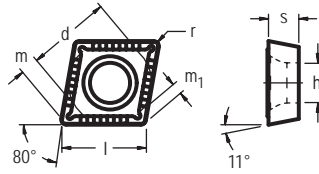
EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					Through Coolant
				Min Bore Ø A	ØD	f	L1	h	
033286	S25T DCLNL 12	LH	CN_1204	31	25	17	300	23	
033287	S32U DCLNL 12	LH	CN_1204	39	32	22	350	30	
033288	S40V DCLNL 12	LH	CN_1204	48	40	27	400	37	
033289	S25T DCLNR 12	RH	CN_1204	31	25	17	300	23	
033290	S32U DCLNR 12	RH	CN_1204	39	32	22	350	30	
033291	S40V DCLNR 12	RH	CN_1204	48	40	27	400	37	
033292	*S40V DCLNL 16	LH	CN_1606	48	40	27	400	37	
033293	*S50W DCLNL 16	LH	CN_1606	61	50	35	450	47	
033294	*S40V DCLNR 16	RH	CN_1606	48	40	27	400	37	
033295	*S50W DCLNR 16	RH	CN_1606	61	50	35	450	47	



D Style Internal Boring Bar for Negative Inserts:
CN_1204 & CN_1606
Application:- I/D Face and Bore
Axial Approach 95°
Axial -5°
Radial -13,5°
Profiling Clearance Angle $\beta = 0^\circ$
RH Bar Shown

S..DCLNL/R Spare Parts

Item Description	Clamp Screw EDP	Clamp EDP	Clamp Spring EDP	Anvil EDP	Anvil Screw EDP	Clamp & Anvil Screw Key						
S25T DCLNL/R 12	033710	1696	033707	DC2712	033719	4295	017456	3612	029095	1765	018287	KH5004
S32U DCLNL/R 12							029079	ICCN432	034508	1161		
S40V DCLNL/R 12							034507	1160				
*S40V DCLNL/R 16			001685	ICSN-533	034509	1768						
*S50W DCLNL/R 16												


CPMT
-73 Geometry


Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032496	CPMT060204E-73	SP4019	6,35	6,45	2,38	0,40	2,80		Medium
032497	CPMT080302E-73	SP4019	9,52	7,94	3,18	0,20	3,05		Medium
032498	CPMT080304E -73	SP4019	9,52	7,94	3,18	0,40	3,05		Medium
032499	CPMT080308E-73	SP4019	9,52	7,94	3,18	0,80	3,05		Medium

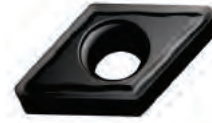
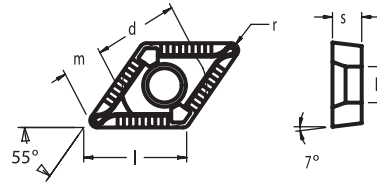
Material Guide – Key to Recommended Inserts
Material Designation

Unalloyed Steels
 Alloyed Steels
 Stainless Steels
 PH Stainless
 Cast Irons
 Aluminum & Alloys
 High Temp. Alloys
 Hard Materials



Turning Inserts

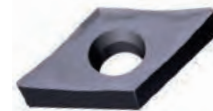
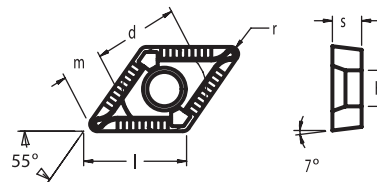
DCGT & DCGX -62 Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
031401	DCGX0702005E-62	SP4019	6,35	7,70	2,38	0,05	2,79		Finishing
030577	DCGT070201E-62	SP4019	6,35	7,70	2,38	0,10	2,79		Finishing
030578	DCGT070202E-62	SP4019	6,35	7,70	2,38	0,20	2,79		Finishing
030579	DCGT070204E-62	SP4019	6,35	7,70	2,38	0,40	2,79		Finishing
031402	DCGX11T3005E-62	SP4019	9,52	11,60	3,97	0,05	4,39		Finishing
030581	DCGT11T301E-62	SP4019	9,52	11,60	3,97	0,10	4,39		Finishing
030582	DCGT11T302E-62	SP4019	9,52	11,60	3,97	0,20	4,39		Finishing
030583	DCGT11T304E-62	SP4019	9,52	11,60	3,97	0,40	4,39		Finishing
030584	DCGT11T308E-62	SP4019	9,52	11,60	3,97	0,80	4,39		Finishing

For Toolholders External: see pages C68 - C70 | Internal: see pages C71 - C73

DCGT -64 Geometry



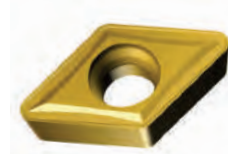
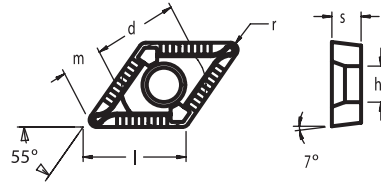
EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
034465	DCGT11T302F-64	GH1	9,52	11,60	3,97	0,20	4,39		Finishing
014068	DCGT11T304F-64	GH1	9,52	11,60	3,97	0,40	4,39		Finishing
014069	DCGT11T308F-64	GH1	9,52	11,60	3,97	0,80	4,39		Finishing

For Toolholders External: see pages C68 - C70 | Internal: see pages C71 - C73

Material Guide – Key to Recommended Inserts

Material Designation

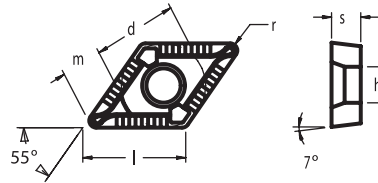
- P Unalloyed Steels
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- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials


DCMT
 -73 Geometry


Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032501	DCMT070202E-73	SP4019	6,35	7,70	2,38	0,20	2,79		Medium
032502	DCMT070202E-73	NL300	6,35	7,70	2,38	0,20	2,79		Medium
032503	DCMT070204E-73	SP4019	6,35	7,70	2,38	0,40	2,79		Medium
032504	DCMT070204E-73	NL300	6,35	7,70	2,38	0,40	2,79		Medium
032285	DCMT11T304E-73	SP4019	9,52	11,60	3,97	0,40	4,39		Medium
032505	DCMT11T304E-73	NL300	9,52	11,60	3,97	0,40	4,39		Medium
032506	DCMT11T304E-73	NL920	9,52	11,60	3,97	0,40	4,39		Medium
032297	DCMT11T308E-73	SP4019	9,52	11,60	3,97	0,80	4,39		Medium
032507	DCMT11T308E-73	NL300	9,52	11,60	3,97	0,80	4,39		Medium
032508	DCMT11T308E-73	NL920	9,52	11,60	3,97	0,80	4,39		Medium

For Toolholders External: see pages C68 - C70 | Internal: see pages C71 - C73

DCMT
 M Geometry


EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032509	DCMT150404E-M	SP4019	12,70	15,50	4,76	0,40	5,16		Medium
032510	DCMT150404E-M	NL300	12,70	15,50	4,76	0,40	5,16		Medium
032511	DCMT150408E-M	SP4019	12,70	15,50	4,76	0,80	5,16		Medium
032512	DCMT150408E-M	NL300	12,70	15,50	4,76	0,80	5,16		Medium
032513	DCMT150408E-M	NL920	12,70	15,50	4,76	0,80	5,16		Medium

For Toolholders External: see pages C68 - C70 | Internal: see pages C71 - C73

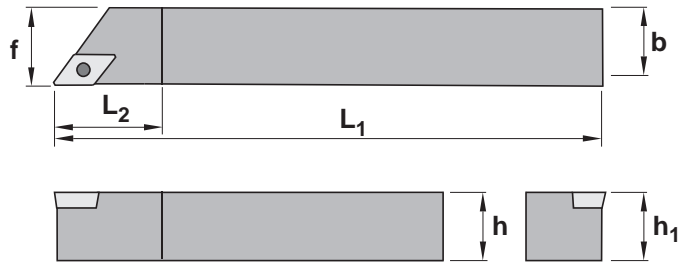
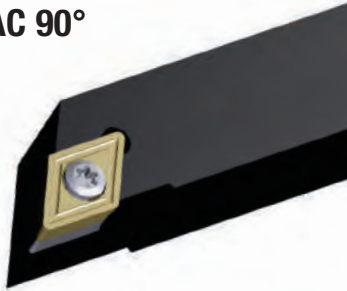
Material Guide – Key to Recommended Inserts
Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



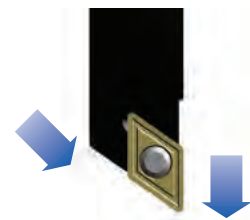
Turning Inserts

SDAC 90°



SDAC LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
025072	SDACL 1010 M07	LH	DC_0702	10	10	10	150	15
033486	SDACL 1212 M07	LH	DC_0702	12	12	12	150	15
025071	SDACR 1010 M07	RH	DC_0702	10	10	10	150	15
033487	SDACR 1212 M07	RH	DC_0702	12	12	12	150	15
025074	SDACL 1212 M11	LH	DC_11T3	12	12	12	150	19
025076	SDACL 1616 M11	LH	DC_11T3	16	16	16	150	19
025078	SDACL 2020 K11	LH	DC_11T3	20	20	20	125	20
025073	SDACR 1212 M11	RH	DC_11T3	12	12	12	150	19
025075	SDACR 1616 M11	RH	DC_11T3	16	16	16	150	19
025077	SDACR 2020 K11	RH	DC_11T3	20	20	20	125	20



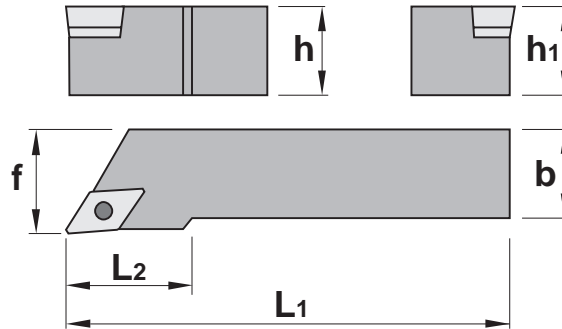
S Style External Toolholder
for Positive Inserts:
DC_0702 and DC_11T3
Application: O/D Profiling
Approach 90°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 32^\circ$
RH Holder Shown

SDACL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SDACL/R 1010 M07	015061	F25007T	018488	T7	-	-	-	-
SDACL/R 1212 M07								
SDACL/R 1212 M11	015262	D4010T	015240	T15	-	-	-	-
SDACL/R 1616 M11								
SDACL/R 2020 K11								



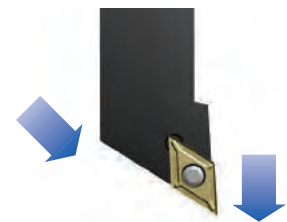
SDJC 93°



Turning Inserts

SDJC LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
028462	SDJCL 1010 E07	LH	DC_0702	10	10	12	70	14
018001	SDJCL 1212 F07	LH	DC_0702	12	12	16	80	16
028469	SDJCR 1010 E07	RH	DC_0702	10	10	12	70	14
018010	SDJCR 1212 F07	RH	DC_0702	12	12	16	80	16
018002	SDJCL 1212 F11	LH	DC_11T3	12	12	16	80	20
028464	SDJCL 1616 H11	LH	DC_11T3	16	16	20	100	18
028465	SDJCL 2020 K11	LH	DC_11T3	20	20	25	125	22
028466	SDJCL 2525 M11	LH	DC_11T3	25	25	32	150	28
018011	SDJCR 1212 F11	RH	DC_11T3	12	12	16	80	20
028470	SDJCR 1616 H11	RH	DC_11T3	16	16	20	100	18
028471	SDJCR 2020 K11	RH	DC_11T3	20	20	25	125	22
028472	SDJCR 2525 M11	RH	DC_11T3	25	25	32	150	28



S Style External Toolholder
for Positive Inserts:
DC_0702 and DC_11T3
Application: Facing and O/D Profiling
Approach 93°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 29^\circ$
RH Holder Shown

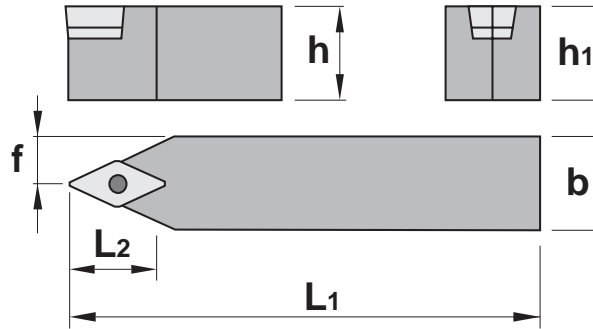
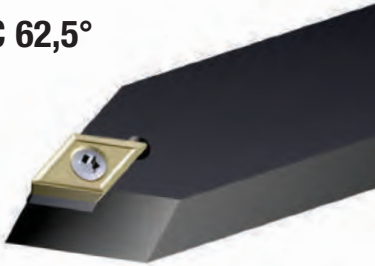
SDJCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SDJCL/R 1010 E07	015061	F2507T	018488	T7	-	-	-	-
SDJCL/R 1212 F07								
SDJCL/R 1212 F11	015262	D4010T	015240	T15	-	-	-	-
SDJCL/R 1616 H11	034497	1335	028475	K5516	028477	SA3714	028478	SAS1750
SDJCL/R 2020 K11								
SDJCL/R 2525 M11								



Turning Inserts

SDNC 62,5°



SDNC Neutral External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
028519	SDNC N 1010 E07	Neutral	DC_0702	10	10	5	70	16
028520	SDNC N 1212 F07	Neutral	DC_0702	12	12	6	80	16
028522	SDNC N 1616 H11	Neutral	DC_11T3	16	16	8	100	22
028523	SDNC N 2020 K11	Neutral	DC_11T3	20	20	10	125	22
028524	SDNC N 2525 M11	Neutral	DC_11T3	25	25	12,5	150	22



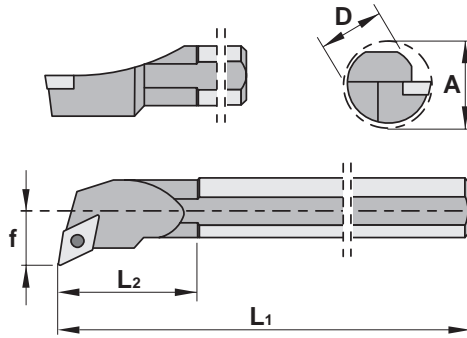
S Style External Toolholder
for Positive Inserts:
DC_0702, and DC_11T3
Application: Plunge and O/D Profiling
Approach 62,5°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 59,5^\circ$
Neutral Holder Shown

SDNC Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SDNC N 1010 E07	015061	F2507T	018488	T7	-	-	-	-
SDNC N 1212 F07								
SDNC N 1010 E07	034497	1335	028475	K5516	028477	SA3714	028739	SAS1750
SDNC N 1212 F07								
SDJCL/R 2525 M11								



A.. SDUC 93°



Turning Inserts

A.. SDUC LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					
				Min Bore Ø A	ØD	f	L1	L2	Through Coolant
018357	A12K SDUCL 07	LH	DC_0702	16	12	9	125	23	
018359	A16M SDUCL 07	LH	DC_0702	20	16	11	150	31	
018358	A12K SDUCR 07	RH	DC_0702	16	12	9	125	23	
018360	A16M SDUCR 07	RH	DC_0702	20	16	11	150	31	
018361	A20Q SDUCL 11	LH	DC_11T3	24	20	13	180	36	
017990	A25R SDUCL 11	LH	DC_11T3	31	25	17	200	42	
018363	A32S SDUCL 11	LH	DC_11T3	39	32	22	250	45	
018362	A20Q SDUCR 11	RH	DC_11T3	24	20	13	180	36	
017991	A25R SDUCR 11	RH	DC_11T3	31	25	17	200	42	
018364	A32S SDUCR 11	RH	DC_11T3	39	32	22	250	45	



S Style Boring Bar
for Positive Inserts:
DC_0702, and DC_11T3
Application: I/D Profiling
Approach 93°
Axial 0°
Radial -6°
Profiling Clearance Angle $\beta = 29^\circ$
RH Bar Shown

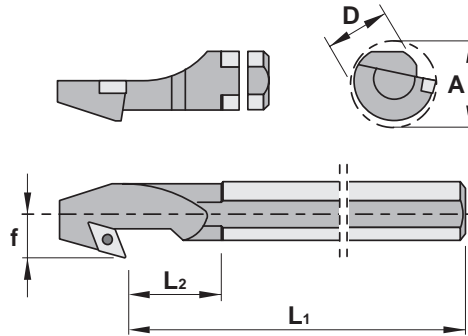
A.. SDUCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
A12K SDUCL/R 07	015061	F2507T	018488	T7	-	-	-	-
A16M SDUCL/R 07								
A20Q SDUCL/R 11	015262	D4010T	018488	T7	-	-	-	-
A25R SDUCL/R 11								
A32S SDUCL/R 11	034497	1335	028475	K5516	028477	SA3714	028478	SAS1750



Turning Inserts

A.. SDUC 93°-EX



A.. SDUC -EX LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					
				Min Bore Ø A	ØD	f	L1	L2	Through Coolant
034596	A12K SDUCL 07-EX	LH	DC_0702	16	12	9	125	32	
034597	A16M SDUCL 07-EX	LH	DC_0702	20	16	11	150	40	
034598	A12K SDUCR 07-EX	RH	DC_0702	16	12	9	125	32	
034599	A16M SDUCR 07-EX	RH	DC_0702	20	16	11	150	40	
034600	A20Q SDUCL 11-EX	LH	DC_11T3	24	20	13	180	45	
034601	A25R SDUCL 11-EX	LH	DC_11T3	31	25	17	200	50	
034602	A20Q SDUCR 11-EX	RH	DC_11T3	24	20	13	180	45	
034603	A25R SDUCR 11-EX	RH	DC_11T3	31	25	17	200	50	

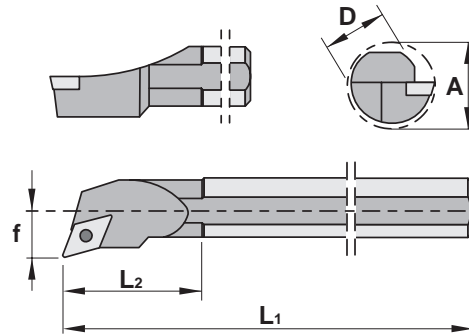
S Style Boring Bar
for Positive Inserts:
DC_0702, and DC_11T3
Application: Back Boring and Profiling
Approach 93°
Axial 0°
Radial -6°
Profiling Clearance Angle $\beta = 29^\circ$
RH Bar Shown

A.. SDUCL/R -EX Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
A12K SDUCL/R 07	015061	F2507T	018488	T7	-	-	-	-
A16M SDUCL/R 07								
A20Q SDUCL/R 11	034499	1440	015240	T15	-	-	-	-
A25R SDUCL/R 11	015262	D4010T						



A.. SDQC 107,5°



Turning Inserts

A.. SDQC LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					
				Min Bore Ø A	ØD	f	L1	L2	Through Coolant
033507	A12K SDQCL 07	LH	DC_0702	16	12	9	125	23	
033508	A16M SDQCL 07	LH	DC_0702	20	16	11	150	31	
033509	A12K SDQCR 07	RH	DC_0702	16	12	9	125	23	
033510	A16M SDQCR 07	RH	DC_0702	20	16	11	150	31	
033511	A20Q SDQCL 11	LH	DC_11T3	24	20	13	180	36	
033512	A25R SDQCL 11	LH	DC_11T3	31	25	17	200	42	
033513	A20Q SDQCR 11	RH	DC_11T3	24	20	13	180	36	
033514	A25R SDQCR 11	RH	DC_11T3	31	25	17	200	42	



S Style Boring Bar
for Positive Inserts:
DC_0702, and DC_11T3
Application: Face and I/D Profiling
Approach 107,5°
Axial: 0°
Radial -6°
Profiling Clearance Angle $\beta = 14,5^\circ$
RH Bar Shown

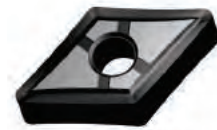
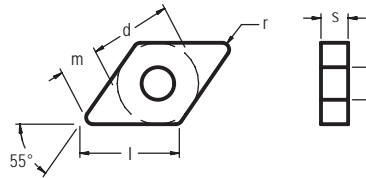
A.. SDQCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
A12K SDQCL/R 07	015061	F2507T	018488	T7	-	-	-	-
A16M SDQCL/R 07								
A20Q SDQCL/R 11	015262	D4010T	015240	T15	-	-	-	-
A25R SDQCL/R 11								



Turning Inserts

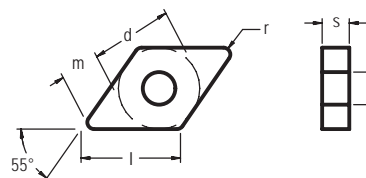
DNGG
3F Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
031561	DNGG150402F-3F	SP0819	12,70	15,50	4,76	0,20	5,16		Medium
031562	DNGG150404F-3F	SP0819	12,70	15,50	4,76	0,40	5,16		Medium
031563	DNGG150408F-3F	SP0819	12,70	15,50	4,76	0,80	5,16		Medium
031564	DNGG150412F-3F	SP0819	12,70	15,50	4,76	1,20	5,16		Medium
031547	DNGG150602F-3F	SP0819	12,70	15,50	6,35	0,20	5,16		Medium
031548	DNGG150604F-3F	SP0819	12,70	15,50	6,35	0,40	5,16		Medium
031565	DNGG150608F-3F	SP0819	12,70	15,50	6,35	0,80	5,16		Medium
031566	DNGG150612F-3F	SP0819	12,70	15,50	6,35	1,20	5,16		Medium

For Toolholders External: see pages C83 - C85 | Internal: see pages C86 - C87

DNMA
Flat Top



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032514	DNMA150408E	NL250	12,70	15,50	4,76	0,80	5,16		Heavy-Roughing
034471	DNMA150412E	NL250	12,70	15,50	4,76	1,20	5,16		Heavy-Roughing
032515	DNMA150608E	NL250	12,70	15,50	6,35	0,80	5,16		Heavy-Roughing
032516	DNMA150612E	NL250	12,70	15,50	6,35	1,20	5,16		Heavy-Roughing

For Toolholders External: see pages C83 - C85 | Internal: see pages C86 - C87

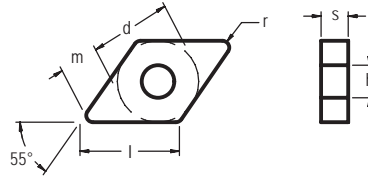
Material Guide – Key to Recommended Inserts

Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



DNMG
1B Geometry



Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032517	DNMG110404E-1B	NL250	9,52	11,00	4,76	0,40	4,39		Finishing
030869	DNMG110404E-1B	SP0819	9,52	11,00	4,76	0,40	4,39		Finishing
032518	DNMG110408E-1B	NL250	9,52	11,00	4,76	0,80	4,39		Finishing
030870	DNMG110408E-1B	SP0819	9,52	11,00	4,76	0,80	4,39		Finishing
032519	DNMG150404E-1B	NL250	12,70	15,50	4,76	0,40	5,16		Finishing
030872	DNMG150404E-1B	SP0819	12,70	15,50	4,76	0,40	5,16		Finishing
032520	DNMG150408E-1B	NL250	12,70	15,50	4,76	0,80	5,16		Finishing
030873	DNMG150408E-1B	SP0819	12,70	15,50	4,76	0,80	5,16		Finishing
030874	DNMG150412E-1B	SP0819	12,70	15,50	4,76	1,20	5,16		Finishing
032521	DNMG150412E-1B	NL250	12,70	15,50	4,76	1,20	5,16		Finishing
030875	DNMG150604E-1B	SP0819	12,70	15,50	6,35	0,40	5,16		Finishing
032522	DNMG150604E-1B	NL250	12,70	15,50	6,35	0,40	5,16		Finishing
032523	DNMG150608E-1B	NL250	12,70	15,50	6,35	0,80	5,16		Finishing
030876	DNMG150608E-1B	SP0819	12,70	15,50	6,35	0,80	5,16		Finishing
030877	DNMG150612E-1B	SP0819	12,70	15,50	6,35	1,20	5,16		Finishing
032524	DNMG150612E-1B	NL250	12,70	15,50	6,35	1,20	5,16		Finishing

For Toolholders External: see pages C83 - C85 | Internal: see pages C86 - C87

Material Guide – Key to Recommended Inserts

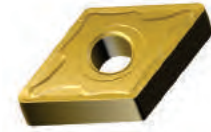
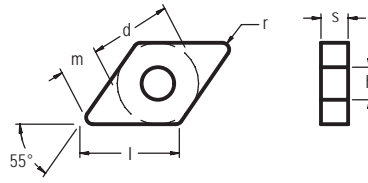
Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



Turning Inserts

DNMG
2N Geometry



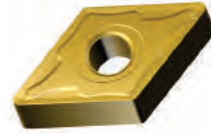
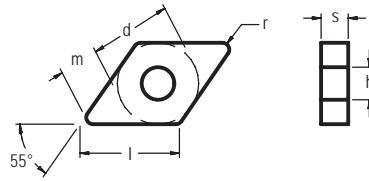
EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032525	DNMG110404E-2N	NL250	9,52	11,00	4,76	0,40	4,39		Medium
032526	DNMG110404E-2N	NL300	9,52	11,00	4,76	0,40	4,39		Medium
032527	DNMG110404E-2N	NL920	9,52	11,00	4,76	0,40	4,39		Medium
032528	DNMG110408E-2N	NL250	9,52	11,00	4,76	0,80	4,39		Medium
032529	DNMG110408E-2N	NL300	9,52	11,00	4,76	0,80	4,39		Medium
032530	DNMG110408E-2N	NL920	9,52	11,00	4,76	0,80	4,39		Medium

For Toolholders External: see pages C83 - C85 | Internal: see pages C86 - C87

Material Guide – Key to Recommended Inserts

Material Designation

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- M PH Stainless
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- S High Temp. Alloys
- H Hard Materials


DNMG
2N Geometry


EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032531	DNMG150404E-2N	NL250	12,70	15,50	4,76	0,40	5,16		Medium
032532	DNMG150404E-2N	NL300	12,70	15,50	4,76	0,40	5,16		Medium
032533	DNMG150404E-2N	NL920	12,70	15,50	4,76	0,40	5,16		Medium
032534	DNMG150408E-2N	NL250	12,70	15,50	4,76	0,80	5,16		Medium
032535	DNMG150408E-2N	NL300	12,70	15,50	4,76	0,80	5,16		Medium
032536	DNMG150408E-2N	NL920	12,70	15,50	4,76	0,80	5,16		Medium
032537	DNMG150412E-2N	NL250	12,70	15,50	4,76	1,20	5,16		Medium
034472	DNMG150412E-2N	NL300	12,70	15,50	4,76	1,20	5,16		Medium
032539	DNMG150604E-2N	NL250	12,70	15,50	6,35	0,40	5,16		Medium
032540	DNMG150604E-2N	NL300	12,70	15,50	6,35	0,40	5,16		Medium
032541	DNMG150604E-2N	NL920	12,70	15,50	6,35	0,40	5,16		Medium
032542	DNMG150608E-2N	NL250	12,70	15,50	6,35	0,80	5,16		Medium
032543	DNMG150608E-2N	NL300	12,70	15,50	6,35	0,80	5,16		Medium
032544	DNMG150608E-2N	NL920	12,70	15,50	6,35	0,80	5,16		Medium
032545	DNMG150612E-2N	NL250	12,70	15,50	6,35	1,20	5,16		Medium
032546	DNMG150612E-2N	NL300	12,70	15,50	6,35	1,20	5,16		Medium
032547	DNMG150612E-2N	NL920	12,70	15,50	6,35	1,20	5,16		Medium

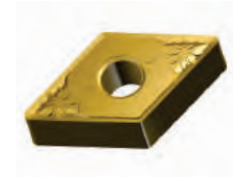
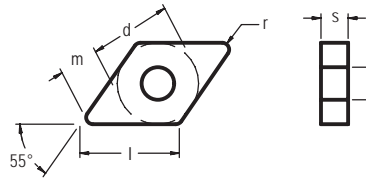
For Toolholders External: see pages C83 - C85 | Internal: see pages C86 - C87

Material Guide – Key to Recommended Inserts
Material Designation



Turning Inserts

DNMG
3J Geometry



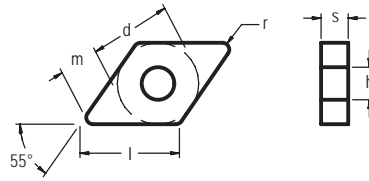
EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032548	DNMG110404E-3J	SP4019	9,52	11,00	4,76	0,40	4,39		Medium
032549	DNMG110408E-3J	SP4019	9,52	11,00	4,76	0,80	4,39		Medium
032550	DNMG150404E-3J	SP4019	12,70	15,50	4,76	0,40	5,16		Medium
032551	DNMG150408E-3J	SP4019	12,70	15,50	4,76	0,80	5,16		Medium
032552	DNMG150412E-3J	SP4019	12,70	15,50	4,76	1,20	5,16		Medium
032553	DNMG150604E-3J	SP4019	12,70	15,50	6,35	0,40	5,16		Medium
032554	DNMG150608E-3J	SP4019	12,70	15,50	6,35	0,80	5,16		Medium
032555	DNMG150612E-3J	SP4019	12,70	15,50	6,35	1,20	5,16		Medium

For Toolholders External: see pages C83 - C85 | Internal: see pages C86 - C87

Material Guide – Key to Recommended Inserts

Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials


DNMG
4E Geometry


Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
030516	DNMG150404E-4E	SP0819	12,70	15,50	4,76	0,40	5,16		Medium-Roughing
030517	DNMG150408E-4E	SP0819	12,70	15,50	4,76	0,80	5,16		Medium-Roughing
032556	DNMG150408E-4E	NL400	12,70	15,50	4,76	0,80	5,16		Medium-Roughing
030518	DNMG150412E-4E	SP0819	12,70	15,50	4,76	1,20	5,16		Medium-Roughing
032557	DNMG150412E-4E	NL400	12,70	15,50	4,76	1,20	5,16		Medium-Roughing
030524	DNMG150604E-4E	SP0819	12,70	15,50	6,35	0,40	5,16		Medium-Roughing
030525	DNMG150608E-4E	SP0819	12,70	15,50	6,35	0,80	5,16		Medium-Roughing
032558	DNMG150608E-4E	NL400	12,70	15,50	6,35	0,80	5,16		Medium-Roughing
030526	DNMG150612E-4E	SP0819	12,70	15,50	6,35	1,20	5,16		Medium-Roughing
032559	DNMG150612E-4E	NL400	12,70	15,50	6,35	1,20	5,16		Medium-Roughing

For Toolholders External: see pages C83 - C85 | Internal: see pages C86 - C87

Material Guide – Key to Recommended Inserts

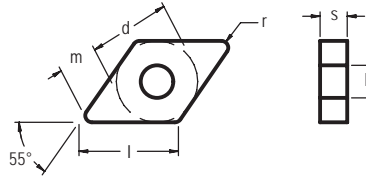
Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



Turning Inserts

DNMG
4T Geometry



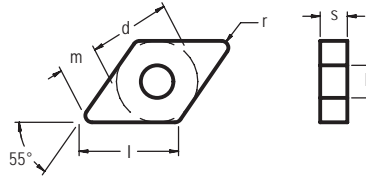
EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032560	DNMG150404E-4T	NL250	12,70	15,50	4,76	0,40	5,16	◆◆◆◆	Roughing
032561	DNMG150404E-4T	NL300	12,70	15,50	4,76	0,40	5,16	◆◆◆◆◆	Roughing
032562	DNMG150404E-4T	NL400	12,70	15,50	4,76	0,40	5,16	◆◆◆◆	Roughing
032563	DNMG150404E-4T	NL920	12,70	15,50	4,76	0,40	5,16	◆◆◆◆◆	Roughing
032564	DNMG150408E-4T	NL250	12,70	15,50	4,76	0,80	5,16	◆◆◆◆	Roughing
032565	DNMG150408E-4T	NL300	12,70	15,50	4,76	0,80	5,16	◆◆◆◆◆	Roughing
032566	DNMG150408E-4T	NL400	12,70	15,50	4,76	0,80	5,16	◆◆◆◆	Roughing
032567	DNMG150408E-4T	NL920	12,70	15,50	4,76	0,80	5,16	◆◆◆◆◆	Roughing
032568	DNMG150412E-4T	NL250	12,70	15,50	4,76	1,20	5,16	◆◆◆◆	Roughing
032569	DNMG150412E-4T	NL300	12,70	15,50	4,76	1,20	5,16	◆◆◆◆◆	Roughing
032570	DNMG150412E-4T	NL400	12,70	15,50	4,76	1,20	5,16	◆◆◆◆	Roughing
032571	DNMG150412E-4T	NL920	12,70	15,50	4,76	1,20	5,16	◆◆◆◆◆	Roughing
032572	DNMG150604E-4T	NL250	12,70	15,50	6,35	0,40	5,16	◆◆◆◆	Roughing
032573	DNMG150604E-4T	NL300	12,70	15,50	6,35	0,40	5,16	◆◆◆◆◆	Roughing
032574	DNMG150604E-4T	NL400	12,70	15,50	6,35	0,40	5,16	◆◆◆◆	Roughing
032575	DNMG150604E-4T	NL920	12,70	15,50	6,35	0,40	5,16	◆◆◆◆◆	Roughing
032576	DNMG150608E-4T	NL250	12,70	15,50	6,35	0,80	5,16	◆◆◆◆	Roughing
032577	DNMG150608E-4T	NL300	12,70	15,50	6,35	0,80	5,16	◆◆◆◆◆	Roughing
032578	DNMG150608E-4T	NL400	12,70	15,50	6,35	0,80	5,16	◆◆◆◆	Roughing
032579	DNMG150608E-4T	NL920	12,70	15,50	6,35	0,80	5,16	◆◆◆◆◆	Roughing

For Toolholders External: see pages C83 - C85 | Internal: see pages C86 - C87

Material Guide – Key to Recommended Inserts

Material Designation

- ◆ P Unalloyed Steels
- ◆ P Alloyed Steels
- ◆ M Stainless Steels
- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials


DNMG
 4T Geometry


EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032580	DNMG150612E-4T	NL250	12,70	15,50	6,35	1,20	5,16		Roughing
032581	DNMG150612E-4T	NL300	12,70	15,50	6,35	1,20	5,16		Roughing
032582	DNMG150612E-4T	NL400	12,70	15,50	6,35	1,20	5,16		Roughing
032583	DNMG150612E-4T	NL920	12,70	15,50	6,35	1,20	5,16		Roughing
032584	DNMG190608E-4T	NL250	15,88	19,40	6,35	0,80	6,35		Roughing
032585	DNMG190608E-4T	NL300	15,88	19,40	6,35	0,80	6,35		Roughing
032586	DNMG190608E-4T	NL400	15,88	19,40	6,35	0,80	6,35		Roughing
032587	DNMG190608E-4T	NL920	15,88	19,40	6,35	0,80	6,35		Roughing
032588	DNMG190612E-4T	NL250	15,88	19,40	6,35	1,20	6,35		Roughing
032589	DNMG190612E-4T	NL300	15,88	19,40	6,35	1,20	6,35		Roughing
032590	DNMG190612E-4T	NL400	15,88	19,40	6,35	1,20	6,35		Roughing
032591	DNMG190612E-4T	NL920	15,88	19,40	6,35	1,20	6,35		Roughing

For Toolholders External: see pages C83 - C85 | Internal: see pages C86 - C87

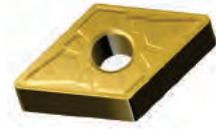
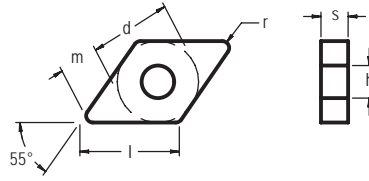
Material Guide – Key to Recommended Inserts
Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



Turning Inserts

DNMG
4U Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032592	DNMG150408E-4U	NL200	12,70	15,50	4,76	0,80	5,16		Roughing
032593	DNMG150412E-4U	NL200	12,70	15,50	4,76	1,20	5,16		Roughing
032594	DNMG150608E-4U	NL200	12,70	15,50	6,35	0,80	5,16		Roughing
032595	DNMG150612E-4U	NL200	12,70	15,50	6,35	1,20	5,16		Roughing

For Toolholders External: see pages C83 - C85 | Internal: see pages C86 - C87

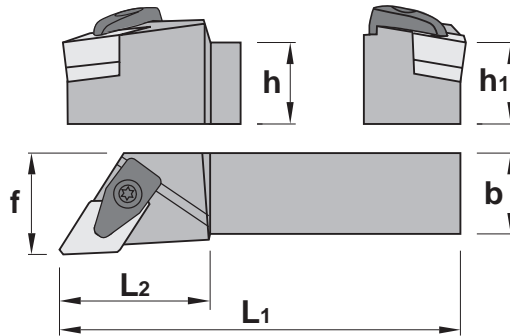
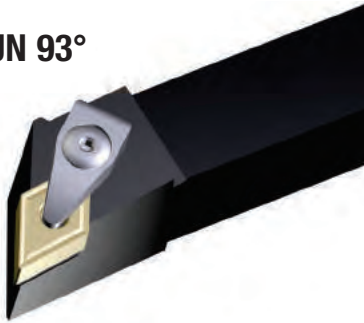
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



DDJN 93°



Turning Inserts

DDJN LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
033306	DDJNL 2020 K 11	LH	DN_1104	20	20	25	125	34
033307	DDJNL 2525 M11	LH	DN_1104	25	25	32	150	34
033308	DDJNR 2020 K11	RH	DN_1104	20	20	25	125	34
033309	DDJNR 2525 M11	RH	DN_1104	25	25	32	150	34
033310	DDJNL 2020 K 15	LH	DN_1506	20	20	25	125	38
033311	DDJNL 2525 M15	LH	DN_1506	25	25	32	150	38
033312	DDJNL 3232 P15	LH	DN_1506	32	32	40	170	38
033313	DDJNR 2020 K15	RH	DN_1506	20	20	25	125	38
033314	DDJNR 2525 M15	RH	DN_1506	25	25	32	150	38
033315	DDJNR 3232 P15	RH	DN_1506	32	32	40	170	38



D Style External Toolholder
for Negative Inserts:
DN_1104 & DN_1506
Application: Turn and Profile
Axial Approach 93°
Axial -6,25
Radial -6,75
Profiling Clearance Angle $\beta = 29^\circ$
RH Holder Shown

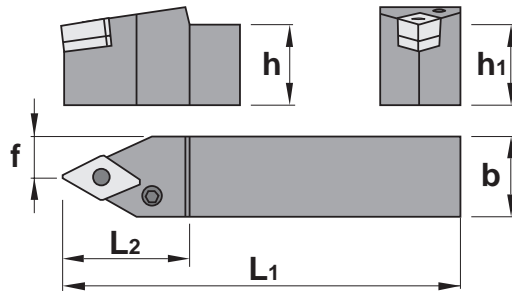
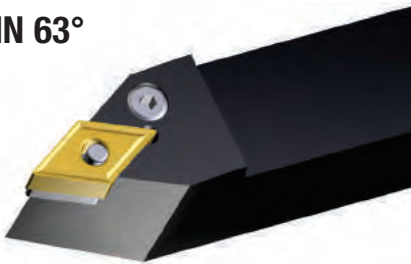
DDJNL/R Spare Parts

Item Description	Clamp Screw EDP	Clamp EDP	Clamp EDP	Clamp Spring EDP	Anvil EDP	Anvil EDP	Anvil Screw EDP	Clamp & Anvil Screw Key				
DDJNL/R 2020 K11	033711	1695	033709	DC2708	033720	4294	034496	IDSN322	033718	1764	018286	KH5003
DDJNL/R 2525 M11												
DDJNL/R 2020 K15	033710	1696	033707	DC2712	033719	4295	001689	IDSN433	033716	1766	018287	KH5004
DDJNL/R 2525 M15												
DDJNL/R 3232 P15												



Turning Inserts

PDNN 63°



PDNN External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
017140	PDNN N 2020 K15	Neutral	DN_1506	20	20	10	125	34
017142	PDNN N 2525 M15	Neutral	DN_1506	25	25	12,5	150	34
017144	PDNN N 3232 P15	Neutral	DN_1506	32	32	16	170	34



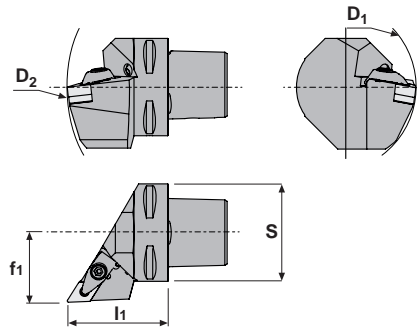
P Style External Toolholder
for Negative Inserts: DN_1506
Application: External Plunge, Turn & Profile
Axial Approach 63°
Axial -8°
Radial -2,5°
Profiling Clearance Angle $\beta = 59.5^\circ$
Neutral Holder Shown

PDNN Spare Parts

Item Description	Lever EDP	Lever Screw EDP	Anvil EDP	Anvil Clip EDP	Clip Punch EDP	Key EDP						
PDNN N 2020 K15	017444	PL8415	017499	PLS1638	017459	PA3715	017453	PC4112	028054	PCP0012	018286	KH5003
PDNN N 2525 M15												
PDNN N 3232 P15												



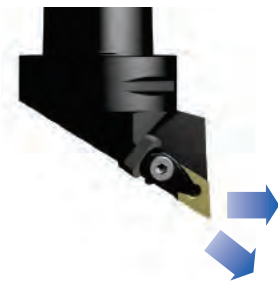
DDJN 93°



Turning Inserts

DDJN LH & RH External PSC Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				S	D1	D2	f1	l1
033697	C5-50-DDJNL35060-15	LH	DN_1506	50	110	165	35	60
033698	C5-50-DDJNR35060-15	RH	DN_1506	50	110	165	35	60
033699	C6-63-DDJNL45065-15	LH	DN_1506	63	110	190	45	65
033700	C6-63-DDJNR45065-15	RH	DN_1506	63	110	190	45	65



D Style External Toolholder
for Negative Inserts:
DN_1506
Application: External Profile Turn O/D
Approach 93
Axial -6°
Radial -7°
Profiling Clearance Angle $\beta=27^\circ$
RH Holder Shown

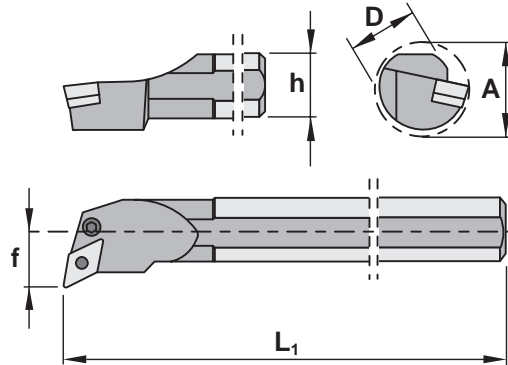
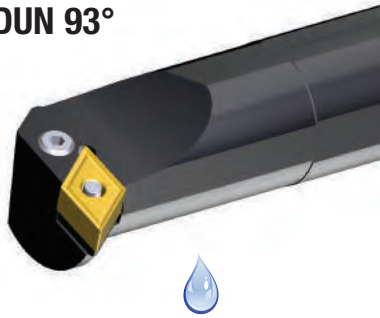
DDJNL/R Spare Parts

Item Description	Clamp EDP	Clamp Screw EDP	Anvil EDP	Anvil Screw EDP	Clamp Spring EDP	Screw Key EDP						
C5-50-DDJNL/R 35060-15	033707	2712	033710	1696	033713	IDSN432	033716	1766	033719	4295	018287	KH5004
C6-63-DDJNL/R 45065-15												



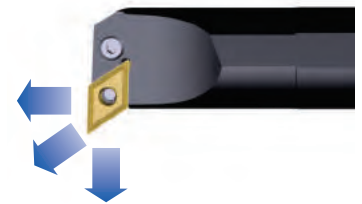
Turning Inserts

A..PDUN 93°



A..PDUN LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					Through Coolant
				Min Bore Ø A	ØD	f	L ₁	h	
033334	A25R PDUNL 11	LH	DN_1104	31	25	17	200	23	
033335	A25R PDUNR 11	RH	DN_1104	31	25	17	200	23	
033336	A32S PDUNL 15	LH	DN_1506	39	32	22	250	30	
033337	A40T PDUNL 15	LH	DN_1506	48	40	27	300	37	
033338	A32S PDUNR 15	RH	DN_1506	39	32	22	250	30	
033339	A40T PDUNR 15	RH	DN_1506	48	40	27	300	37	



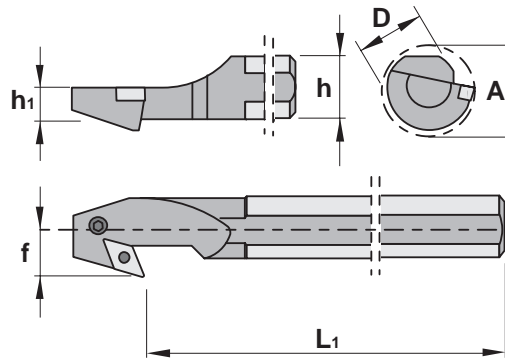
P Style Boring Bar
for Negative Inserts:
DN_1104 & DN_1506
Application: Bore and profile
Axial Approach 93°
Axial -6°
Radial -14°
Profiling Clearance Angle $\beta = 29^\circ$
RH Bar Shown

A..PDUNL/R Spare Parts

Item Description	Lever EDP		Lever Screw EDP		Anvil EDP		Anvil Clip EDP		Clip Punch EDP		Key EDP	
A25R PDUNL/R 11	017442	PL8009	017447	PLS1606	028375	PA3711	000000	PC4109	028053	PCP0009	018285	KH5025
A32S PDUNL/R 15	017444	PL8415	022625	PLS1648	017459	PA3715	017453	PC4112	028054	PCP0012	018286	KH5003
A40T PDUNL/R 15												



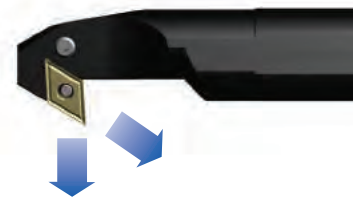
S..PDUN 93°-EX



Turning Inserts

S..PDUN LH & RH Internal Boring Bars

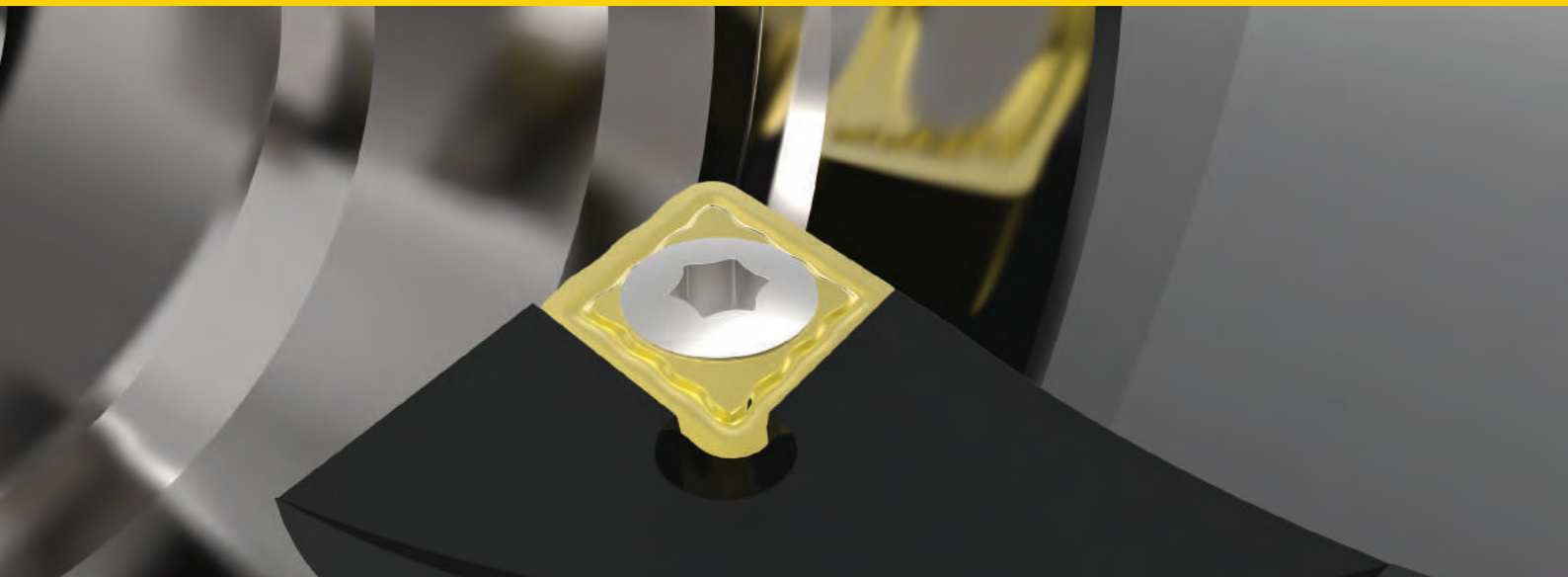
EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)						
				Min Bore Ø A	ØD	f	L1	h	h1	Through Coolant
033346	S32U PDUNL 15-EX	LH	DN_1506	39	32	22	350	30	15	
033347	S40V PDUNL 15-EX	LH	DN_1506	48	40	27	400	37	18,5	
033348	S32U PDUNR 15-EX	RH	DN_1506	39	32	22	350	30	15	
033349	S40V PDUNR 15-EX	RH	DN_1506	48	40	27	400	37	18,5	



P Style Internal Boring Bar
 Negative Inserts: DN_1506
 Application: Internal Back Boring & Profiling
 Axial Approach 93°
 Profiling Clearance Angle $\beta = 29^\circ$
 RH Bar Shown

S..PDUNL/R -EX Spare Parts

Item Description	Lever EDP	Lever Screw EDP	Anvil EDP	Anvil Clip EDP	Clip Punch EDP	Key EDP
S32U PDUNL/R 15-EX	017444	PL8415	022625 PLS1648	-	-	018286 KH5003
S40V PDUNL/R 15-EX			017499 PLS1638	017459 PA3715	017453 PC4112	

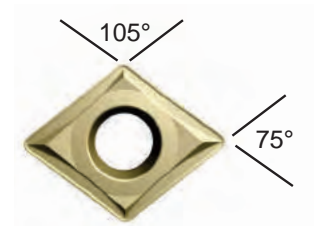


The Posicut® range of positive inserts and holders, along with the Posimatic® range for small part machining for medical and watchmaker components.

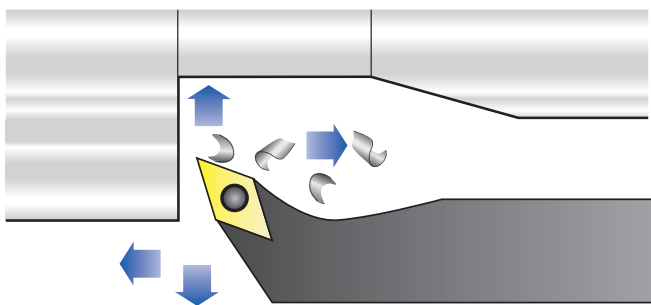
The “E” Style Program, developed exclusively by Kennametal:

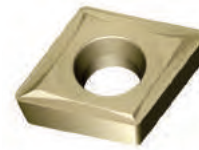
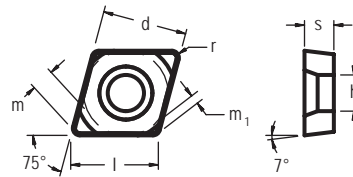
With the 75° inclusive cutting angle this gives the “E” inserts an advantage over the “C” style inserts, allowing for greater radial clearance between the work piece and insert for profiling and chip evacuation. Also improves insert location with a more secure pocket design whilst not compromising insert edge strength.

E” Style Inserts in combination with the Stellram Boring Bar’s give greater radial clearance, and with the improved design of Insert and Boring Bar, allows for greater profiling capability and chip evacuation.



Posicut:
The world's first, for screw-on inserts




ECMT
 -73 Geometry


Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
034429	ECMT09T304E-73	NL300	9,52	9,85	3,97	0,40	4,40		Medium
034456	ECMT09T308E-73	NL300	9,52	9,85	3,97	0,80	4,40		Medium
032295	ECMT12T304E-73	SP4019	12,00	12,40	3,97	0,40	5,40		Medium
032598	ECMT12T304E-73	NL300	12,00	12,40	3,97	0,40	5,40		Medium
032599	ECMT12T304E-73	NL920	12,00	12,40	3,97	0,40	5,40		Medium
032296	ECMT12T308E-73	SP4019	12,00	12,40	3,97	0,80	5,40		Medium
032600	ECMT12T308E-73	NL300	12,00	12,40	3,97	0,80	5,40		Medium
032601	ECMT12T308E-73	NL920	12,00	12,40	3,97	0,80	5,40		Medium
032602	ECMT12T312E-73	NL300	12,00	12,40	3,97	1,20	5,40		Medium
032603	ECMT12T312E-73	NL920	12,00	12,40	3,97	1,20	5,40		Medium
032604	ECMT16M608E-73	NL300	15,88	16,40	6,00	0,80	6,40		Medium
032605	ECMT16M608E-73	NL920	15,88	16,40	6,00	0,80	6,40		Medium
032606	ECMT16M612E-73	NL300	15,88	16,40	6,00	1,20	6,40		Medium
032607	ECMT16M612E-73	NL920	15,88	16,40	6,00	1,20	6,40		Medium

For Toolholders External: see pages C95 - C100 | Internal: see pages C101 - C103

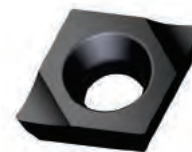
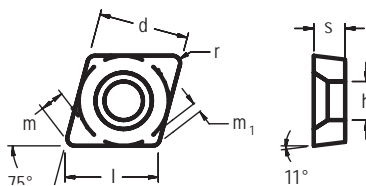
Material Guide – Key to Recommended Inserts
Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



Turning Inserts

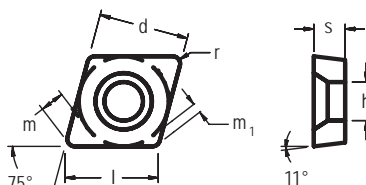
EPEX
-15 Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
022212	EPEX040202F-15	GH1	4,76	4,93	2,38	0,20	2,30	◆	Finishing
032608	EPEX040202F-15	SP4019	4,76	4,93	2,38	0,20	2,30	◆◆◆◆	Finishing
032609	EPEX060202F-15	GH1	6,35	6,54	2,38	0,20	2,80	◆	Finishing
032610	EPEX060202F-15	SP4019	6,35	6,54	2,38	0,20	2,80	◆◆◆◆	Finishing

For Toolholders External: see pages C95 - C100 | Internal: see pages C101 - C103

EPEX



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032611	EPEX060202FL	SP4019	6,35	6,54	2,38	0,20	2,80	◆◆◆	Medium
032612	EPEX060202FR	SP4019	6,35	6,54	2,38	0,20	2,80	◆◆◆	Medium
017378	EPEX060202FL	GH1	6,35	6,54	2,38	0,20	2,80	◆	Medium
018118	EPEX060202FR	GH1	6,35	6,54	2,38	0,20	2,80	◆	Medium
032613	EPEX060204FL	SP4019	6,35	6,54	2,38	0,40	2,80	◆◆◆	Medium
034460	EPEX060204FR	SP4019	6,35	6,54	2,38	0,40	2,80	◆◆◆	Medium
017280	EPEX060204FL	GH1	6,35	6,54	2,38	0,40	2,80	◆	Medium
017387	EPEX060204FR	GH1	6,35	6,54	2,38	0,40	2,80	◆	Medium

For Toolholders External: see pages C95 - C100 | Internal: see pages C101 - C103

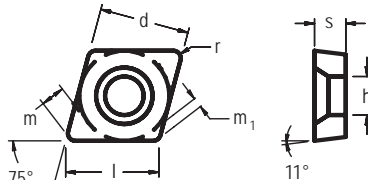
Material Guide – Key to Recommended Inserts

Material Designation

- ◆ P Unalloyed Steels
- ◆ P Alloyed Steels
- ◆ M Stainless Steels
- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials



EPEX
Flat Top



Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
034592	EPEX08M3005FL	SP4019	8.00	8.20	3.00	0.05	4.20	◆◆◆	Medium
034593	EPEX08M3005FR	SP4019	8.00	8.20	3.00	0.05	4.20	◆◆◆	Medium
034594	EPEX08M3005FL	GH1	8.00	8.20	3.00	0.05	4.20	◆	Medium
034595	EPEX08M3005FR	GH1	8.00	8.20	3.00	0.05	4.20	◆	Medium
032310	EPEX08M301FL	SP4019	8.00	8.20	3.00	0.10	4.20	◆◆◆	Medium
032618	EPEX08M301FR	SP4019	8.00	8.20	3.00	0.10	4.20	◆◆◆	Medium
032619	EPEX08M301FL	GH1	8.00	8.20	3.00	0.10	4.20	◆	Medium
032620	EPEX08M301FR	GH1	8.00	8.20	3.00	0.10	4.20	◆	Medium
032306	EPEX08M302FL	SP4019	8.00	8.20	3.00	0.20	4.20	◆◆◆	Medium
032304	EPEX08M302FR	SP4019	8.00	8.20	3.00	0.20	4.20	◆◆◆	Medium
017853	EPEX08M302FL	GH1	8.00	8.20	3.00	0.20	4.20	◆	Medium
017854	EPEX08M302FR	GH1	8.00	8.20	3.00	0.20	4.20	◆	Medium
032312	EPEX08M304FL	SP4019	8.00	8.20	3.00	0.40	4.20	◆◆◆	Medium
032311	EPEX08M304FR	SP4019	8.00	8.20	3.00	0.40	4.20	◆◆◆	Medium

For Toolholders External: see pages C95 - C100 | Internal: see pages C101 - C103

Material Guide – Key to Recommended Inserts

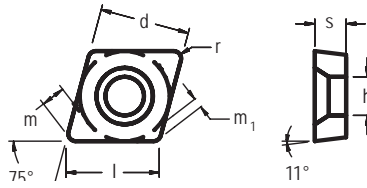
Material Designation

- ◆ P Unalloyed Steels
- ◆ P Alloyed Steels
- ◆ M Stainless Steels
- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials



Turning Inserts

EPGT
-62 Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
031612	EPGT040201E-62	SP4019	4,76	4,93	2,38	0,10	2,30		Finishing
030585	EPGT040202E-62	SP4019	4,76	4,93	2,38	0,20	2,30		Finishing
030586	EPGT040204E-62	SP4019	4,76	4,93	2,38	0,40	2,30		Finishing
030587	EPGT060202E-62	SP4019	6,35	6,54	2,38	0,20	2,80		Finishing
030588	EPGT060204E-62	SP4019	6,35	6,54	2,38	0,40	2,80		Finishing
030590	EPGT08M301E-62	SP4019	8,00	8,20	3,00	0,10	4,20		Finishing
030591	EPGT08M302E-62	SP4019	8,00	8,20	3,00	0,20	4,20		Finishing
030592	EPGT08M304E-62	SP4019	8,00	8,20	3,00	0,40	4,20		Finishing
030593	EPGT08M308E-62	SP4019	8,00	8,20	3,00	0,80	4,20		Finishing
031403	EPGX08M3005E-62	SP4019	8,00	8,20	3,00	0,05	4,20		Finishing

For Toolholders External: see pages C95 - C100 | Internal: see pages C101 - C103

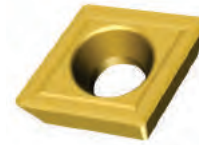
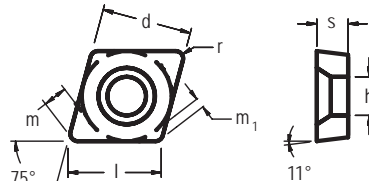
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



EPMT



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032299	EPMT060202E	SP4019	6,35	6,54	2,38	0,20	2,80		Medium
032622	EPMT060202E	NL300	6,35	6,54	2,38	0,20	2,80		Medium
018135	EPMT060204E	GH1	6,35	6,54	2,38	0,40	2,80		Medium
032274	EPMT060204E	SP4019	6,35	6,54	2,38	0,40	2,80		Medium
032623	EPMT060204E	NL300	6,35	6,54	2,38	0,40	2,80		Medium
034464	EPMT060204E	NL920	6,35	6,54	2,38	0,40	2,80		Medium
018142	EPMT08M302E	GH1	8,00	8,20	3,00	0,20	4,20		Medium
032286	EPMT08M302E	SP4019	8,00	8,20	3,00	0,20	4,20		Medium
032624	EPMT08M302E	NL300	8,00	8,20	3,00	0,20	4,20		Medium
017335	EPMT08M304E	GH1	8,00	8,20	3,00	0,40	4,20		Medium
032275	EPMT08M304E	SP4019	8,00	8,20	3,00	0,40	4,20		Medium
032625	EPMT08M304E	NL300	8,00	8,20	3,00	0,40	4,20		Medium
034589	EPMT08M304E	NL920	8,00	8,20	3,00	0,40	4,20		Medium
018156	EPMT08M308E	GH1	8,00	8,20	3,00	0,80	4,20		Medium
032290	EPMT08M308E	SP4019	8,00	8,20	3,00	0,80	4,20		Medium
032626	EPMT08M308E	NL300	8,00	8,20	3,00	0,80	4,20		Medium
034590	EPMT08M308E	NL920	8,00	8,20	3,00	0,80	4,20		Medium

For Toolholders External: see pages C95 - C100 | Internal: see pages C101 - C103

Material Guide – Key to Recommended Inserts

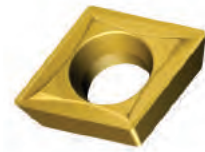
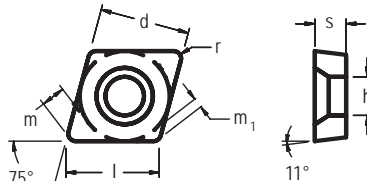
Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



Turning Inserts

EPMT
-73 Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032279	EPMT08M302E-73	SP4019	8,00	8,20	3,00	0,20	4,20		Medium
032627	EPMT08M302E-73	NL300	8,00	8,20	3,00	0,20	4,20		Medium
031245	EPMT08M304E-73	SP4019	8,00	8,20	3,00	0,40	4,20		Medium
032628	EPMT08M304E-73	NL300	8,00	8,20	3,00	0,40	4,20		Medium
032629	EPMT08M304E-73	NL920	8,00	8,20	3,00	0,40	4,20		Medium
032287	EPMT08M308E-73	SP4019	8,00	8,20	3,00	0,80	4,20		Medium
032630	EPMT08M308E-73	NL300	8,00	8,20	3,00	0,80	4,20		Medium
032631	EPMT08M308E-73	NL920	8,00	8,20	3,00	0,80	4,20		Medium

For Toolholders External: see pages C95 - C100 | Internal: see pages C101 - C103

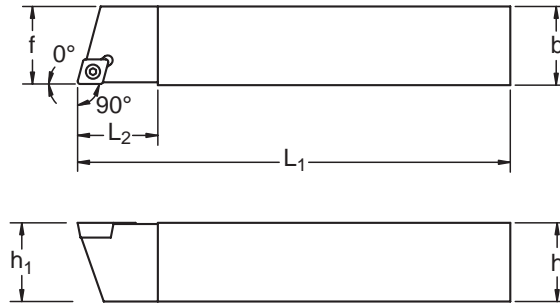
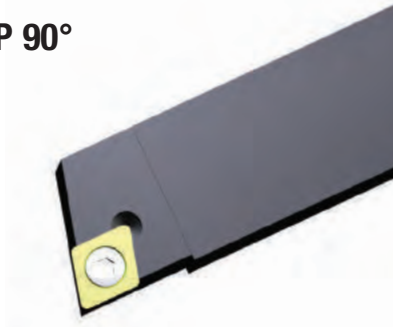
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
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- Hard Materials



SEAP 90°



Turning Inserts

Inserts - EPGT08M3 & EPMT08M3

SEAP LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
018024	SEAPL 1010 M08	LH	EP_08M3	10	10	10	150	16
018025	SEAPL 1212 M08	LH	EP_08M3	12	12	12	150	16
025044	SEAPL 1616 M08	LH	EP_08M3	16	16	16	150	16
025046	SEAPL 2020 K08	LH	EP_08M3	20	20	20	125	16
018027	SEAPR 1010 M08	RH	EP_08M3	10	10	10	150	16
018028	SEAPR 1212 M08	RH	EP_08M3	12	12	12	150	16
025043	SEAPR 1616 M08	RH	EP_08M3	16	16	16	150	16
025045	SEAPR 2020 K08	RH	EP_08M3	20	20	20	125	16



S Style External Toolholder
for Positive Inserts: EP_08M3
Application: Face, Turning and Profile
Approach 90°
Axial: 0°
Radial 0°
Profiling Clearance Angle $\beta = 12^\circ$
RH Holder Shown

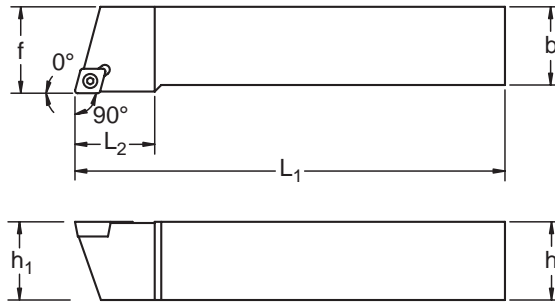
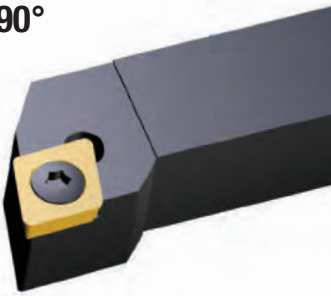
SEAPL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SEAPL/R 1010 E06	017032	A3006T	013214	T9	-	-	-	-
SEAPL/R 1212 F09								
SEAPL/R 1616 H09								
SEAPL/R 2020 K09								



Turning Inserts

SEGP 90°



Inserts - EPGT08M3 & EPMT08M3

SEGP LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
018087	SEGPL 0808 F08	LH	EP_08M3	8	8	11	80	14
017987	SEGPL 1010 F08	LH	EP_08M3	10	10	12	80	14
018077	SEGPL 1212 F08	LH	EP_08M3	12	12	16	80	16
018078	SEGPR 0808 F08	RH	EP_08M3	8	8	11	80	14
018079	SEGPR 1010 F08	RH	EP_08M3	10	10	12	80	14
018080	SEGPR 1212 F08	RH	EP_08M3	12	12	16	80	16



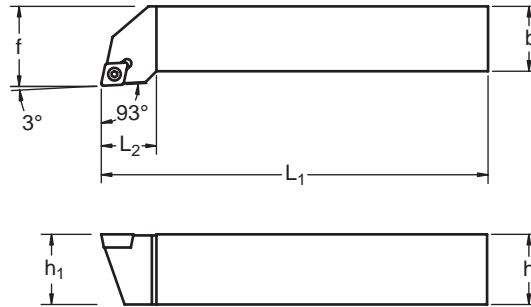
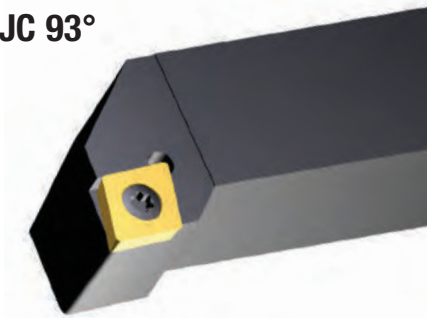
S Style External Toolholder
for Positive Inserts: EP_08M3
Application: Face, Turning and Profile
Approach 90°
Axial: 0°
Radial 0°
Profiling Clearance Angle $\beta = 12^\circ$
RH Holder Shown

SEGPL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SEGPL/R 0808 F08	017032	A3006T	013214	T9	-	-	-	-
SEGPL/R 1010 F08								
SEGPL/R 1212 F08								



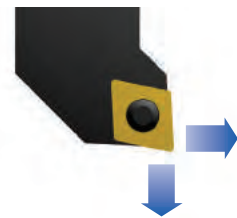
SEJC 93°



Inserts - EPMT16M6

SEJC LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
028581	SEJCL 2525 M16	LH	EC_16M6	25	25	32	150	28
028582	SEJCR 2525 M16	RH	EC_16M6	25	25	32	150	28



S Style External Toolholder
for Positive Inserts: EC_16M6
Application: Face, Turning and Profile
Approach 93°
Axial: 0°
Radial 0°
Profiling Clearance Angle $\beta = 9^\circ$
RH Holder Shown

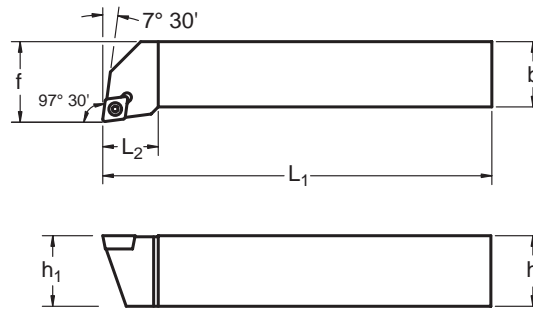
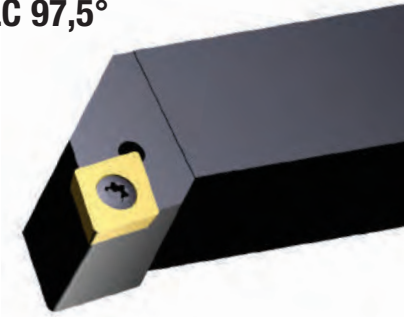
SEJCL/R Spare Parts (mm)

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SEJCL/R 2525 M16	023081	A5025T	015241	T20	-	-	-	-



Turning Inserts

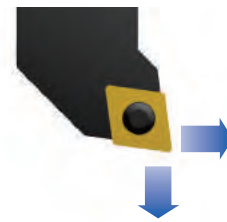
SELCL 97,5°



Inserts - ECMT12T3

SELCL LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
018082	SELCL 2020 K12	LH	EC_12T3	20	20	25	125	22
018083	SELCL 2525 M12	LH	EC_12T3	25	25	32	150	28
018085	SELCL 2020 K12	RH	EC_12T3	20	20	25	125	22
018086	SELCL 2525 M12	RH	EC_12T3	25	25	32	150	28



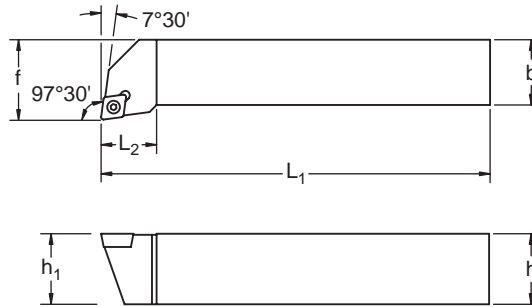
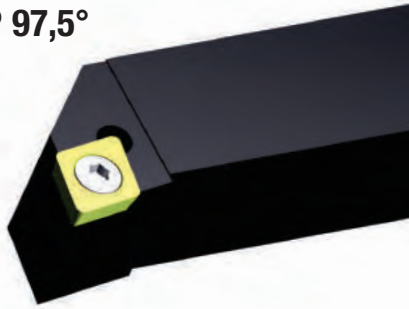
S Style External Toolholder
for Positive Inserts: EC_12T3
Application: Face, Turning and Profile
Approach 97,5°
Axial: 0°
Radial 0°
Profiling Clearance Angle $\beta = 4,5^\circ$
RH Holder Shown

SELCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SELCL/R 2020 K12	034500	1540	034577	K5517	029091	SA3712	029095	1765
SELCL/R 2525 M12								



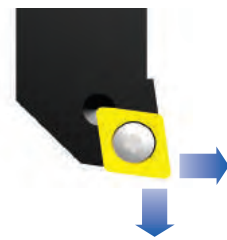
SELP 97,5°



Inserts - EPGT08M3 & EPMT08M3

SELP LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
018089	SELPL 1010 F08	LH	EP_08M3	10	10	12	80	14
018090	SELPL 1212 F08	LH	EP_08M3	12	12	16	80	16
018091	SELPL 1616 H08	LH	EP_08M3	16	16	20	100	18
018092	SELPL 2020 K08	LH	EP_08M3	20	20	25	125	22
018093	SELPL 2525 M08	LH	EP_08M3	25	25	32	150	28
018094	SELPR 1010 F08	RH	EP_08M3	10	10	12	80	14
018095	SELPR 1212 F08	RH	EP_08M3	12	12	16	80	16
018096	SELPR 1616 H08	RH	EP_08M3	16	16	20	100	18
018097	SELPR 2020 K08	RH	EP_08M3	20	20	25	125	22
018098	SELPR 2525 M08	RH	EP_08M3	25	25	32	150	28



S Style External Toolholder
for Positive Inserts: EP_08M3
Application: Face, Turning and Profile
Approach 97,5°
Axial: 0°
Radial 0°
Profiling Clearance Angle $\beta = 4,5^\circ$
RH Holder Shown

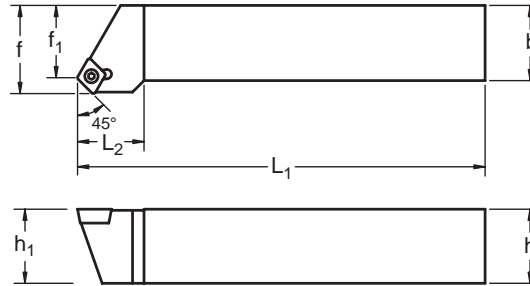
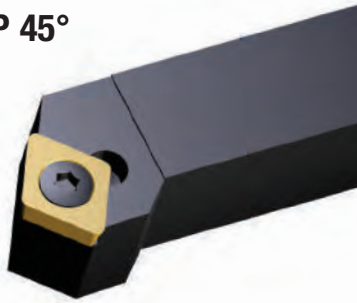
SELPL/R Spare Parts

Item Description	Insert Screw EDP	Insert Key EDP	Anvil EDP	Anvil Screw EDP
SELPL/R 1010 F08	017032	A3006T	013214	T9
SELPL/R 1212 F08				
SELPL/R 1616 H08				
SELPL/R 2020 K08				
SELPL/R 2525 M08				



Turning Inserts

SESP 45°



Inserts - EPGT08M3 & EPMT8M3

SESP LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
018099	SESPL 1010 F08	LH	EP_08M3	10	10	13,6	80	14
018100	SESPL 1212 F08	LH	EP_08M3	12	12	16	80	16
018101	SESPR 1010 F08	RH	EP_08M3	10	10	13,6	80	14
018102	SESPR 1212 F08	RH	EP_08M3	12	12	16	80	16



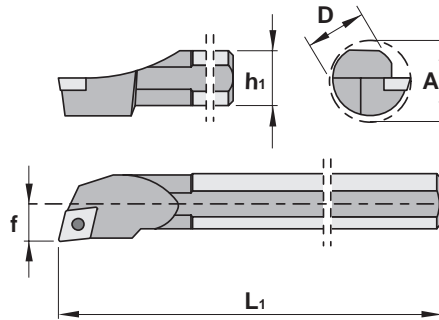
S Style External Toolholder
Positive Inserts: EP_08M3
Application: Turning and Profile
Approach 45°
Axial: 0°
Radial 0°
Profiling Clearance Angle $\beta = 34^\circ$
RH Holder Shown

SESPL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SESPL/R 1010 F08	017032	A3006T	013214	T9	-	-	-	-
SESPL/R 1212 F08								



A.. SELP 97,5°



Inserts - EPEX0402, EPGT0402, EPEX0602, EPGT0602, EPMT0602, EPEX08M3, EPGT08M3 and EPMT8M3

A.. SELP LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					Through Coolant
				Min Bore Ø A	ØD	f	L ₁	h ₁	
018408	S06F SELPL 04	LH	EP_0402	8	6	4	80	4,2	
018397	A08H SELPL 04	LH	EP_0402	11	8	6	100	4	
018322	S06F SELPR 04	RH	EP_0402	8	6	4	80	4,2	
018315	A08H SELPR 04	RH	EP_0402	11	8	6	100	4	
018398	A08H SELPL 06	LH	EP_0602	11	8	6	100	4	
018399	A10K SELPL 06	LH	EP_0602	13	10	7	125	5	
018316	A08H SELPR 06	RH	EP_0602	11	8	6	100	4	
018401	A10K SELPR 06	RH	EP_0602	13	10	7	125	5	
018400	A10K SELPL 08	LH	EP_08M3	13	10	7	125	5	
018318	A12K SELPL 08	LH	EP_08M3	16	12	9	125	6	
018320	A16M SELPL 08	LH	EP_08M3	20	16	11	150	8	
018402	A20Q SELPL 08	LH	EP_08M3	24	20	13	180	10	
018404	A25R SELPL 08	LH	EP_08M3	31	25	17	200	12,5	
018317	A10K SELPR 08	RH	EP_08M3	13	10	7	125	5	
018319	A12K SELPR 08	RH	EP_08M3	16	12	9	125	6	
018321	A16M SELPR 08	RH	EP_08M3	20	16	11	150	8	
018403	A20Q SELPR 08	RH	EP_08M3	24	20	13	180	10	
018405	A25R SELPR 08	RH	EP_08M3	31	25	17	200	12,5	



S Style Boring Bar for Positive Inserts:
EP_0402, EP_0602, and EP_08M3
Application: Facing and I/D part profiling
Approach 97,5°
Axial 5°
Radial 3° - 5°
Profiling Clearance Angle β = 0°
RH Bar Shown

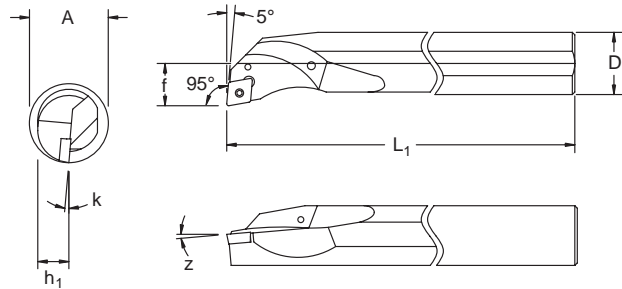
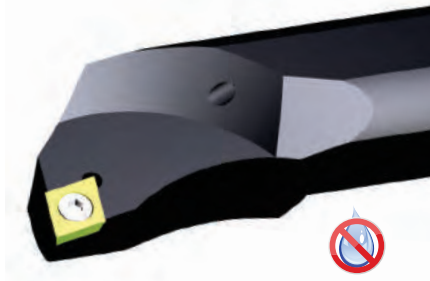
A.. SELPL/R Spare Part

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
S06F SELPL/R 04 A08H SELPL/R 04	015059	F2004T	018487	T6	-	-	-	-
A/D08H SELPL/R 06 A10K SELPL/R 06	015059	F2505T	018488	T7	-	-	-	-
A/D10K SELPL/R 08 A/D12K SELPL/R 08 A/D16M SELPL/R 08 A/D20Q SELPL/R 08 A/D25R SELPL/R 08	017032	A3006T	013214	T9	-	-	-	-



Turning Inserts

D.. SELP 97,5°
Anti-Vibration Bars



D.. SELP LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					Through Coolant
				Min Bore Ø A	ØD	f	L1	h1	
023135	D08H SELPR 06	RH	EP_0602	11	8	6	100	4	
023137	D10K SELPR 08	RH	EP_08M3	13	10	7	125	5	
023139	D12K SELPR 08	RH	EP_08M3	16	12	9	125	6	
023141	D16M SELPR 08	RH	EP_08M3	20	16	11	150	8	
023143	D20Q SELPR 08	RH	EP_08M3	24	20	13	180	10	



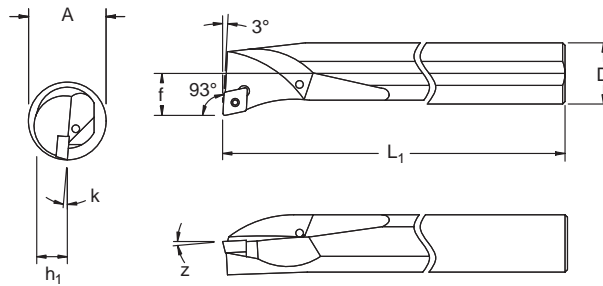
S Style Boring Bar
for Positive Inserts:
EP_0402, EP_0602, and EP_08M3
Application: Facing and I/D part profiling
Approach 97,5°
Axial 5°
Radial 3° - 5°
Profiling Clearance Angle $\beta = 0^\circ$
RH Bar Shown

A.. SELPL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
S06F SELPL/R 04	015059	F2004T	018487	T6	-	-	-	-
A08H SELPL/R 04								
A/D08H SELPL/R 06	015059	F2505T	018488	T7	-	-	-	-
A10K SELPL/R 06								
A/D10K SELPL/R 08	017032	A3006T	013214	T9	-	-	-	-
A/D12K SELPL/R 08								
A/D16M SELPL/R 08								
A/D20Q SELPL/R 08								
A/D25R SELPL/R 08								



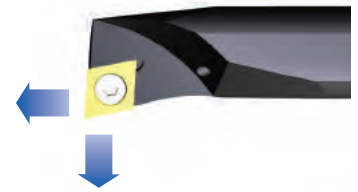
A.. SEUP 93°



Inserts - EPEX0402, EPGT0402, EPEX0602, EPGT0602, EPMT0602, EPEX08M3, EPGT08M3 and EPMT8M3

A.. SEUP LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					Through Coolant
				Min Bore Ø A	ØD	f	L ₁	h ₁	
018324	S06F SEUPL 04	LH	EP_0402	8	6	4	80	4,2	
018325	S06F SEUPR 04	RH	EP_0402	8	6	4	80	4,2	
018409	A08H SEUPL 06	LH	EP_0602	11	8	6	100	4	
018410	A08H SEUPR 06	RH	EP_0602	11	8	6	100	4	
018412	A10K SEUPL 08	LH	EP_08M3	13	10	7	125	5	
018415	A12K SEUPL 08	LH	EP_08M3	16	12	9	125	6	
018414	A10K SEUPR 08	RH	EP_08M3	13	10	7	125	5	
018323	A12K SEUPR 08	RH	EP_08M3	16	12	9	125	6	



S Style Boring Bar for Positive Inserts:
EP_0402, EP_0602, and EP_08M3
Application: Facing and I/D part profiling
Approach 93°
Axial 0° - 3°
Radial 5° - 10°
Profiling Clearance Angle $\beta = 9^\circ$
RH Bar Shown

A.. SEUPL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
S06F SEUPL/R 04	015059	F2004T	018487	T6	-	-	-	-
A08H SEUPL/R 06	015059	F2505T	018488	T7	-	-	-	-
A10K SEUPL/R 08	017032	A3006T	013214	T9	-	-	-	-
A12K SEUPL/R 08								



Turning Inserts

RCGX
Ceramics



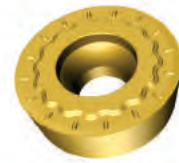
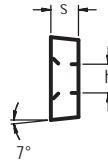
EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032338	RCGX060400 E010	SA6609	6,35	-	4,76	0,00	-	◆	Roughing
032339	RCGX090700 E010	SA6609	9,52	-	7,94	0,00	-	◆	Roughing
032340	RCGX120700 E010	SA6609	12,70	-	7,94	0,00	-	◆	Roughing

Note: For edge condition refer to Grade page C29

Material Guide – Key to Recommended Inserts

Material Designation

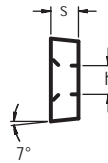
◆ P Unalloyed Steels
 ◆ P Alloyed Steels
 ◆ M Stainless Steels
 ◆ M PH Stainless
 ◆ K Cast Irons
 ◆ N Aluminum & Alloys
 ◆ S High Temp. Alloys
 ◆ H Hard Materials


RCMT
2N Geometry


Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	S	r _ε	h		
032632	RCMT190600E-2N	NL920	19,05	-	6,35	-	6,50		Medium

For Toolholders External: see pages C107 - C108

RCMT


EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	S	r _ε	h		
032633	RCMT0602M0E	NL250	6,00	-	2,38	-	2,79		Medium
032634	RCMT0602M0E	NL920	6,00	-	2,38	-	2,79		Medium
032635	RCMT10T3M0E	NL250	10,00	-	3,97	-	4,39		Medium
032636	RCMT10T3M0E	NL400	10,00	-	3,97	-	4,39		Medium
032637	RCMT10T3M0E	NL920	10,00	-	3,97	-	4,39		Medium
032638	RCMT1204M0E	NL250	12,00	-	4,76	-	5,50		Medium
032639	RCMT1204M0E	NL400	12,00	-	4,76	-	5,50		Medium
032640	RCMT1204M0E	NL920	12,00	-	4,76	-	5,50		Medium
032641	RCMT1606M0E	NL300	15,88	-	6,35	-	5,51		Roughing
032642	RCMT1606M0E	NL400	15,88	-	6,35	-	5,51		Roughing
032643	RCMT1606M0E	NL920	15,88	-	6,35	-	5,51		Roughing

For Toolholders External: see pages C107 - C108

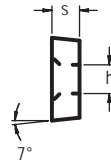
Material Guide – Key to Recommended Inserts

Material Designation



Turning Inserts

RCMT



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032644	RCMT2006M0E	NL300	20,00	-	6,35	-	6,50		Roughing
032645	RCMT2006M0E	NL400	20,00	-	6,35	-	6,50		Roughing
032646	RCMT2006M0E	NL920	20,00	-	6,35	-	6,50		Roughing
032647	RCMT2507M0S	NL300	25,00	-	7,94	-	7,11		Roughing
032648	RCMT2507M0S	NL400	25,00	-	7,94	-	7,11		Roughing
032649	RCMT2507M0S	NL920	25,00	-	7,94	-	7,11		Roughing
032650	RCMT3209M0S	NL400	32,00	-	9,53	-	9,52		Roughing
032924	RCMT3209M0S	NL300	32,00	-	9,53	-	9,52		Roughing

For Toolholders External: see pages C107 - C108

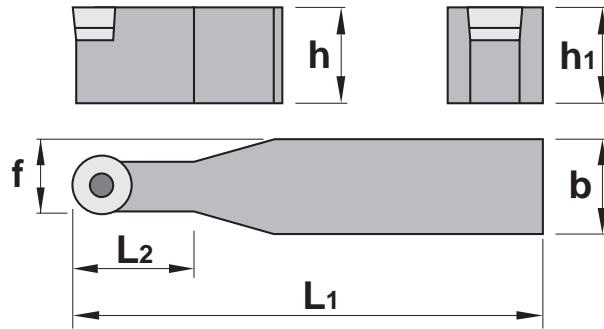
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



SRDC







Turning Inserts

Inserts - RCMT0602, 10T3, and 1204

SRDC Neutral External Square Shank Toolholders								
EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
018106	SRDC N 1616 H06	Neutral	RCMT_0602	16	16	11	100	20
018107	SRDC N 2020 K06	Neutral	RCMT_0602	20	20	13	125	20
018108	SRDC N 2020 K10	Neutral	RCMT_10T3	20	20	15	125	22
028594	SRDC N 2525 M10	Neutral	RCMT_10T3	25	25	17,5	150	22
033523	SRDC N 2020 K12	Neutral	RCMT_1204	20	20	16	125	22
018088	SRDC N 2525 M12	Neutral	RCMT_1204	25	25	18,5	150	28



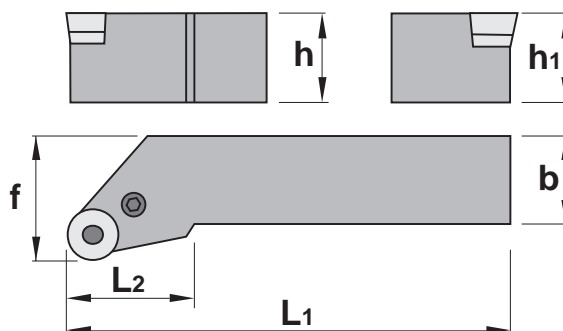
S Style External Toolholder for Positive Inserts: RCMT06, 10, and 12
 Application: Turning, Plunge and Profile
 Approach Angle 0°
 Axial 0°
 Radial 0°
 Neutral Holder Shown

SRDC N Spare Parts								
Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SRDC N 1616 H06	015061	F2507T	018488	T7	-	-	-	-
SRDC N 2020 K06								
SRDC N 2020 K10	034497	1335	028475	K5516	034501	SA3811	028478	SAS1750
SRDC N 2525 M10								
SRDC N 2020 K12								
SRDC N 2525 M12					034502	SA3814		



Turning Inserts

PRSC



Inserts - RCMT10T3, 1204, 1606, 2006, & 2507

PRSC LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h1	b	f	L1	L2
033527	PRSC 2020 K10	LH	RCMT_10T3	20	20	25	125	28
033528	PRSC 2525 M10	LH	RCMT_10T3	25	25	32	150	28
033529	PRSCR 2020 K10	RH	RCMT_10T3	20	20	25	125	28
033530	PRSCR 2525 M10	RH	RCMT_10T3	25	25	32	150	28
033531	PRSC 2020 K12	LH	RCMT_1204	20	20	25	125	28
033532	PRSC 2525 M12	LH	RCMT_1204	25	25	32	150	28
033533	PRSCR 2020 K12	RH	RCMT_1204	20	20	25	125	28
033534	PRSCR 2525 M12	RH	RCMT_1204	25	25	32	150	28
033535	PRSC 2525 M16	LH	RCMT_1606	25	25	32	150	34
033536	PRSC 3225 P16	LH	RCMT_1606	32	25	32	170	34
033537	PRSCR 2525 M16	RH	RCMT_1606	25	25	32	150	34
033538	PRSCR 3225 P16	RH	RCMT_1606	32	25	32	170	34
033539	PRSC 3232 P20	LH	RCMT_2006	32	32	40	170	42
033540	PRSCR 3232 P20	RH	RCMT_2006	32	32	40	170	42
033541	*PRSC 4040 S25	LH	RCMT_2507	40	40	50	250	48
033542	*PRSCR 4040 S25	RH	RCMT_2507	40	40	50	250	48

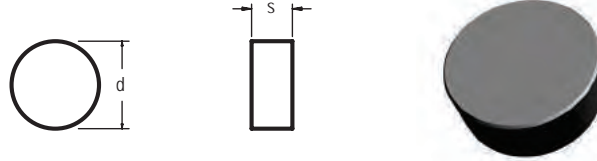


P Style External Toolholder
for Positive Inserts:
RCMT10, 12, 16, 20 and 25
Application: Turning, Plunge and Profile
Approach Angle 0°
Axial 0°
Radial 0°
RH Holder Shown

* Non Stock Items, subject to extended delivery time

PRSC/L/R Spare Parts

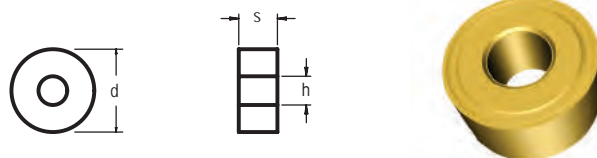
Item Description	Lever EDP	Lever Screw EDP	Anvil EDP	Anvil Clip EDP	Clip Punch EDP	Key EDP						
PRSC/L/R 2020 K10 PRSC/L/R 2525 M10	034475	PL8110	034480	PLS1705	034484	PA3810	028417	PC4110	028053	PCP0009	028578	KH5002
PRSC/L/R 2020 K12 PRSC/L/R 2525 M12	034476	PL8112	017447	PLS1606	034485	PA3812					018285	KH5025
PRSC/L/R 2525 M16 PRSC/L/R 3232 P16	034477	PL8116	034481	PLS1706	034486	PA3816	034504	PC4116	028054	PCP0012		
PRSC/L/R 3232 P20	034478	PL8120	028458	PLS1708	034487	PA3820	028051	PC4115	034505	PCP0015	018286	KH5003
*PRSC/L/R 4040 S25	034479	PL8125	034482	PLS1710	034488	PA3825	017455	PC4119	028056	PCP0019	018287	KH5004


RNGN
Ceramics


Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032324	RNGN090300 E010	SA6609	9,52	-	3,18	-	-	◆	Roughing
032325	RNGN090400 E010	SA6609	9,52	-	4,76	-	-	◆	Roughing
032326	RNGN120400 E010	SA6609	12,70	-	4,76	-	-	◆	Roughing
032327	RNGN120700 E010	SA6609	12,70	-	7,94	-	-	◆	Roughing
032328	RNGN120700 E030	SA6609	12,70	-	7,94	-	-	◆	Roughing
032329	RNGN150700 E010	SA6609	15,88	-	7,94	-	-	◆	Roughing
032330	RNGN190700 E010	SA6609	19,05	-	7,94	-	-	◆	Roughing

Note: For edge condition refer to Grade page C29

RNGN
4T Geometry


EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032651	RNMG250900E-4T	NL300	25,00	-	9,53	0,80	5,16	◆◆◆◆	Roughing
032652	RNMG250900E-4T	NL920	25,00	-	9,53	0,80	5,16	◆◆◆◆	Roughing

For Toolholders External: see page C111

Material Guide – Key to Recommended Inserts

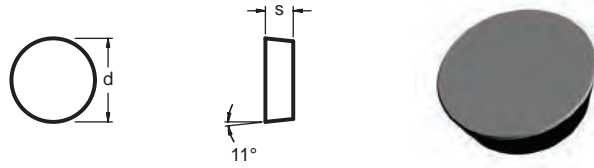
Material Designation

◆ P Unalloyed Steels ◆ P Alloyed Steels ◆ M Stainless Steels ◆ M PH Stainless ◆ K Cast Irons ◆ N Aluminum & Alloys ◆ S High Temp. Alloys ◆ H Hard Materials



Turning Inserts

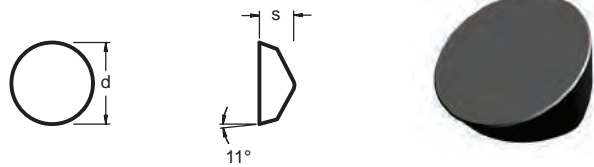
RPGN
Ceramics



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032336	RPGN090300 E010	SA6609	9,52	-	3,18	-	-	◆	Roughing
032337	RPGN120400 E010	SA6609	12,70	-	4,76	-	-	◆	Roughing

Note: For edge condition refer to Grade page C29

RPGX
Ceramics



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032341	RPGX060400 E010	SA6609	6,35	-	4,76	-	-	◆	Roughing
032342	RPGX090700 E010	SA6609	9,52	-	7,94	-	-	◆	Roughing
032343	RPGX120700 E010	SA6609	12,70	-	7,94	-	-	◆	Roughing

Note: For edge condition refer to Grade page C29

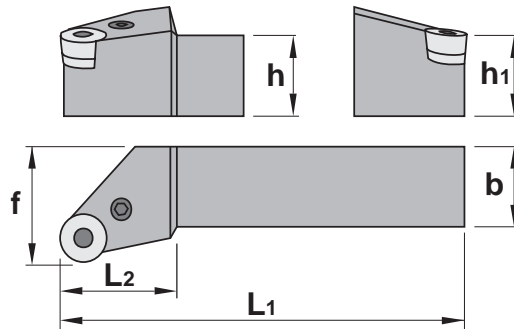
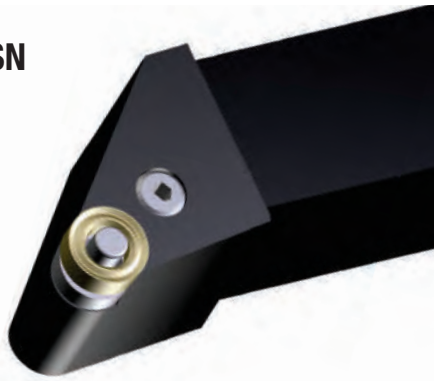
Material Guide – Key to Recommended Inserts

Material Designation

◆ P Unalloyed Steels
 ◆ P Alloyed Steels
 ◆ M Stainless Steels
 ◆ M PH Stainless
 ◆ K Cast Irons
 ◆ N Aluminum & Alloys
 ◆ S High Temp. Alloys
 ◆ H Hard Materials



PRSN



Turning Inserts

PRSN LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
028392	PRSNL 4040 S25	LH	RN_2509	40	40	50	250	45
028396	PRSNR 4040 S25	RH	RN_2509	40	40	50	250	45



P Style External Toolholder
for Negative Inserts: RN_2509
Application: Turn, Face Plunge and Profile
Axial Approach 0°
Axial -6°
Radial -6°
Profiling Clearance Angle $\beta = 42^\circ$
RH Holder Shown

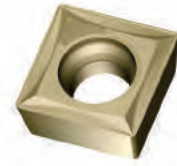
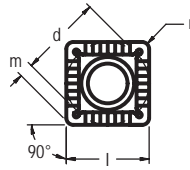
PRSNL/R Spare Parts

Item Description	Lever EDP		Lever Screw EDP		Anvil EDP		Anvil Clip EDP		Clip Punch EDP		Key EDP	
PRSNL/R 4040 S25	028408	PL8025	028409	PLS1612	034489	PA3925	028418	PC4125	034506	PCP0025	018288	KH5005



Turning Inserts

SCMT
-73 Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032653	SCMT09T304E-73	SP4019	9,53	9,53	3,97	0,40	4,40		Medium
032654	SCMT09T304E-73	NL300	9,53	9,53	3,97	0,40	4,40		Medium
032655	SCMT09T304E-73	NL920	9,53	9,53	3,97	0,40	4,40		Medium
030484	SCMT09T308E-73	SP4019	9,53	9,53	3,97	0,80	4,40		Medium
032656	SCMT09T308E-73	NL300	9,53	9,53	3,97	0,80	4,40		Medium
032657	SCMT09T308E-73	NL920	9,53	9,53	3,97	0,80	4,40		Medium
032658	SCMT12M504E-73	SP4019	12,70	12,70	5,00	0,40	5,50		Medium
032659	SCMT12M504E-73	NL300	12,70	12,70	5,00	0,40	5,50		Medium
032660	SCMT12M504E-73	NL920	12,70	12,70	5,00	0,40	5,50		Medium
032661	SCMT12M508E-73	SP4019	12,70	12,70	5,00	0,80	5,50		Medium
032662	SCMT12M508E-73	NL300	12,70	12,70	5,00	0,80	5,50		Medium
032663	SCMT12M508E-73	NL920	12,70	12,70	5,00	0,80	5,50		Medium

For Toolholders External: see page C113 | Internal: see page C114

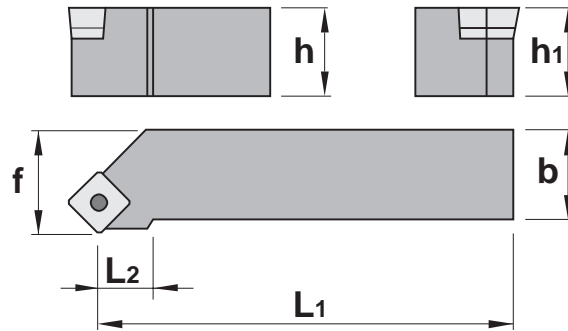
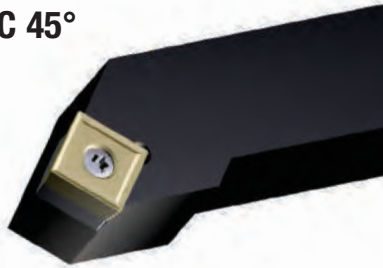
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



SSSC 45°



Inserts - SCMT09T3 & 12M5

SSSC LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h1	b	f	L1	L2
028605	SSSCL 1212 F09	LH	SCMT09T3	12	12	16	80	20
028606	SSSCL 1616 H09	LH	SCMT09T3	16	16	20	100	22
028609	SSSCR 1212 F09	RH	SCMT09T3	12	12	16	80	20
028610	SSSCR 1616 H09	RH	SCMT09T3	16	16	20	100	22
028607	SSSCL 2020 K12	LH	SCMT12M5	20	20	25	125	25
028608	SSSCL 2525 M12	LH	SCMT12M5	25	25	32	150	28
028611	SSSCR 2020 K12	RH	SCMT12M5	20	20	25	125	25
028612	SSSCR 2525 M12	RH	SCMT12M5	25	25	32	150	28



S Style External Toolholder
for Positive Inserts
SCMT09T3 & SCMT12M5
Application: Turning, Plunge and Profile
Approach Angle 45°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 42^\circ$
RH Holder Shown

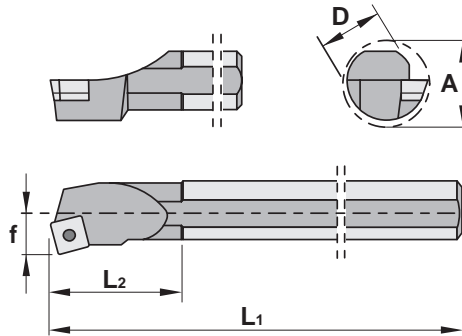
SSSCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SSSCL/R 1212 F09	015262	D4010T	015240	T15	-	-	-	-
SSSCL/R 1616 H09								
SSSCL/R 2020 K12	034500	1540	034577	K5517	028738	SA3514	028739	SAS1760
SSSCL/R 2525 M12								



Turning Inserts

SSKC 75°



S.. SSKC LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					
				Min Bore Ø A	ØD	f	L1	L2	Through Coolant
033549	S16R SSKCL 09	LH	SC_09T3	20	16	11	200	31	
033550	S20S SSKCL 09	LH	SC_09T3	24	20	13	250	36	
033551	S25T SSKCL 09	LH	SC_09T3	31	25	17	300	42	
033552	S16R SSKCR 09	RH	SC_09T3	20	16	11	200	31	
033553	S20S SSKCR 09	RH	SC_09T3	24	20	13	250	36	
033554	S25T SSKCR 09	RH	SC_09T3	31	25	17	300	42	
033555	S32U SSKCL 12	LH	SC_12M5	39	32	22	350	45	
033556	*S40V SSKCL 12	LH	SC_12M5	48	40	27	400	50	
033557	*S50W SSKCL 12	LH	SC_12M5	61	50	35	450	50	
033558	S32U SSKCR 12	RH	SC_12M5	39	32	22	350	45	
033559	*S40V SSKCR 12	RH	SC_12M5	48	40	27	400	50	
033560	*S50W SSKCR 12	RH	SC_12M5	61	50	35	450	50	

* Note these items are on an extended delivery time



S Style Internal Boring Bar
for Positive Inserts:
SCMT09T3 & SCMT12M5
Application: I/D Boring
Axial Approach: 75°
Radial -8°
Profiling Clearance Angle $\beta = 12^\circ$
RH Bar Shown

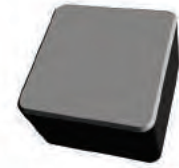
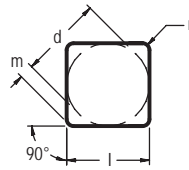
S.. SSKCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
S16R SSKCL/R 09	034499	1440	015240	T15	-	-	-	-
S20S SSKCL/R 09	015262	D4010T						
S25T SSKCL/R 09								
S32U SSKCL/R 12	034500	1540	034577	K5517	028738	SA3514	028739	SAS1760
*S40V SSKCL/R 12								
*S50W SSKCL/R 12								

* Note these items are on an extended delivery time



SNGN
Ceramics



Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032331	SNGN120408 E010	SA6609	12,70	12,70	4,76	0,80	-	◆	Roughing
032332	SNGN120412 E010	SA6609	12,70	12,70	4,76	1,20	-	◆	Roughing
032333	SNGN120708 E010	SA6609	12,70	12,70	7,94	0,80	-	◆	Roughing
032334	SNGN120712 E010	SA6609	12,70	12,70	7,94	1,20	-	◆	Roughing
032335	SNGN190616 E010	SA6609	19,05	19,05	6,35	1,60	-	◆	Roughing

Note: For edge condition refer to Grade page C29

Material Guide – Key to Recommended Inserts

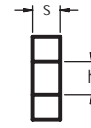
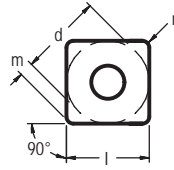
Material Designation

- ◆ P Unalloyed Steels
- ◆ P Alloyed Steels
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- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials



Turning Inserts

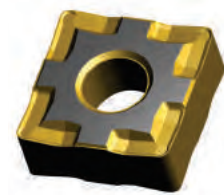
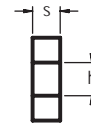
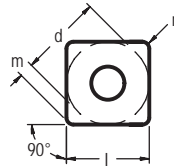
SNMA
Flat Top



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032664	SNMA120408E	NL250	12,70	12,70	4,76	0,80	5,16	◆	Heavy Roughing
032665	SNMA120412E	NL250	12,70	12,70	4,76	1,20	5,16	◆	Heavy Roughing
032666	SNMA120416E	NL250	12,70	12,70	4,76	1,60	5,16	◆	Heavy Roughing
032667	SNMA150612E	NL250	15,88	15,88	6,35	1,20	6,35	◆	Heavy Roughing
032668	SNMA190616E	NL250	19,05	19,05	6,35	1,60	7,94	◆	Heavy Roughing
032669	SNMA190632E	NL250	19,05	19,05	6,35	3,20	7,94	◆	Heavy Roughing

For Toolholders External: see pages C124 - C127 | Internal: see page C128

SNMG
1B Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
030878	SNMG120408E-1B	SP0819	12,70	12,70	4,76	0,80	5,16	◆◆◆◆◆	Finishing
032670	SNMG120408E-1B	NL250	12,70	12,70	4,76	0,80	5,16	◆◆◆◆◆	Finishing

For Toolholders External: see pages C124 - C127 | Internal: see page C128

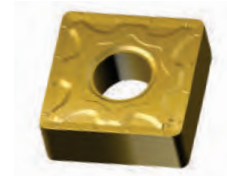
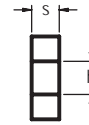
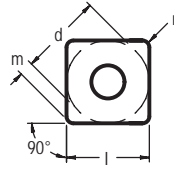
Material Guide – Key to Recommended Inserts

Material Designation

- ◆ P Unalloyed Steels
- ◆ P Alloyed Steels
- ◆ M Stainless Steels
- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials



SNMG
2N Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032671	SNMG120408E-2N	NL250	12,70	12,70	4,76	0,80	5,16	◆◆◆◆	Medium
032672	SNMG120408E-2N	NL300	12,70	12,70	4,76	0,80	5,16	◆◆◆◆	Medium
032673	SNMG120408E-2N	NL920	12,70	12,70	4,76	0,80	5,16	◆◆◆◆	Medium
032674	SNMG120412E-2N	NL250	12,70	12,70	4,76	1,20	5,16	◆◆◆◆	Medium
032675	SNMG120412E-2N	NL300	12,70	12,70	4,76	1,20	5,16	◆◆◆◆	Medium
032676	SNMG120412E-2N	NL920	12,70	12,70	4,76	1,20	5,16	◆◆◆◆	Medium
032677	SNMG120416E-2N	NL250	12,70	12,70	4,76	1,60	5,16	◆◆◆◆	Medium
032678	SNMG120416E-2N	NL300	12,70	12,70	4,76	1,60	5,16	◆◆◆◆	Medium
032679	SNMG120416E-2N	NL920	12,70	12,70	4,76	1,60	5,16	◆◆◆◆	Medium
<hr/>									
032680	SNMG150608E-2N	NL250	15,88	15,88	6,35	0,80	6,35	◆◆◆◆	Medium
032681	SNMG150608E-2N	NL300	15,88	15,88	6,35	0,80	6,35	◆◆◆◆	Medium
032682	SNMG150608E-2N	NL920	15,88	15,88	6,35	0,80	6,35	◆◆◆◆	Medium
032683	SNMG150612E-2N	NL250	15,88	15,88	6,35	1,20	6,35	◆◆◆◆	Medium
032684	SNMG150612E-2N	NL300	15,88	15,88	6,35	1,20	6,35	◆◆◆◆	Medium
032685	SNMG150612E-2N	NL920	15,88	15,88	6,35	1,20	6,35	◆◆◆◆	Medium
032686	SNMG150616E-2N	NL250	15,88	15,88	6,35	1,60	6,35	◆◆◆◆	Medium
032687	SNMG150616E-2N	NL300	15,88	15,88	6,35	1,60	6,35	◆◆◆◆	Medium
<hr/>									
032688	SNMG190612E-2N	NL920	19,05	19,05	6,35	1,20	7,94	◆◆◆◆	Medium
032689	SNMG190616E-2N	NL300	19,05	19,05	6,35	1,60	7,94	◆◆◆◆	Medium
032690	SNMG190616E-2N	NL920	19,05	19,05	6,35	1,60	7,94	◆◆◆◆	Medium

For Toolholders External: see pages C124 - C127 | Internal: see page C128

Material Guide – Key to Recommended Inserts

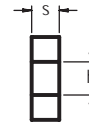
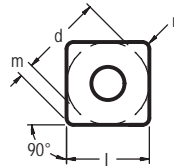
Material Designation

- ◆ P Unalloyed Steels
- ◆ P Alloyed Steels
- ◆ M Stainless Steels
- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials



Turning Inserts

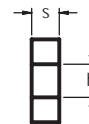
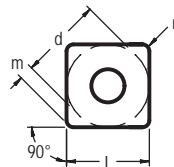
SNMG
3J Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032691	SNMG120408E-3J	SP4019	12,70	12,70	4,76	0,80	5,16		Medium
032692	SNMG120412E-3J	SP4019	12,70	12,70	4,76	1,20	5,16		Medium
032693	SNMG120416E-3J	SP4019	12,70	12,70	4,76	1,60	5,16		Medium

For Toolholders External: see pages C124 - C127 | Internal: see page C128

SNMG
4E Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
031578	SNMG120408E-4E	SP0819	12,70	12,70	4,76	0,80	5,16		Roughing
032694	SNMG120408E-4E	NL400	12,70	12,70	4,76	0,80	5,16		Roughing
031658	SNMG120412E-4E	SP0819	12,70	12,70	4,76	1,20	5,16		Roughing
032695	SNMG120412E-4E	NL400	12,70	12,70	4,76	1,20	5,16		Roughing
031696	SNMG120416E-4E	SP0819	12,70	12,70	4,76	1,60	5,16		Roughing
032696	SNMG120416E-4E	NL400	12,70	12,70	4,76	1,60	5,16		Roughing

For Toolholders External: see pages C124 - C127 | Internal: see page C128

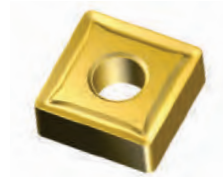
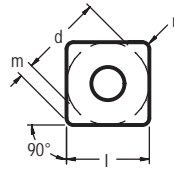
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



SNMG
4E Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
030527	SNMG150608E-4E	SP0819	15,88	15,88	6,35	0,80	6,35		Medium-Roughing
032697	SNMG150608E-4E	NL400	15,88	15,88	6,35	0,80	6,35		Medium-Roughing
030528	SNMG150612E-4E	SP0819	15,88	15,88	6,35	1,20	6,35		Medium-Roughing
032698	SNMG150612E-4E	NL400	15,88	15,88	6,35	1,20	6,35		Medium-Roughing
030529	SNMG150616E-4E	SP0819	15,88	15,88	6,35	1,60	6,35		Medium-Roughing
032699	SNMG150616E-4E	NL400	15,88	15,88	6,35	1,60	6,35		Medium-Roughing
030530	SNMG190608E-4E	SP0819	19,05	19,05	6,35	0,80	7,94		Medium-Roughing
032700	SNMG190608E-4E	NL400	19,05	19,05	6,35	0,80	7,94		Medium-Roughing
030531	SNMG190612E-4E	SP0819	19,05	19,05	6,35	1,20	7,94		Medium-Roughing
032701	SNMG190612E-4E	NL400	19,05	19,05	6,35	1,20	7,94		Medium-Roughing
032362	SNMG190616E-4E	NL400	19,05	19,05	6,35	1,60	7,94		Medium-Roughing
030532	SNMG190616E-4E	SP0819	19,05	19,05	6,35	1,60	7,94		Medium-Roughing
030533	SNMG190624E-4E	SP0819	19,05	19,05	6,35	2,40	7,94		Medium-Roughing
032703	SNMG190624E-4E	NL400	19,05	19,05	6,35	2,40	7,94		Medium-Roughing

For Toolholders External: see pages C124 - C127 | Internal: see page C128

Material Guide – Key to Recommended Inserts

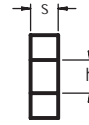
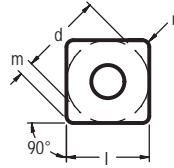
Material Designation

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- Alloyed Steels
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- High Temp. Alloys
- Hard Materials



Turning Inserts

SNMG
4T Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032704	SNMG120404E-4T	NL250	12,70	12,70	4,76	0,40	5,16	◆◆◆◆	Roughing
032705	SNMG120404E-4T	NL300	12,70	12,70	4,76	0,40	5,16	◆◆◆◆	Roughing
032706	SNMG120404E-4T	NL400	12,70	12,70	4,76	0,40	5,16	◆◆◆◆	Roughing
032707	SNMG120404E-4T	NL920	12,70	12,70	4,76	0,40	5,16	◆◆◆◆	Roughing
032708	SNMG120408E-4T	NL250	12,70	12,70	4,76	0,80	5,16	◆◆◆◆	Roughing
032709	SNMG120408E-4T	NL300	12,70	12,70	4,76	0,80	5,16	◆◆◆◆	Roughing
032710	SNMG120408E-4T	NL400	12,70	12,70	4,76	0,80	5,16	◆◆◆◆	Roughing
032711	SNMG120408E-4T	NL920	12,70	12,70	4,76	0,80	5,16	◆◆◆◆	Roughing
032712	SNMG120412E-4T	NL250	12,70	12,70	4,76	1,20	5,16	◆◆◆◆	Roughing
032713	SNMG120412E-4T	NL300	12,70	12,70	4,76	1,20	5,16	◆◆◆◆	Roughing
032714	SNMG120412E-4T	NL400	12,70	12,70	4,76	1,20	5,16	◆◆◆◆	Roughing
032715	SNMG120412E-4T	NL920	12,70	12,70	4,76	1,20	5,16	◆◆◆◆	Roughing
032716	SNMG120416E-4T	NL250	12,70	12,70	4,76	1,60	5,16	◆◆◆◆	Roughing
032717	SNMG120416E-4T	NL300	12,70	12,70	4,76	1,60	5,16	◆◆◆◆	Roughing
032718	SNMG120416E-4T	NL400	12,70	12,70	4,76	1,60	5,16	◆◆◆◆	Roughing
032719	SNMG120416E-4T	NL920	12,70	12,70	4,76	1,60	5,16	◆◆◆◆	Roughing

For Toolholders External: see pages C124 - C127 | Internal: see page C128

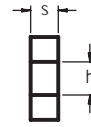
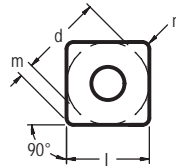
Material Guide – Key to Recommended Inserts

Material Designation

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- ◆ S High Temp. Alloys
- ◆ H Hard Materials



SNMG
4T Geometry



Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032720	SNMG150608E-4T	NL250	15,88	15,88	6,35	0,80	6,35		Roughing
032721	SNMG150608E-4T	NL300	15,88	15,88	6,35	0,80	6,35		Roughing
032722	SNMG150608E-4T	NL400	15,88	15,88	6,35	0,80	6,35		Roughing
032723	SNMG150608E-4T	NL920	15,88	15,88	6,35	0,80	6,35		Roughing
032724	SNMG150612E-4T	NL250	15,88	15,88	6,35	1,20	6,35		Roughing
032725	SNMG150612E-4T	NL300	15,88	15,88	6,35	1,20	6,35		Roughing
032726	SNMG150612E-4T	NL400	15,88	15,88	6,35	1,20	6,35		Roughing
032727	SNMG150612E-4T	NL920	15,88	15,88	6,35	1,20	6,35		Roughing
032728	SNMG150616E-4T	NL250	15,88	15,88	6,35	1,60	6,35		Roughing
032729	SNMG150616E-4T	NL300	15,88	15,88	6,35	1,60	6,35		Roughing
032730	SNMG150616E-4T	NL400	15,88	15,88	6,35	1,60	6,35		Roughing
032731	SNMG150616E-4T	NL920	15,88	15,88	6,35	1,60	6,35		Roughing

For Toolholders External: see pages C124 - C127 | Internal: see page C128

Material Guide – Key to Recommended Inserts

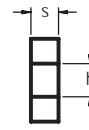
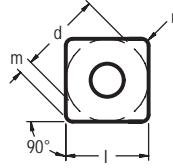
Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



Turning Inserts

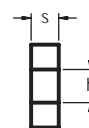
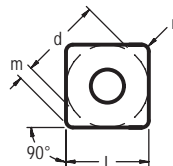
SNMG 4T Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032732	SNMG190612E-4T	NL250	19,05	19,05	6,35	1,20	7,94		Roughing
032733	SNMG190612E-4T	NL300	19,05	19,05	6,35	1,20	7,94		Roughing
032734	SNMG190612E-4T	NL400	19,05	19,05	6,35	1,20	7,94		Roughing
032735	SNMG190612E-4T	NL920	19,05	19,05	6,35	1,20	7,94		Roughing
032736	SNMG190616E-4T	NL250	19,05	19,05	6,35	1,60	7,94		Roughing
032737	SNMG190616E-4T	NL300	19,05	19,05	6,35	1,60	7,94		Roughing
032738	SNMG190616E-4T	NL400	19,05	19,05	6,35	1,60	7,94		Roughing
032739	SNMG190616E-4T	NL920	19,05	19,05	6,35	1,60	7,94		Roughing
032740	SNMG250924E-4T	NL300	25,40	25,40	9,53	2,40	9,12		Roughing
032741	SNMG250924E-4T	NL400	25,40	25,40	9,53	2,40	9,12		Roughing
032742	SNMG250924E-4T	NL920	25,40	25,40	9,53	2,40	9,12		Roughing

For Toolholders External: see pages C124 - C127 | Internal: see page C128

SNMG 4U Geometry



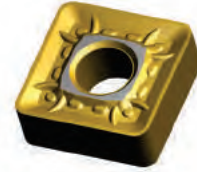
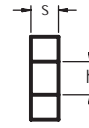
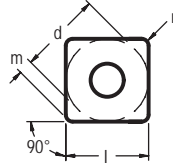
EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032743	SNMG120408E-4U	NL200	12,70	12,70	4,76	0,80	5,16		Roughing
032744	SNMG120412E-4U	NL200	12,70	12,70	4,76	1,20	5,16		Roughing

For Toolholders External: see pages C124 - C127 | Internal: see page C128

Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials


SNMM
5R Geometry


Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
031690	SNMM150612E-5R	NL300	15,88	15,88	6,35	1,20	6,35		Heavy Roughing
031674	SNMM150612E-5R	NL400	15,88	15,88	6,35	1,20	6,35		Heavy Roughing
031691	SNMM150616E-5R	NL300	15,88	15,88	6,35	1,60	6,35		Heavy Roughing
031675	SNMM150616E-5R	NL400	15,88	15,88	6,35	1,60	6,35		Heavy Roughing
031692	SNMM150624E-5R	NL300	15,88	15,88	6,35	2,40	6,35		Heavy Roughing
031676	SNMM150624E-5R	NL400	15,88	15,88	6,35	2,40	6,35		Heavy Roughing
031693	SNMM190612E-5R	NL300	19,05	19,05	6,35	1,20	7,94		Heavy Roughing
031677	SNMM190612E-5R	NL400	19,05	19,05	6,35	1,20	7,94		Heavy Roughing
031694	SNMM190616E-5R	NL300	19,05	19,05	6,35	1,60	7,94		Heavy Roughing
031678	SNMM190616E-5R	NL400	19,05	19,05	6,35	1,60	7,94		Heavy Roughing
031695	SNMM190624E-5R	NL300	19,05	19,05	6,35	2,40	7,94		Heavy Roughing
031679	SNMM190624E-5R	NL400	19,05	19,05	6,35	2,40	7,94		Heavy Roughing
031681	SNMM250924E-5R	NL300	25,40	25,40	9,53	2,40	9,12		Heavy Roughing
032750	SNMM250924E-5R	NL400	25,40	25,40	9,53	2,40	9,12		Heavy Roughing
031680	SNMM250924E-5R	NL920	25,40	25,40	9,53	2,40	9,12		Heavy Roughing

For Toolholders External: see pages C124 - C127 | Internal: see page C128

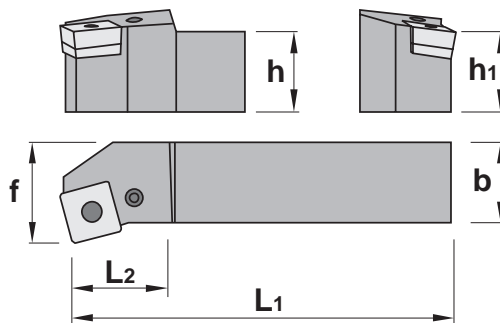
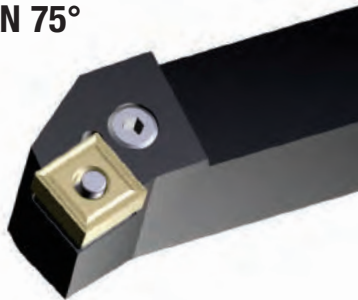
Material Guide – Key to Recommended Inserts

Material Designation



Turning Inserts

PSKN 75°



PSKN LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
017165	PSKNL 2020 K 12	LH	SN_1204	20	20	25	125	28
017167	PSKNL 2525 M12	LH	SN_1204	25	25	32	150	28
017169	PSKNL 3225 P12	LH	SN_1204	32	25	32	170	34
017166	PSKNR 2020 K 12	RH	SN_1204	20	20	25	125	28
017168	PSKNR 2525 M12	RH	SN_1204	25	25	32	150	28
017170	PSKNR 3225 P12	RH	SN_1204	32	25	32	170	34
024735	PSKNL 2525 M15	LH	SN_1506	25	25	32	150	34
028429	PSKNL 3232 P15	LH	SN_1506	32	32	40	170	42
024739	PSKNR 2525 M15	RH	SN_1506	25	25	32	150	34
023289	PSKNR 3232 P15	RH	SN_1506	32	32	40	170	42
024738	*PSKNL 4040 S19	LH	SN_1906	40	40	50	250	45
024741	*PSKNR 4040 S19	RH	SN_1906	40	40	50	250	45
033352	*PSKNL 5050 T25	LH	SN_2509	50	50	60	300	45
033353	*PSKNR 5050 T25	RH	SN_2509	50	50	60	300	45



P Style External Toolholder
for Negative Inserts:
SN_1204, SN_1506, SN_1906 & SN_2507
Application: Facing
Axial Approach 75°
Axial -4,25°
Radial -7,25°
Profiling Clearance Angle $\beta = 0^\circ$
RH Holder Shown

* Non Stock Items, subject to extended delivery time

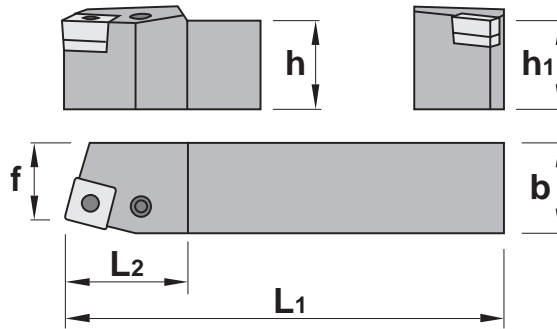
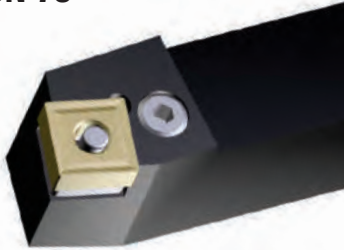
PSKNL/R Spare Parts

Item Description	Lever EDP	Lever Screw EDP	Anvil EDP	Anvil Clip EDP	Clip Punch EDP	Key EDP						
PSKNL/R 2020 K 12	017443	8012	017448	1608	017460	PA3512	017453	PC4112	028054	PCP0012	018286	KH5003
PSKNL/R 2525 M12												
PSKNL/R 3225 P12												
PSKNL/R 2525 M15	017445	8016	017450	1618	017461	PA3515	028051	PC4115	034505	PCP0015	018287	KH5004
PSKNL/R 3232 P15												
*PSKNL/R 4040 S19	017446	8019	017451	1610	017462	PA3519	017455	PC4119	028056	PCP0019	018287	KH5004
*PSKNL/R 5050 T25	028408	8025	028409	1612	028416	PA3525	028418	PC4125	034506	PCP0025	018288	KH5005

* Non Stock Items, subject to extended delivery time



PSBN 75°



Turning Inserts

PSBN LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
017152	PSBNL 2020 K 12	LH	SN_1204	20	20	17	125	28
017154	PSBNL 2525 M12	LH	SN_1204	25	25	22	150	28
028399	PSBNL 3225 P12	LH	SN_1204	32	25	22	170	28
017153	PSBNR 2020 K 12	RH	SN_1204	20	20	17	125	28
017155	PSBNR 2525 M12	RH	SN_1204	25	25	22	150	28
028405	PSBNR 3225 P12	RH	SN_1204	32	25	22	170	28
028400	PSBNL 2525 M15	LH	SN_1506	25	25	22	150	34
028401	PSBNL 3232 P15	LH	SN_1506	32	32	27	170	34
017159	PSBNR 2525 M15	RH	SN_1506	25	25	22	150	34
028406	PSBNR 3232 P15	RH	SN_1506	32	32	27	170	34
018466	*PSBNL 4040 S19	LH	SN_1906	40	40	35	250	48
018467	*PSBNR 4040 S19	RH	SN_1906	40	40	35	250	48
033356	*PSBNL 5050 T25	LH	SN_2509	50	50	43	300	50
033357	*PSBNR 5050 T25	RH	SN_2509	50	50	43	300	50



P Style External Toolholder
for Negative Inserts:
SN_1204, SN_1506, SN_1906 & SN_2507
Application: Turn O/D
Axial Approach 75°
Axial -7,25°
Radial -4,25°
Profiling Clearance Angle $\beta = 12^\circ$
RH Holder Shown

* Non Stock Items, subject to extended delivery time

PSBNL/R Spare Parts

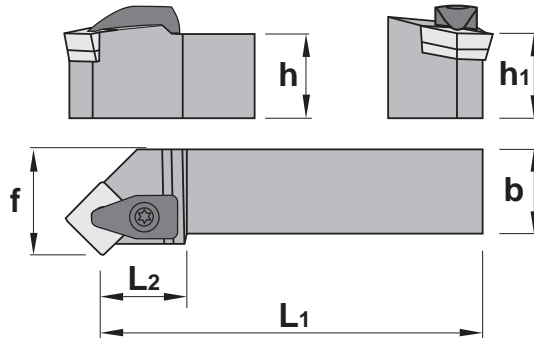
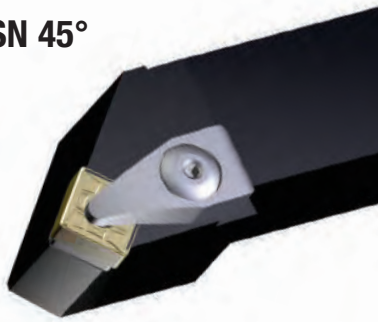
Item Description	Lever EDP	Lever Screw EDP	Anvil EDP	Anvil Clip EDP	Clip Punch EDP	Key EDP						
PSBNL/R 2020 K 12	017443	PL8012	017448	PLS1608	017460	PA3512	017453	PC4112	028054	PCP0012	018286	KH5003
PSBNL/R 2525 M12												
PSBNL/R 3225 P12												
PSBNL/R 2525 M15	017445	PL8016	017450	PLS1618	017461	PA3515	028051	PC4115	034505	PCP0015	018287	KH5004
PSBNL/R 3232 P15												
PSBNL/R 4040 S19	017446	PL8019	017451	PLS1610	017462	PA3519	017455	PC4119	028056	PCP0019	018287	KH5004
*PSBNL/R 5050 T25	028408	PL8025	028409	PLS1612	028416	PA3525	028418	PC4125	034506	PCP0025	018288	KH5005

* Non Stock Items, subject to extended delivery time



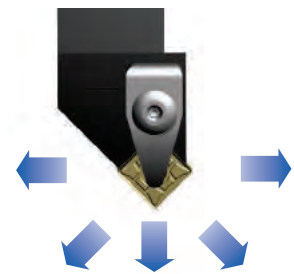
Turning Inserts

DSSN 45°



DSSN LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
033358	DSSNL 2020 K12	LH	SN_1204	20	20	25	125	37
033359	DSSNL 2525 M12	LH	SN_1204	25	25	32	150	37
033360	DSSNL 3225 P12	LH	SN_1204	32	25	32	170	37
033361	DSSNR 2020 K12	RH	SN_1204	20	20	25	125	37
033362	DSSNR 2525 M12	RH	SN_1204	25	25	32	150	37
033363	DSSNR 3225 P12	RH	SN_1204	32	25	32	170	37
033364	DSSNL 2525 M15	LH	SN_1506	25	25	32	150	36
033365	DSSNL 3232 P15	LH	SN_1506	32	32	40	170	40
033366	DSSNR 2525 M15	RH	SN_1506	25	25	32	150	36
033367	DSSNR 3232 P15	RH	SN_1506	32	32	40	170	40
033368	DSSNL 3232 P19	LH	SN_1906	32	32	40	170	45
033369	*DSSNL 4040 S19	LH	SN_1906	40	40	50	250	45
033370	DSSNR 3232 P19	RH	SN_1906	32	32	40	170	45
033371	*DSSNR 4040 S19	RH	SN_1906	40	40	50	250	45



D Style External Toolholder
for Negative Inserts:
SN_1204, SN_1506 & SN_1906
Application: Turn O/D & Plunge Profile
Axial Approach 45°
Axial -5,75°
Radial -5,75°
Profiling Clearance Angle $\beta = 42^\circ$
RH Holder Shown

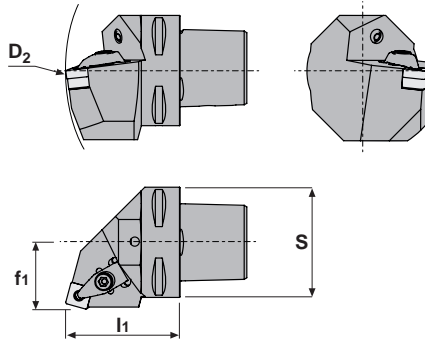
* Non Stock Items, subject to extended delivery time

DSSNL/R Spare Parts

Item Description	Clamp Screw EDP	Clamp EDP	Clamp Spring EDP	Anvil EDP	Anvil Screw EDP	Clamp & Anvil Screw Key
DSSNL/R 2020 K12	033710	1696	033719	4295	001704	018287
DSSNL/R 2525 M12					ISSN433	
DSSNL/R 3225 P12					033716	
DSSNL/R 2525 M15					1766	
DSSNL/R 3232 P15					034509	
DSSNL/R 3232 P19					1768	
DSSNL/R 4040 S19	033717	1770				



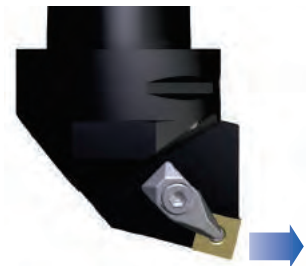
DSRN 75°



Turning Inserts

DSRN LH & RH External PSC Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				S	D1	D2	f1	l1
033705	C6-63-DSRNL35065-12	LH	SN_1204	63	-	190	35	65
033706	C6-63-DSRNR35065-12	RH	SN_1204	63	-	190	35	65



D Style External Toolholder
for Negative Inserts: SN_1204
Application: External Face and Turn O/D
Approach Angle 75°
Axial -6°
Radial -6°
Profiling Clearance Angle $\beta = 12^\circ$
RH Holder Shown

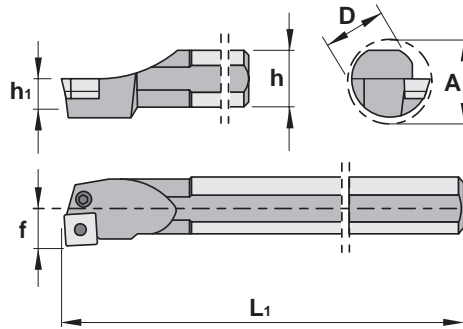
C.. DSRNL/R Spare Parts

Item Description	Clamp EDP	Clamp Screw EDP	Anvil EDP	Anvil Screw EDP	Clamp Spring EDP	Screw Key EDP						
C6-63-DSRNL/R 35065-12	033707	2712	033710	1696	033715	ISSN442	033716	1766	033719	4295	018287	KH5004



Turning Inserts

A..PSKN 75°



A..PSKN LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)						
				Min Bore Ø A	ØD	f	L1	h	h1	Through Coolant
028724	A25R PSKNL 12	LH	SN_1204	31	25	17	200	23	11,5	
028725	A32S PSKNL 12	LH	SN_1204	39	32	22	250	30	15,0	
028726	A40T PSKNL 12	LH	SN_1204	48	40	27	300	37	18,5	
028727	A25R PSKNR 12	RH	SN_1204	31	25	17	200	23	11,5	
028728	A32S PSKNR 12	RH	SN_1204	39	32	22	250	30	15,0	
028729	A40T PSKNR 12	RH	SN_1204	48	40	27	300	37	18,5	



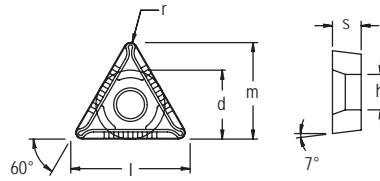
P Style Internal Boring Bar
for Negative Inserts: SN_1204
Application: Boring
Axial Approach 75°
Axial -3°
Radial -11°
Profiling Clearance Angle $\beta = 12^\circ$
RH Bar Shown

A..PSKNL/R Spare Parts

Item Description	Lever EDP		Lever Screw EDP		Anvil EDP		Anvil Clip EDP		Clip Punch EDP		Key EDP	
A25R PSKNL/R 12	028742	PL8212	028743	PLS1626	-	-	-	-	-	-	018285	KH5025
A32S PSKNL/R 12	028047	PL8312	022625	PLS1648	017460	PA3512	017453	PC4112	028054	PCP0012	018286	KH5003
A40T PSKNL/R 12	017443	PL8012	017448	PLA1608								



TCMT
-73 Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032751	TCMT110202E-73	SP4019	6,35	11,00	2,38	0,20	2,80		Medium
032752	TCMT110202E-73	NL300	6,35	11,00	2,38	0,20	2,80		Medium
032753	TCMT110204E-73	SP4019	6,35	11,00	2,38	0,40	2,80		Medium
032754	TCMT110204E-73	NL300	6,35	11,00	2,38	0,40	2,80		Medium
032755	TCMT110204E-73	NL920	6,35	11,00	2,38	0,40	2,80		Medium
032302	TCMT16T304E-73	SP4019	9,53	16,50	3,97	0,40	4,40		Medium
032756	TCMT16T304E-73	NL300	9,53	16,50	3,97	0,40	4,40		Medium
032757	TCMT16T304E-73	NL920	9,53	16,50	3,97	0,40	4,40		Medium
032294	TCMT16T308E-73	SP4019	9,53	16,50	3,97	0,80	4,40		Medium
032758	TCMT16T308E-73	NL300	9,53	16,50	3,97	0,80	4,40		Medium
032759	TCMT16T308E-73	NL920	9,53	16,50	3,97	0,80	4,40		Medium
032760	TCMT22M508E-73	NL920	12,70	22,00	5,00	0,80	5,50		Medium

For Toolholders External: see page C130 | Internal: see page C131

Material Guide – Key to Recommended Inserts

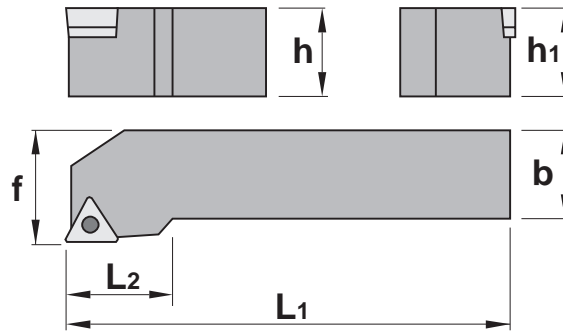
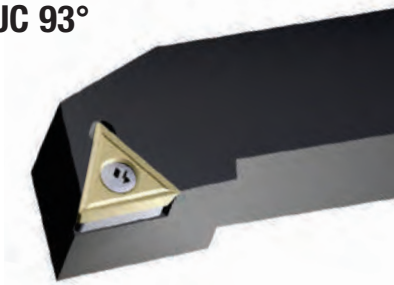
Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



Turning Inserts

STJC 93°



STJC LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
028625	STJCL 1212 F11	LH	TCMT1102	12	12	16	80	16
028626	STJCL 1616 H11	LH	TCMT1102	16	16	20	100	18
028630	STJCR 1212 F11	RH	TCMT1102	12	12	16	80	16
028631	STJCR 1616 H11	RH	TCMT1102	16	16	20	100	18
028627	STJCL 1616 H16	LH	TCMT16T3	16	16	20	100	18
028628	STJCL 2020 K16	LH	TCMT16T3	20	20	25	125	22
028629	STJCL 2525 M16	LH	TCMT16T3	25	25	32	150	28
028632	STJCR 1616 H16	RH	TCMT16T3	16	16	20	100	18
028633	STJCR 2020 K16	RH	TCMT16T3	20	20	25	125	22
028634	STJCR 2525 M16	RH	TCMT16T3	25	25	32	150	28



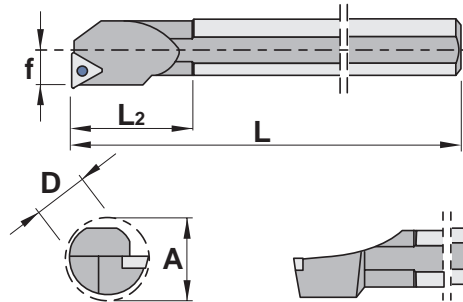
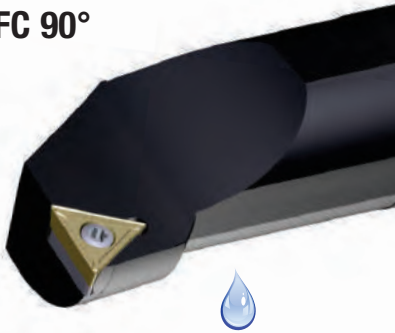
S Style External Toolholder
for Positive Inserts:
TCMT1102 and TCMT16T3
Application: O/D Turning
Approach Angle 93°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 0^\circ$
RH Holder Shown

STJCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
STJCL/R 1212 F11	015061	F2507T	018488	T7	-	-	-	-
STJCL/R 1616 H11								
STJCL/R 1616 H16	034497	1335	028475	K5516	028580	SA3414	028478	SA1750
STJCL/R 2020 K16								
STJCL/R 2525 M16								



A..STFC 90°



Turning Inserts

A.. STFC LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					
				Min Bore Ø A	ØD	f	L1	L2	Through Coolant
033573	A12K STFCL 11	LH	TCMT1102	16	12	9	125	23	
033574	A16M STFCL 11	LH	TCMT1102	20	16	11	150	31	
033577	A20Q STFCL 11	LH	TCMT1102	24	20	13	180	36	
033575	A12K STFCL 11	RH	TCMT1102	16	12	9	125	23	
033576	A16M STFCL 11	RH	TCMT1102	20	16	11	150	31	
033580	A20Q STFCL 11	RH	TCMT16T3	24	20	13	180	36	
033578	A25R STFCL 16	LH	TCMT16T3	31	25	17	200	42	
033579	A32S STFCL 16	LH	TCMT16T3	39	32	22	250	45	
033581	A25R STFCL 16	RH	TCMT16T3	31	25	17	200	42	
033582	A32S STFCL 16	RH	TCMT16T3	39	32	22	250	45	



S Style Internal Boring Bar
for Positive Inserts:
TCMT1102 and TCMT16T3
Application: I/D Boring
Axial Approach: 90°
Axial 0°
Radial -6°
Profiling Clearance Angle $\beta = 0^\circ$
RH Bar Shown

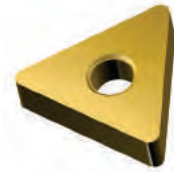
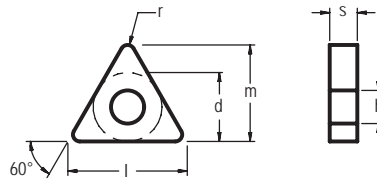
A.. STFCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
A12K STFCL/R 11	015061	F2507T	018488	T7	-	-	-	-
A16M STFCL/R 11								
A20Q STFCL/R 11								
A25R STFCL/R 16	015262	D4010T	015240	T15	-	-	-	-
A32S STFCL/R 16	034497	1335	028475	K5516	028580	SA3414	028478	SAS1750



Turning Inserts

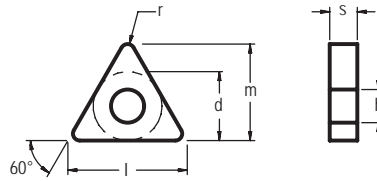
TNMA
Flat Top



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032761	TNMA160408E	NL250	9,53	16,50	4,76	0,80	3,81	◆	Heavy Roughing
032762	TNMA160412E	NL250	9,53	16,50	4,76	1,20	3,81	◆	Heavy Roughing
032763	TNMA220408E	NL250	12,70	22,00	4,76	0,80	5,16	◆	Heavy Roughing
032764	TNMA220412E	NL250	12,70	22,00	4,76	1,20	5,16	◆	Heavy Roughing
032765	TNMA220416E	NL250	12,70	22,00	4,76	1,60	5,16	◆	Heavy Roughing
032766	TNMA270616E	NL250	15,88	27,50	6,35	1,60	6,35	◆	Heavy Roughing

For Toolholders External: see pages C139 - C140 | Internal: see page C141

TNMG
1B Geometry



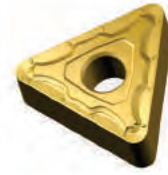
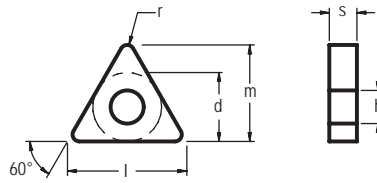
EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032767	TNMG160404E-1B	NL250	9,53	16,50	4,76	0,40	3,81	◆◆◆◆	Finishing
030879	TNMG160404E-1B	SP0819	9,53	16,50	4,76	0,40	3,81	◆◆◆◆◆	Finishing
032768	TNMG160408E-1B	NL250	9,53	16,50	4,76	0,80	3,81	◆◆◆◆	Finishing
030880	TNMG160408E-1B	SP0819	9,53	16,50	4,76	0,80	3,81	◆◆◆◆◆	Finishing
032769	TNMG160412E-1B	SP0819	9,53	16,50	4,76	1,20	3,81	◆◆◆◆◆	Finishing
032770	TNMG160412E-1B	NL250	9,53	16,50	4,76	1,20	3,81	◆◆◆◆	Finishing

For Toolholders External: see pages C139 - C140 | Internal: see page C141

Material Guide – Key to Recommended Inserts

Material Designation

- ◆ P Unalloyed Steels
- ◆ P Alloyed Steels
- ◆ M Stainless Steels
- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials


TNMG
2N Geometry


EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032771	TNMG160404E-2N	NL250	9,53	16,50	4,76	0,40	3,81	◆◆◆◆	Semi-Medium
032772	TNMG160404E-2N	NL300	9,53	16,50	4,76	0,40	3,81	◆◆◆◆	Semi-Medium
032773	TNMG160404E-2N	NL920	9,53	16,50	4,76	0,40	3,81	◆◆◆◆	Semi-Medium
032774	TNMG160408E-2N	NL250	9,53	16,50	4,76	0,80	3,81	◆◆◆◆	Semi-Medium
032775	TNMG160408E-2N	NL300	9,53	16,50	4,76	0,80	3,81	◆◆◆◆	Semi-Medium
032776	TNMG160408E-2N	NL920	9,53	16,50	4,76	0,80	3,81	◆◆◆◆	Semi-Medium
032777	TNMG160412E-2N	NL250	9,53	16,50	4,76	1,20	3,81	◆◆◆◆	Semi-Medium
032778	TNMG160412E-2N	NL300	9,53	16,50	4,76	1,20	3,81	◆◆◆◆	Semi-Medium
032779	TNMG160412E-2N	NL920	9,53	16,50	4,76	1,20	3,81	◆◆◆◆	Semi-Medium
<hr/>									
032780	TNMG220404E-2N	NL250	12,70	22,00	4,76	0,40	5,16	◆◆◆◆	Semi-Medium
032781	TNMG220404E-2N	NL300	12,70	22,00	4,76	0,40	5,16	◆◆◆◆	Semi-Medium
032782	TNMG220404E-2N	NL920	12,70	22,00	4,76	0,40	5,16	◆◆◆◆	Semi-Medium
032783	TNMG220408E-2N	NL250	12,70	22,00	4,76	0,80	5,16	◆◆◆◆	Semi-Medium
032784	TNMG220408E-2N	NL300	12,70	22,00	4,76	0,80	5,16	◆◆◆◆	Semi-Medium
032785	TNMG220408E-2N	NL920	12,70	22,00	4,76	0,80	5,16	◆◆◆◆	Semi-Medium
032786	TNMG220412E-2N	NL250	12,70	22,00	4,76	1,20	5,16	◆◆◆◆	Semi-Medium
032787	TNMG220412E-2N	NL300	12,70	22,00	4,76	1,20	5,16	◆◆◆◆	Semi-Medium
032788	TNMG220412E-2N	NL920	12,70	22,00	4,76	1,20	5,16	◆◆◆◆	Semi-Medium
<hr/>									
032789	TNMG270616E-2N	NL920	15,88	27,50	6,35	1,60	6,35	◆◆◆◆	Semi-Medium

For Toolholders External: see pages C139 - C140 | Internal: see page C141

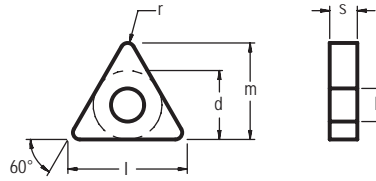
Material Guide – Key to Recommended Inserts
Material Designation

- ◆ P Unalloyed Steels
- ◆ P Alloyed Steels
- ◆ M Stainless Steels
- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials



Turning Inserts

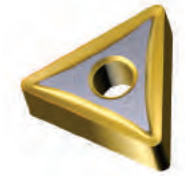
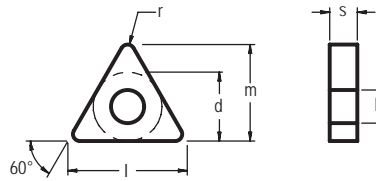
TNMG 3J Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032790	TNMG160404E-3J	SP4019	9,53	16,50	4,76	0,40	3,81		Medium
032791	TNMG160408E-3J	SP4019	9,53	16,50	4,76	0,80	3,81		Medium
032792	TNMG160412E-3J	SP4019	9,53	16,50	4,76	1,20	3,81		Medium
032793	TNMG220408E-3J	SP4019	12,70	22,00	4,76	0,80	5,16		Medium
032794	TNMG220412E-3J	SP4019	12,70	22,00	4,76	1,20	5,16		Medium
032795	TNMG220416E-3J	SP4019	12,70	22,00	4,76	1,60	5,16		Medium

For Toolholders External: see pages C139 - C140 | Internal: see page C141

TNMG 4E Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
030534	TNMG160404E-4E	SP0819	9,53	16,50	4,76	0,40	3,81		Medium-Roughing
032926	TNMG160404E-4E	NL400	9,53	16,50	4,76	0,40	3,81		Medium-Roughing
030535	TNMG160408E-4E	SP0819	9,53	16,50	4,76	0,80	3,81		Medium-Roughing
032927	TNMG160408E-4E	NL400	9,53	16,50	4,76	0,80	3,81		Medium-Roughing
030536	TNMG160412E-4E	SP0819	9,53	16,50	4,76	1,20	3,81		Medium-Roughing
032928	TNMG160412E-4E	NL400	9,53	16,50	4,76	1,20	3,81		Medium-Roughing

For Toolholders External: see pages C139 - C140 | Internal: see page C141

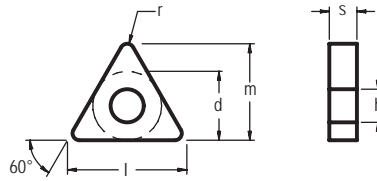
Material Guide – Key to Recommended Inserts

Material Designation

P Unalloyed Steels
 P Alloyed Steels
 M Stainless Steels
 M PH Stainless
 K Cast Irons
 N Aluminum & Alloys
 S High Temp. Alloys
 H Hard Materials



TNMG
4T Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032796	TNMG160304E-4T	NL300	9,53	16,50	3,18	0,40	3,81	◆◆◆◆	Roughing
032797	TNMG160304E-4T	NL400	9,53	16,50	3,18	0,40	3,81	◆◆◆◆	Roughing
032798	TNMG160304E-4T	NL920	9,53	16,50	3,18	0,40	3,81	◆◆◆◆	Roughing
032799	TNMG160308E-4T	NL300	9,53	16,50	3,18	0,80	3,81	◆◆◆◆	Roughing
032800	TNMG160308E-4T	NL400	9,53	16,50	3,18	0,80	3,81	◆◆◆◆	Roughing
032801	TNMG160308E-4T	NL920	9,53	16,50	3,18	0,80	3,81	◆◆◆◆	Roughing
032802	TNMG160404E-4T	NL250	9,53	16,50	4,76	0,40	3,81	◆◆◆◆	Roughing
032803	TNMG160404E-4T	NL300	9,53	16,50	4,76	0,40	3,81	◆◆◆◆	Roughing
032804	TNMG160404E-4T	NL400	9,53	16,50	4,76	0,40	3,81	◆◆◆◆	Roughing
032805	TNMG160404E-4T	NL920	9,53	16,50	4,76	0,40	3,81	◆◆◆◆	Roughing
032806	TNMG160408E-4T	NL250	9,53	16,50	4,76	0,80	3,81	◆◆◆◆	Roughing
032807	TNMG160408E-4T	NL300	9,53	16,50	4,76	0,80	3,81	◆◆◆◆	Roughing
032808	TNMG160408E-4T	NL400	9,53	16,50	4,76	0,80	3,81	◆◆◆◆	Roughing
032809	TNMG160408E-4T	NL920	9,53	16,50	4,76	0,80	3,81	◆◆◆◆	Roughing
032810	TNMG160412E-4T	NL250	9,53	16,50	4,76	1,20	3,81	◆◆◆◆	Roughing
032811	TNMG160412E-4T	NL300	9,53	16,50	4,76	1,20	3,81	◆◆◆◆	Roughing
032812	TNMG160412E-4T	NL400	9,53	16,50	4,76	1,20	3,81	◆◆◆◆	Roughing
032813	TNMG160412E-4T	NL920	9,53	16,50	4,76	1,20	3,81	◆◆◆◆	Roughing

For Toolholders External: see pages C139 - C140 | Internal: see page C141

Material Guide – Key to Recommended Inserts

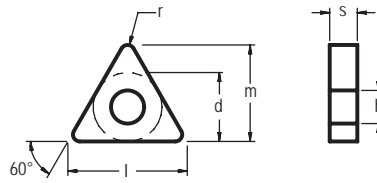
Material Designation

- ◆ P Unalloyed Steels
- ◆ P Alloyed Steels
- ◆ M Stainless Steels
- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials



Turning Inserts

TNMG
4T Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032814	TNMG220404E-4T	NL250	12,70	22,00	4,76	0,40	5,16		Roughing
032815	TNMG220404E-4T	NL300	12,70	22,00	4,76	0,40	5,16		Roughing
032816	TNMG220404E-4T	NL400	12,70	22,00	4,76	0,40	5,16		Roughing
032817	TNMG220404E-4T	NL920	12,70	22,00	4,76	0,40	5,16		Roughing
032818	TNMG220408E-4T	NL250	12,70	22,00	4,76	0,80	5,16		Roughing
032819	TNMG220408E-4T	NL300	12,70	22,00	4,76	0,80	5,16		Roughing
032820	TNMG220408E-4T	NL400	12,70	22,00	4,76	0,80	5,16		Roughing
032821	TNMG220408E-4T	NL920	12,70	22,00	4,76	0,80	5,16		Roughing
032822	TNMG220412E-4T	NL250	12,70	22,00	4,76	1,20	5,16		Roughing
032823	TNMG220412E-4T	NL300	12,70	22,00	4,76	1,20	5,16		Roughing
032824	TNMG220412E-4T	NL400	12,70	22,00	4,76	1,20	5,16		Roughing
032825	TNMG220412E-4T	NL920	12,70	22,00	4,76	1,20	5,16		Roughing
032826	TNMG220416E-4T	NL250	12,70	22,00	4,76	1,60	5,16		Roughing
032827	TNMG220416E-4T	NL300	12,70	22,00	4,76	1,60	5,16		Roughing
032828	TNMG220416E-4T	NL400	12,70	22,00	4,76	1,60	5,16		Roughing
032829	TNMG220416E-4T	NL920	12,70	22,00	4,76	1,60	5,16		Roughing
032830	TNMG220432E-4T	NL300	12,70	22,00	4,76	3,20	5,16		Roughing

For Toolholders External: see pages C139 - C140 | Internal: see page C141

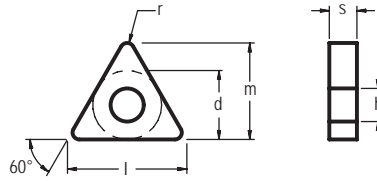
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



TNMG
4T Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032831	TNMG270608E-4T	NL250	15,88	27,50	6,35	0,80	6,35		Roughing
032832	TNMG270608E-4T	NL300	15,88	27,50	6,35	0,80	6,35		Roughing
032833	TNMG270608E-4T	NL400	15,88	27,50	6,35	0,80	6,35		Roughing
032834	TNMG270608E-4T	NL920	15,88	27,50	6,35	0,80	6,35		Roughing
032835	TNMG270612E-4T	NL250	15,88	27,50	6,35	1,20	6,35		Roughing
032836	TNMG270612E-4T	NL300	15,88	27,50	6,35	1,20	6,35		Roughing
032837	TNMG270612E-4T	NL400	15,88	27,50	6,35	1,20	6,35		Roughing
032838	TNMG270612E-4T	NL920	15,88	27,50	6,35	1,20	6,35		Roughing
032839	TNMG270616E-4T	NL250	15,88	27,50	6,35	1,60	6,35		Roughing
032840	TNMG270616E-4T	NL300	15,88	27,50	6,35	1,60	6,35		Roughing
032841	TNMG270616E-4T	NL400	15,88	27,50	6,35	1,60	6,35		Roughing
032842	TNMG270616E-4T	NL920	15,88	27,50	6,35	1,60	6,35		Roughing
032843	TNMG270632E-4T	NL300	15,88	27,50	6,35	3,20	6,35		Roughing
032844	TNMG330924E-4T	NL300	19,05	33,50	9,53	2,40	7,92		Roughing
032845	TNMG330924E-4T	NL400	19,05	33,50	9,53	2,40	7,92		Roughing
032846	TNMG330924E-4T	NL920	19,05	33,50	9,53	2,40	7,92		Roughing

For Toolholders External: see pages C139 - C140 | Internal: see page C141

Material Guide – Key to Recommended Inserts

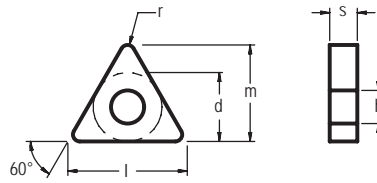
Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



Turning Inserts

TNMG
4U Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032847	TNMG160408E-4U	NL200	9,53	16,50	4,76	0,80	3,81		Roughing
032848	TNMG160412E-4U	NL200	9,53	16,50	4,76	1,20	3,81		Roughing
032849	TNMG220408E-4U	NL200	12,70	22,00	4,76	0,80	5,16		Roughing
032850	TNMG220412E-4U	NL200	12,70	22,00	4,76	1,20	5,16		Roughing
032851	TNMG220416E-4U	NL200	12,70	22,00	4,76	1,60	5,16		Roughing

For Toolholders External: see pages C139 - C140 | Internal: see page C141

Material Guide – Key to Recommended Inserts

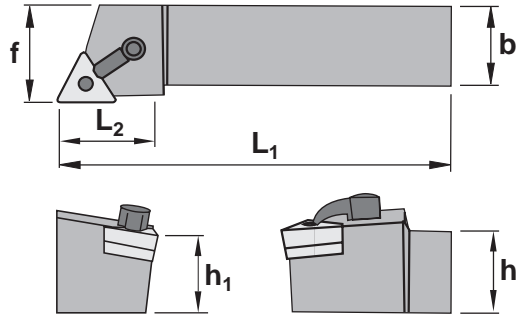
Material Designation

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- S High Temp. Alloys
- H Hard Materials

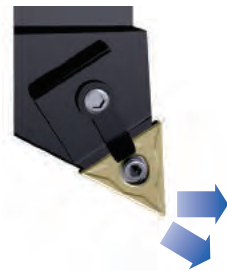


Turning Inserts

MTJN 93°



MTJN LH & RH External Square Shank Toolholders								
EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
028557	MTJNL 2020 K 16-S	LH	TN_1604	20	20	25	125	28
028558	MTJNL 2525 M16-S	LH	TN_1604	25	25	32	150	28
028563	MTJNR 2020 K16-S	RH	TN_1604	20	20	25	125	28
028564	MTJNR 2525 M16-S	RH	TN_1604	25	25	32	150	28
028560	MTJNL 2525 M22-S	LH	TN_2204	25	25	32	150	34
028562	MTJNL 3232 P22-S	LH	TN_2204	32	32	40	170	34
028566	MTJNR 2525 M22-S	RH	TN_2204	25	25	32	150	34
028568	MTJNR 3232 P22-S	RH	TN_2204	32	32	40	170	34



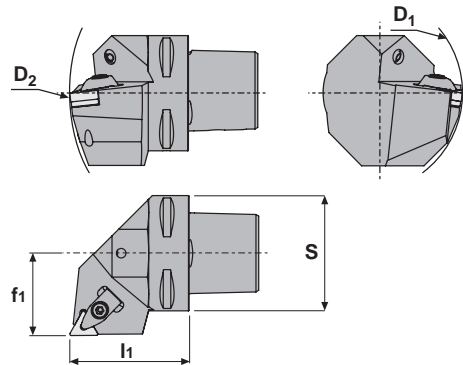
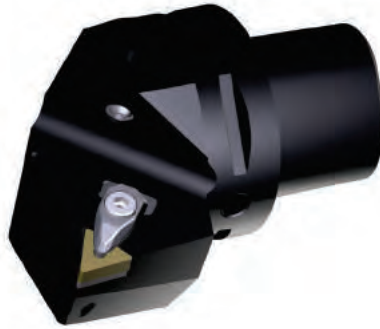
M Style External Toolholder
 Negative Inserts: TN_1604, & TN_2204
 Application:- Turn O/D
 Axial Approach 93°
 Axial -6°
 Radial -6°
 Profiling Clearance Angle $\beta = 24^\circ$
 RH Holder Shown

MTJNL/R Spare Parts												
Item Description	Clamp Screw EDP	Clamp EDP	Clamp Key EDP	Lock Pin EDP	Lock Pin Key EDP	Anvil EDP						
MTJNL/R 2020 K16-S	028575	1086	034490	CL2613	018286	KH5003	034511	1665	028578	KH5002	001714	ITSN323
MTJNL/R 2525 M16-S												
MTJNL/R 2525 M22-S												
MTJNL/R 3232 P22-S												
									018285	KH5025	001689	ITSN433



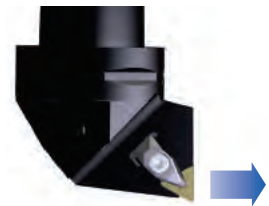
Turning Inserts

DTGN 90°



DTGN LH & RH External PSC Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				S	D1	D2	f1	l1
033701	C5-50-DTGNL35060-16	LH	TN_1604	50	110	165	35	60
033702	C5-50-DTGNR35060-16	RH	TN_1604	50	110	165	35	60
033703	C6-63-DTGNL45065-16	LH	TN_1604	63	110	190	45	65
033704	C6-63-DTGNR45065-16	RH	TN_1604	63	110	190	45	65



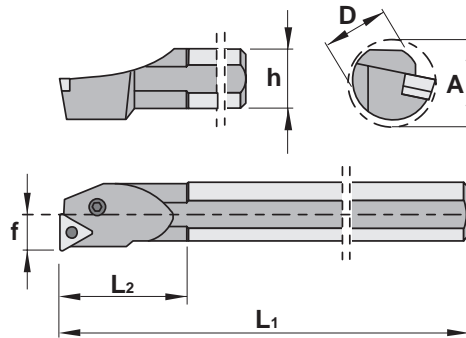
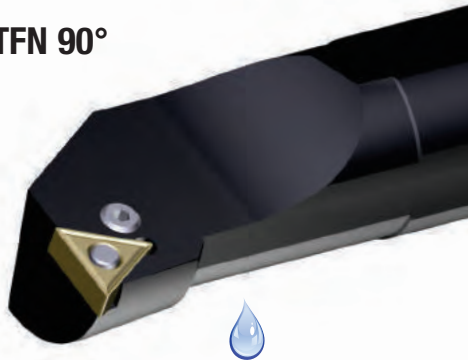
D Style External Toolholder
for Negative Inserts:
TN_1604
Application: External Turn O/D
Approach 90°
Axial -6°
Radial -6°
Profiling Clearance Angle $\beta = 0^\circ$
RH Holder Shown

C, DTGNL/R Spare Parts

Item Description	Clamp EDP	Clamp Screw EDP	Anvil EDP	Anvil Screw EDP	Clamp Spring EDP	Screw Key EDP						
C5-50-DTGNL/R 35060-16	033709	2708	033711	1695	033714	ITSN342	033718	1764	033720	4294	018286	KH5003
C6-63-DTGNL/R 45065-16												



A..PTFN 90°



Turning Inserts

A..PTFN LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)						
				Min Bore Ø A	ØD	f	L1	L2	h	Through Coolant
028710	A25R PTFNL 16	LH	TN_1604	31	25	17	200	42	23	
028711	A32S PTFNL 16	LH	TN_1604	39	32	22	250	45	30	
028713	A25R PTFNR 16	RH	TN_1604	31	25	17	200	42	23	
028714	A32S PTFNR 16	RH	TN_1604	39	32	22	250	45	30	
028712	A40T PTFNL 22	LH	TN_2204	48	40	27	300	50	37	
028715	A40T PTFNR 22	RH	TN_2204	48	40	27	300	50	37	



P Style Internal Boring Bar
for Negative Inserts:
TN_1604 & TN_2204
Application: I/D Boring
Axial Approach =90°
Axial -6°
Radial -11°
Profiling Clearance Angle $\beta = 0^\circ$
RH Bar Shown

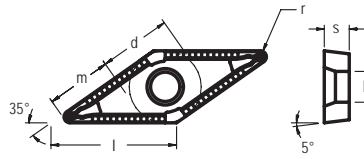
A..PTFNL/R Spare Parts

Item Description	Lever EDP	Lever Screw EDP	Anvil EDP	Anvil Clip EDP	Clip Punch EDP	Key EDP						
A25R PTFNL/R 16	022652	PL8216	028741	PLS1605	-	-	028578	KH5002				
A32S PTFNL/R 16	017442	PL8009	017447	PLS1606	017463	PA3416	034503	PC4109	028053	PCP0009	018285	KH5025
A40T PTFNL/R 22	017443	PL8012	017448	PLS1608	017464	PA3422	017453	PC4112	028054	PCP0012	018286	KH5003



Turning Inserts

VBGT
-62 Geometry



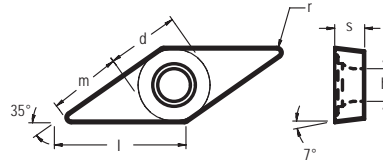
EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
031665	VBGT160402E-62	SP4019	9,53	16,60	6,35	0,20	4,40		Finishing
031666	VBGT160404E-62	SP4019	9,53	16,60	6,35	0,40	4,40		Finishing
031667	VBGT160408E-62	SP4019	9,53	16,60	6,35	0,80	4,40		Finishing

For Toolholders External: see pages C146 - C151 | Internal: see pages C152 - C154

Material Guide – Key to Recommended Inserts

Material Designation

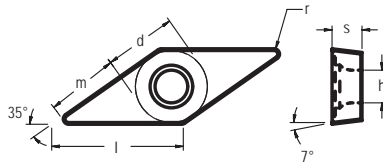
Unalloyed Steels
 Alloyed Steels
 Stainless Steels
 PH Stainless
 Cast Irons
 Aluminum & Alloys
 High Temp. Alloys
 Hard Materials


VCGT
M Geometry


Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032852	VCGT130301F-M	GH1	7,94	13,80	3,97	0,10	3,40		Medium
034463	VCGT130301E-M	SP4019	7,94	13,80	3,97	0,10	3,40		Medium
032854	VCGT130302F-M	GH1	7,94	13,80	3,97	0,20	3,40		Medium
034461	VCGT130302E-M	SP4019	7,94	13,80	3,97	0,20	3,40		Medium
032856	VCGT130304F-M	GH1	7,94	13,80	3,97	0,40	3,40		Medium
034462	VCGT130304E-M	SP4019	7,94	13,80	3,97	0,40	3,40		Medium

For Toolholders External: see pages C146, C149 - C151 | Internal: see pages C153 - C154

VCGT & VCGX
-62 Geometry


EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
031608	VCGX1103005E-62	SP4019	6,35	10,07	3,18	0,05	2,80		Finishing
031609	VCVT110301E-62	SP4019	6,35	10,07	3,18	0,10	2,80		Finishing
031610	VCVT110302E-62	SP4019	6,35	10,07	3,18	0,20	2,80		Finishing
031611	VCVT110304E-62	SP4019	6,35	10,07	3,18	0,40	2,80		Finishing
030594	VCVT130301E-62	SP4019	7,94	13,80	3,18	0,10	3,40		Finishing
030595	VCVT130302E-62	SP4019	7,94	13,80	3,18	0,20	3,40		Finishing
030596	VCVT130304E-62	SP4019	7,94	13,80	3,18	0,40	3,40		Finishing

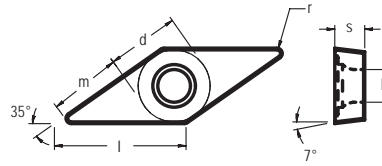
For Toolholders External: see pages C146, C149 - C151 | Internal: see pages C153 - C154

Material Guide – Key to Recommended Inserts
Material Designation



Turning Inserts

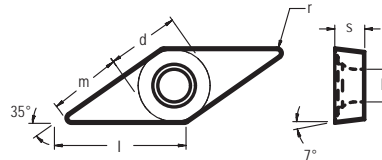
VCGT
-64 Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
014071	VCGT160408F-64	GH1	9,53	16,60	4,76	0,80	4,40		Finishing

For Toolholders External: see pages C146, C149 - C151 | Internal: see pages C153 - C154

VCGT
-66 Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
027453	VCGT130302F-66	GH1	7,94	13,80	3,18	0,20	3,40		Finishing
027454	VCGT130304F-66	GH1	7,94	13,80	3,18	0,40	3,40		Finishing
027455	VCGT130308F-66	GH1	7,94	13,80	3,18	0,80	3,40		Finishing

For Toolholders External: see pages C146, C149 - C151 | Internal: see pages C153 - C154

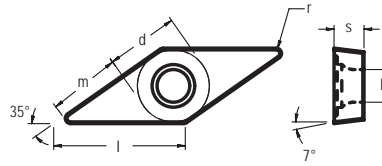
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



VCMT
M Geometry



Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032858	VCMT160404E-M	GH1	9,53	16,60	4,76	0,40	4,40		Medium
032276	VCMT160404E-M	SP4019	9,53	16,60	4,76	0,40	4,40		Medium
032859	VCMT160408E-M	GH1	9,53	16,60	4,76	0,80	4,40		Medium
032282	VCMT160408E-M	SP4019	9,53	16,60	4,76	0,80	4,40		Medium

For Toolholders External: see pages C146, C149 - C151 | Internal: see pages C153 - C154

Material Guide – Key to Recommended Inserts

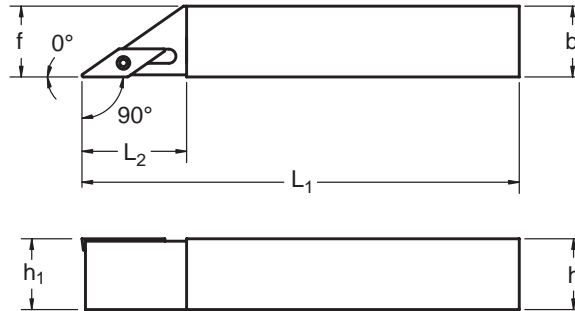
Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



Turning Inserts

SVAC 90°



SVAC LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
033593	SVACL 1010 M11	LH	VC_1103	10	10	10	150	-
033594	SVACL 1212 M11	LH	VC_1103	12	12	12	150	-
033595	SVACL 1616 M11	LH	VC_1103	16	16	16	150	-
033596	SVACR 1010 M11	RH	VC_1103	10	10	10	150	-
033597	SVACR 1212 M11	RH	VC_1103	12	12	12	150	-
033598	SVACR 1616 M11	RH	VC_1103	16	16	16	150	-
025092	SVACL 1010 M13	LH	VC_1303	10	10	10	150	30
025094	SVACL 1212 M13	LH	VC_1303	12	12	12	150	30
025096	SVACL 1616 M13	LH	VC_1303	16	16	16	150	30
025098	SVACL 2020 K13	LH	VC_1303	20	20	20	125	30
025091	SVACR 1010 M13	RH	VC_1303	10	10	10	150	30
025093	SVACR 1212 M13	RH	VC_1303	12	12	12	150	30
025095	SVACR 1616 M13	RH	VC_1303	16	16	16	150	30
025097	SVACR 2020 K13	RH	VC_1303	20	20	20	125	30



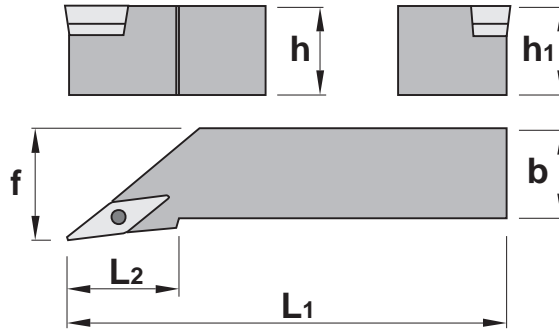
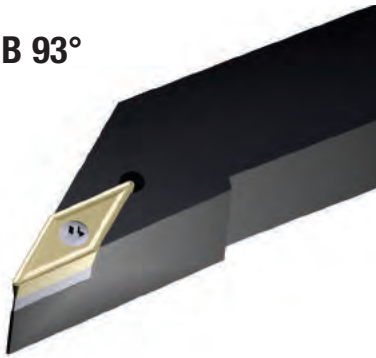
S Style External Toolholder
Positive Inserts VC_1103, and VC_1303
Application: O/D Profiling
Approach 90°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 52^\circ$
RH Holder Shown

SVACL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SVACL/R 1010 M11	15061	F2507T	18488	T7	-	-	-	-
SVACL/R 1212 M11								
SVACL/R 1616 M11								
SVACL/R 1010 M13	15063	F3008T	013214	T9	-	-	-	-
SVACL/R 1212 M13								
SVACL/R 1616 M13								
SVACL/R 2020 K13								



SVJB 93°



Turning Inserts



SVJB LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
028641	SVJBL 2020 K16	LH	VB_1604	20	20	25	125	34
028642	SVJBL 2525 M16	LH	VB_1604	25	25	32	150	34
028644	SVJBR 2020 K16	RH	VB_1604	20	20	25	125	34
028645	SVJBR 2525 M16	RH	VB_1604	25	25	32	150	34



S Style External Toolholder
for Positive Inserts: VB_1604
Application: O/D Profiling
Approach 93°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 49^\circ$
RH Holder Shown

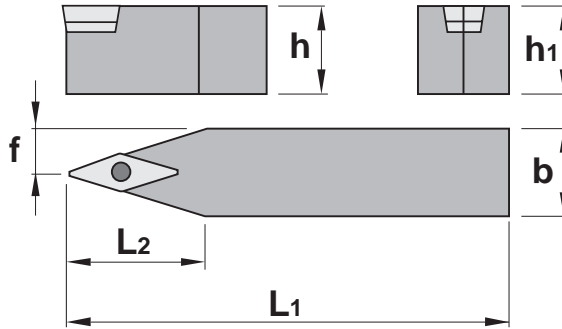
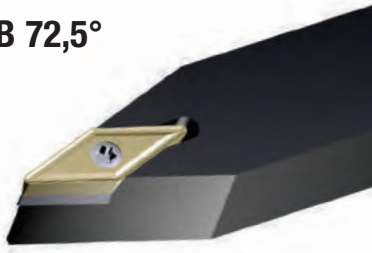
SVJBL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SVJBL/R 2020 K16	034497	1335	028475	K5516	028740	SA3718	028478	SAS1750
SVJBL/R 2525 M16								



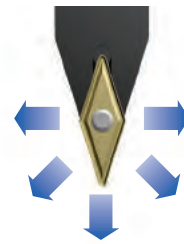
Turning Inserts

SVVB 72,5°



SVVB Neutral External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
033599	SVVBN 2020 K16	Neutral	VB_1604	20	20	10	125	-
033600	SVVBN 2525 M16	Neutral	VB_1604	25	25	12,5	150	-



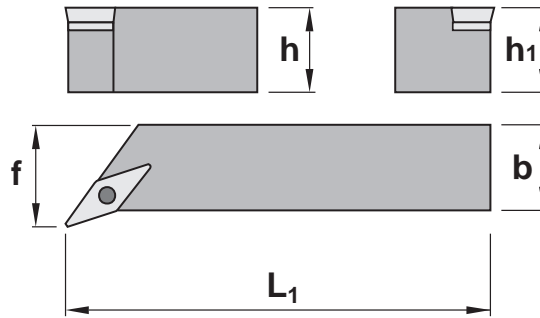
S Style External Toolholder
for Positive Inserts: VB_1604
Application: O/D Profiling
Approach 72,5°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 69,5^\circ$
Neutral Holder Shown

SVVBL N Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SVVBN 2020 K16	034497	1335	028475	K5516	028740	SA3718	028478	SAS1750
SVVBN 2525 M16								



SVHC 107,5°



Turning Inserts

SVHC LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
028635	SVHCL 2020 K16	LH	VC_1604	20	20	25	125	-
028636	SVHCL 2525 M16	LH	VC_1604	25	25	32	150	-
033607	SVHCL 3225 P16	LH	VC_1604	32	25	32	170	-
028638	SVHCR 2020 K16	RH	VC_1604	20	20	25	125	-
028639	SVHCR 2525 M16	RH	VC_1604	25	25	32	150	-
033608	SVHCR 3225 P16	RH	VC_1604	32	25	32	170	-



S Style External Toolholder
for Positive Inserts: VC_1604
Application: O/D and Face Profiling
Approach 107,5°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 44,5^\circ$
RH Holder Shown

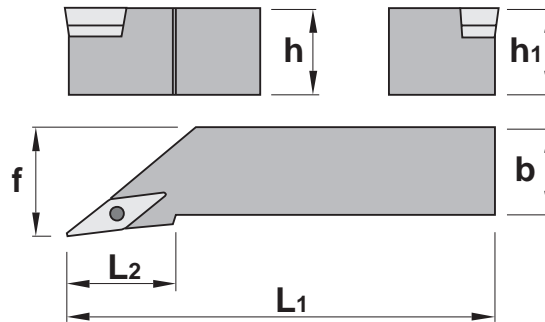
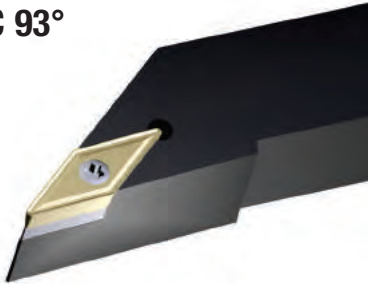
SVHCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SVHCL/R 2020 K16	034497	1335	028475	K5516	028740	SA3718	028478	SAS1750
SVHCL/R 2525 M16								
SVHCL/R 3232 P16								



Turning Inserts

SVJC 93°



SVJC LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
033615	SVJCL 1010 M11	LH	VC_1103	10	10	10	150	-
033616	SVJCL 1212 M11	LH	VC_1103	12	12	12	150	-
033617	SVJCL 1616 M11	LH	VC_1103	16	16	16	150	-
033618	SVJCL 2020 K11	LH	VC_1103	20	20	25	125	25
033619	SVJCR 1010 M11	RH	VC_1103	10	10	10	150	-
033620	SVJCR 1212 M11	RH	VC_1103	12	12	12	150	-
033621	SVJCR 1616 M11	RH	VC_1103	16	16	16	150	-
033622	SVJCR 2020 K11	RH	VC_1103	20	20	25	125	25
018330	SVJCL 1212 F13	LH	VC_1303	12	12	16	80	26
018331	SVJCL 1616 H13	LH	VC_1303	16	16	20	100	30
018333	SVJCL 2020 K13	LH	VC_1303	20	20	25	125	30
018337	SVJCR 1212 F13	RH	VC_1303	12	12	16	80	26
018338	SVJCR 1616 H13	RH	VC_1303	16	16	20	100	30
018340	SVJCR 2020 K13	RH	VC_1303	20	20	25	125	30
028648	SVJCL 2020 K16	LH	VC_1604	20	20	25	125	34
028649	SVJCL 2525 M16	LH	VC_1604	25	25	32	150	34
028651	SVJCR 2020 K16	RH	VC_1604	20	20	25	125	34
028652	SVJCR 2525 M16	RH	VC_1604	25	25	32	150	34



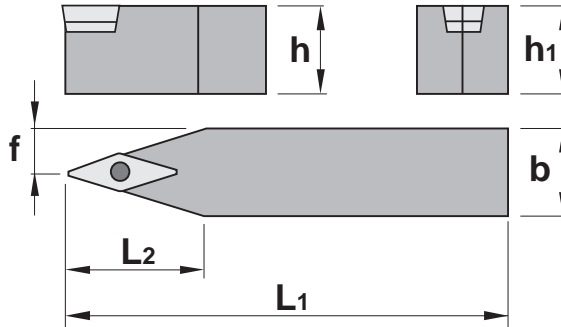
S Style External Toolholder for Positive Inserts:
VC_1103, VC_1303, and VC_1604
Application: O/D Profiling
Approach 93°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 49^\circ$
RH Holder Shown

SVJCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SVJCL/R 1010 M11	015061	F2507T	18488	T7	-	-	-	-
SVJCL/R 1212 M11								
SVJCL/R 1616 M11								
SVJCL/R 2020 K11								
SVJCL/R 1212 F13	015063	F3008T	013214	T9	-	-	-	-
SVJCL/R 1616 H13								
SVJCL/R 2020 K13								
SVJCL/R 2020 K16	034497	1335	028475	K5516	028740	SA3718	028478	SAS1750
SVJCL/R 2525 M16								



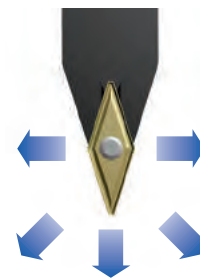
SVVC 72,5°



Turning Inserts

SVVC Neutral External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
033639	SVVCN 1212 M11	Neutral	VC_1103	12	12	6	150	-
033640	SVVCN 1616 M11	Neutral	VC_1103	16	16	8	150	-
033641	SVVCN 2020 K11	Neutral	VC_1103	20	20	10	125	-
018344	SVVCN 1212 F13	Neutral	VC_1303	12	12	6	150	28
018345	SVVCN 1616 H13	Neutral	VC_1303	16	16	8	150	28
018346	SVVCN 2020 K13	Neutral	VC_1303	20	20	10	125	28
028653	SVVCN 2020 K16	Neutral	VC_1604	20	20	10	125	-
028654	SVVCN 2525 M16	Neutral	VC_1604	25	25	12.5	150	-



S Style External Toolholder for Positive Inserts:
VC_1103, VC_1303 and VC_1604
Application: O/D Profiling
Approach 72,5°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 69,5^\circ$
Neutral Holder Shown

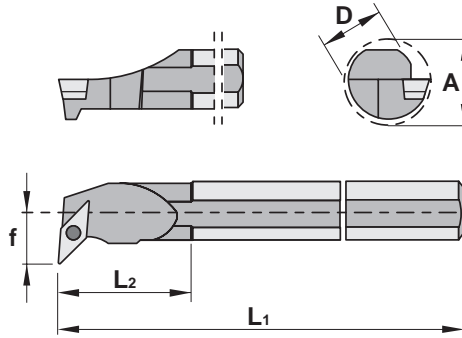
SVVC N Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SVVCN 1212 M11	015061	F2507T	018488	T7	-	-	-	-
SVVCN 1616 M11								
SVVCN 2020 K11								
SVVCN 1212 F13	015063	F3008T	013214	T9	-	-	-	-
SVVCN 1616 H13								
SVVCN 2020 K13								
SVVCN 2020 K16	034497	1335	028475	K5516	028740	SA3718	028478	SAS1750
SVVCN 2525 M16								



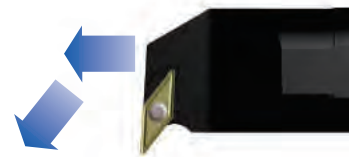
Turning Inserts

SVUB 93°



S.. SVUB LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					Through Coolant
				Min Bore Ø A	ØD	f	L1	L2	
033642	S25R SVUBL 16	LH	VB_1604	31	25	17	300	42	
033643	S32S SVUBL 16	LH	VB_1604	39	32	22	350	45	
033644	S25R SVUBR 16	RH	VB_1604	31	25	17	300	42	
033645	S32S SVUBR 16	RH	VB_1604	39	32	22	350	45	



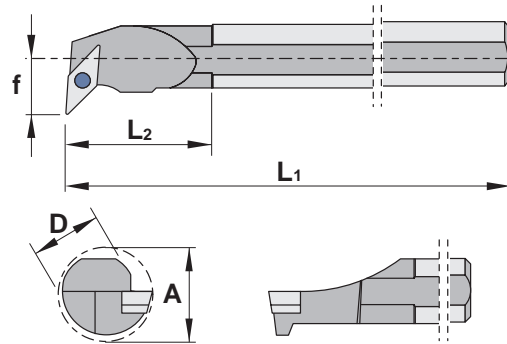
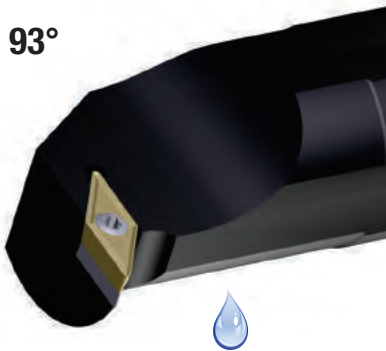
S Style Boring Bar
for Positive Inserts: VB_1604
Application: I/D Profiling
Approach 93°
Axial 0°
Radial -6°
Profiling Clearance Angle $\beta = 49^\circ$
RH Bar Shown

S.. SVUBL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
S25R SVUBL/R 16	015262	D4010T	015240	T15	-	-	-	-
S32S SVUBL/R 16	034497	1335	028475	K5516	028740	SA3718	028478	SAS1750



SVUC 93°



Turning Inserts

A.. SVUC LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					Through Coolant
				Min Bore Ø A	ØD	f	L1	L2	
033650	A16M SVUCL 11	LH	VC_1103	20	16	11	150	31	
033651	A20Q SVUCL 11	LH	VC_1103	25	20	13	180	36	
033652	A16M SVUCR 11	RH	VC_1103	20	16	11	150	31	
033653	A20Q SVUCR 11	RH	VC_1103	25	20	13	180	36	
018443	A20Q SVUCL 13	LH	VC_1303	24	20	13	180	-	
018445	A25S SVUCL 13	LH	VC_1303	31	25	17	259	-	
018444	A20Q SVUCR 13	RH	VC_1303	24	20	13	180	-	
018446	A25S SVUCR 13	RH	VC_1303	31	25	17	259	-	
033654	A25R SVUCL 16	LH	VC_1604	31	25	17	200	42	
033655	A32S SVUCL 16	LH	VC_1604	39	32	22	250	45	
033656	A25R SVUCR 16	RH	VC_1604	31	25	17	200	42	
033657	A32S SVUCR 16	RH	VC_1604	39	32	22	250	45	



S Style Boring Bar
for Positive Inserts:
VC_1103, VC_1303, and VC_1604
Application: I/D Profiling
Approach 93°
Axial 0°
Radial -6°
Profiling Clearance Angle $\beta = 49^\circ$
RH Bar Shown

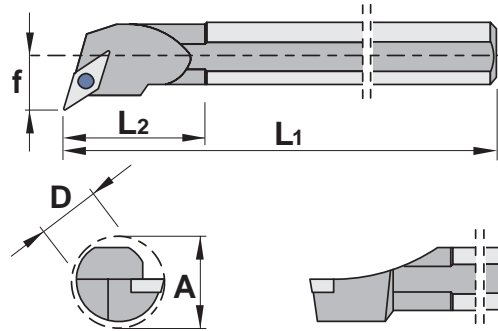
A.. SVUCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
A16M SVUCL/R 11	015061	F2507T	018488	T7	-	-	-	-
A20Q SVUCL/R 11								
A20Q SVUCL/R 13	015063	F3008T	013214	T9	-	-	-	-
A25S SVUCL/R 13								
A25R SVUCL/R 16	034497	1335	028475	K5516	028740	SA3718	028478	SAS1750
A32S SVUCL/R 16								



Turning Inserts

SVQC 107,5°



S.. SVQC LH & RH Internal Boring Bars

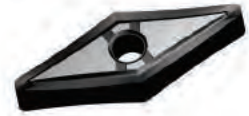
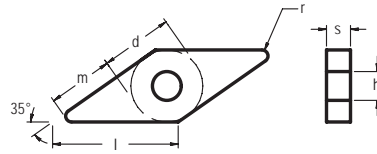
EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					Through Coolant
				Min Bore Ø A	ØD	f	L1	L2	
033668	S16R SVQCL 11	LH	VC_1103	20	16	11	200	31	
033669	S20S SVQCL 11	LH	VC_1103	24	20	13	250	36	
033670	S16R SVQCR 11	RH	VC_1103	20	16	11	200	31	
033671	S20S SVQCR 11	RH	VC_1103	24	20	13	250	36	
033672	S16R SVQCL 13	LH	VC_1303	20	16	11	200	31	
033673	S20S SVQCL 13	LH	VC_1303	24	20	13	250	36	
033674	S16R SVQCR 13	RH	VC_1303	20	16	11	200	31	
033675	S20S SVQCR 13	RH	VC_1303	24	20	13	250	36	
033676	S25T SVQCL 16	LH	VC_1604	31	25	17	300	42	
033677	S25T SVQCR 16	RH	VC_1604	31	25	17	300	42	



S Style Boring Bar
for Positive Inserts:
VC_1103, VC_1303 and VC_1604
Application: I/D Profiling
Approach 107,5°
Axial 0°
Radial -6°
Profiling Clearance Angle $\beta = 34,5^\circ$
RH Bar Shown

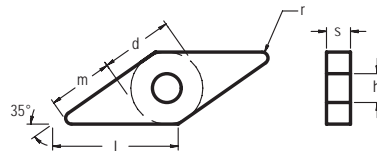
S.. SVQCL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
S16R SVQCL/R 11	015061	F2507T	018488	T7	-	-	-	-
S20S SVQCL/R 11								
S16R SVQCL/R 13	015063	F3008T	013214	T9	-	-	-	-
S20S SVQCL/R 13								
S25T SVQCL/R 16	034497	1335	028475	K5516	028740	SA3718	028478	SAS1750


VNGG
3F Geometry


EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
031549	VNGG160402F-3F	SP0819	9,53	16,60	4,76	0,20	3,81		Medium
031550	VNGG160404F-3F	SP0819	9,53	16,60	4,76	0,40	3,81		Medium
031551	VNGG160408F-3F	SP0819	9,53	16,60	4,76	0,80	3,81		Medium

For Toolholders External: see pages C158 - C160 | Internal: see page C161

VNMG
1B Geometry


EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
030882	VNMG160404E-1B	SP0819	9,53	16,60	4,76	0,40	3,81		Finishing
032860	VNMG160404E-1B	NL250	9,53	16,60	4,76	0,40	3,81		Finishing
032861	VNMG160408E-1B	NL250	9,53	16,60	4,76	0,80	3,81		Finishing
030883	VNMG160408E-1B	SP0819	9,53	16,60	4,76	0,80	3,81		Finishing

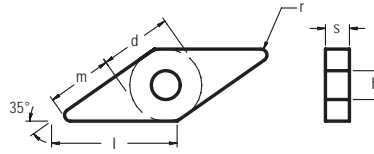
For Toolholders External: see pages C158 - C160 | Internal: see page C161

Material Guide – Key to Recommended Inserts
Material Designation



Turning Inserts

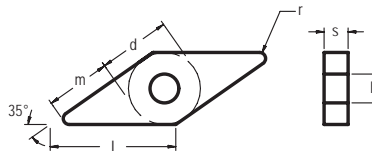
VNMG
2N Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032864	VNMG160404E-2N	NL250	9,53	16,60	4,76	0,40	3,81		Medium
032865	VNMG160404E-2N	NL300	9,53	16,60	4,76	0,40	3,81		Medium
032866	VNMG160404E-2N	NL920	9,53	16,60	4,76	0,40	3,81		Medium
032867	VNMG160408E-2N	NL250	9,53	16,60	4,76	0,80	3,81		Medium
032868	VNMG160408E-2N	NL300	9,53	16,60	4,76	0,80	3,81		Medium
032869	VNMG160408E-2N	NL920	9,53	16,60	4,76	0,80	3,81		Medium

For Toolholders External: see pages C158 - C160 | Internal: see page C161

VNMG
3J Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032873	VNMG160404E-3J	SP4019	9,53	16,60	4,76	0,40	3,81		Medium
032874	VNMG160408E-3J	SP4019	9,53	16,60	4,76	0,80	3,81		Medium

For Toolholders External: see pages C158 - C160 | Internal: see page C161

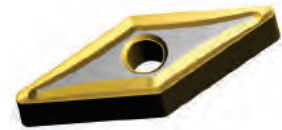
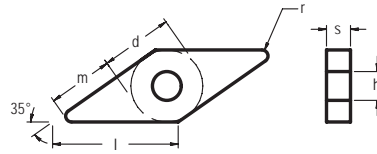
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



VNGG
4E Geometry

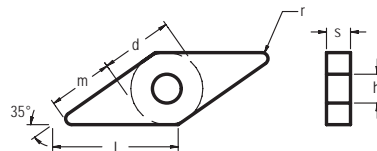


Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
030537	VNMG160404E-4E	SP0819	9,53	16,60	4,76	0,40	3,81		Medium-Roughing
030538	VNMG160408E-4E	SP0819	9,53	16,60	4,76	0,80	3,81		Medium-Roughing

For Toolholders External: see pages C158 - C160 | Internal: see page C161

VNMG
4U Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032875	VNMG160404E-4U	NL200	9,53	16,60	4,76	0,40	3,81		Roughing
032876	VNMG160408E-4U	NL200	9,53	16,60	4,76	0,80	3,81		Roughing

For Toolholders External: see pages C158 - C160 | Internal: see page C161

Material Guide – Key to Recommended Inserts

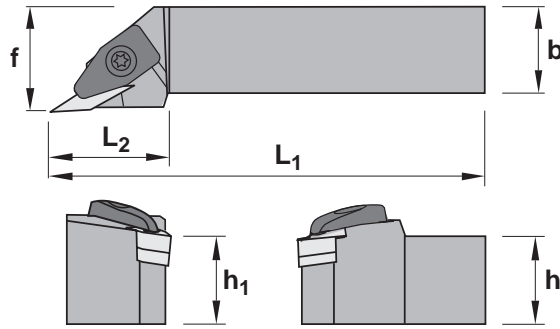
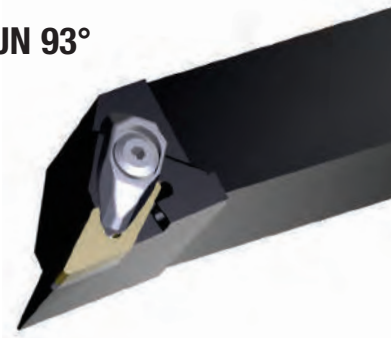
Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



Turning Inserts

DVJN 93°



DVJN LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
033401	DVJNL 2020 K16	LH	VN_1604	20	20	25	125	38
033402	DVJNL 2525 M16	LH	VN_1604	25	25	32	150	38
033403	*DVJNL 3225 P16	LH	VN_1604	32	25	32	170	38
033404	DVJNR 2020 K16	RH	VN_1604	20	20	25	125	38
033405	DVJNR 2525 M16	RH	VN_1604	25	25	32	150	38
033406	*DVJNR 3225 P16	RH	VN_1604	32	25	32	170	38

* Non Stock Items, subject to extended delivery time



D Style External Toolholder
for Negative Inserts: VN_1604
Application: O/D Turn and Profile
Axial Approach 93°
Axial -6°
Radial -6°
Profiling Clearance Angle $\beta = 49^\circ$
RH Holder Shown

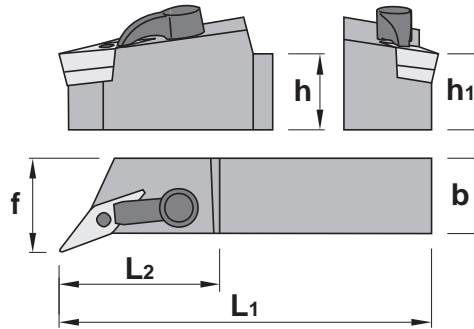
DVJNL/R Spare Parts

Item Description	Clamp Screw EDP	Clamp EDP	Clamp Spring EDP	Anvil EDP	Anvil Screw EDP	Clamp & Anvil Screw Key						
DVJNL/R 2020 K16	033711	1695	033709	DC2708	033720/	4294	001695	IVSN322	033718	1764	018286	KH5003
DVJNL/R 2525 M16												
*DVJNL/R 3225 P16												

* Non Stock Items, subject to extended delivery time



MVQN 117,5°



Turning Inserts

MVQN LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
033413	MVQNL 2020 K16	LH	VN_1604	20	20	25	125	42
033414	MVQNL 2525 M16	LH	VN_1604	25	25	32	150	42
033415	*MVQNL 3225 P16	LH	VN_1604	32	25	32	170	42
033416	MVQNR 2020 K16	RH	VN_1604	20	20	25	125	42
033417	MVQNR 2525 M16	RH	VN_1604	25	25	32	150	42
033418	*MVQNR 3225 P16	RH	VN_1604	32	25	32	170	42

* Non Stock Items, subject to extended delivery time



M Style External Toolholder
for Negative Inserts: VN_1604
Application: Face and Profile Turn
Axial Approach 117,5°
Axial -8°
Radial -10°
Profiling Clearance Angle $\beta = 36,5^\circ$
RH Holder Shown

MVQNL/R Spare Parts

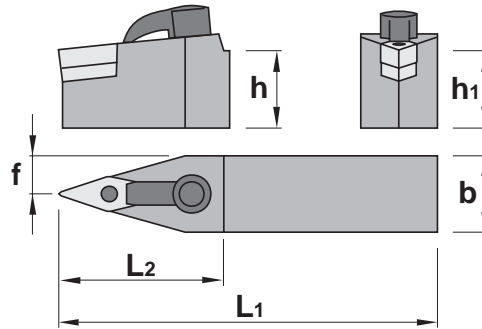
Item Description	Clamp Screw EDP	Clamp EDP	Clamp Key EDP	Lock Pin EDP	Lock Pin Key EDP	Anvil EDP						
MVQNL/R 2020 K16	028575	1086	034492	CL2616	018286	KH5003	034511	1665	028578	KH5002	001695	IVSN322
MVQNL/R 2525 M16												
*MVQNL/R 3225 Q16												

* Non Stock Items, subject to extended delivery time



Turning Inserts

MVVNN 72,5°



MVVNN Neutral External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
028549	MVVNN 2020 K16	Neutral	VN_1604	20	20	10	125	42
028550	MVVNN 2525 M16	Neutral	VN_1604	25	25	12,5	150	42



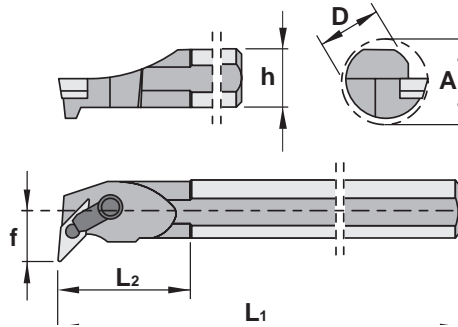
M Style External Toolholder
for Negative Inserts: VN_1604
Application: O/D Plunge and Profile
Axial Approach 72,5°
Axial -6°
Radial 0°
Profiling Clearance Angle $\beta = 69,5^\circ$
Neutral Holder Shown

MVVNNL/R Spare Parts

Item Description	Clamp Screw EDP	Clamp EDP	Clamp Key EDP	Lock Pin EDP	Lock Pin Key EDP	Anvil EDP						
MVVNN 2020 K16	028575	1086	034492	CL2616	018286	KH5003	034511	1665	028578	KH5002	001695	IVSN322
MVVNN 2525 M16												



S..MVUN 93°



Turning Inserts

S..MVUN LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)						
				Min Bore Ø A	ØD	f	L1	L2	h	Through Coolant
033471	S25T MVUNL 16	LH	VN_1604	31	25	17	300	42	23	
033472	S32U MVUNL 16	LH	VN_1604	39	32	22	350	45	30	
033473	S40V MVUNL 16	LH	VN_1604	48	40	27	400	50	37	
033474	S25T MVUNR 16	RH	VN_1604	31	25	17	300	42	23	
033475	S32U MVUNR 16	RH	VN_1604	39	32	22	350	45	30	
033476	S40V MVUNR 16	RH	VN_1604	48	40	27	400	50	37	



M Style External Toolholder
for Negative Inserts: VN_1604
Application: Internal I/D Boring and Profile
Axial Approach 93°
Axial -5°
Radial -15°
Profiling Clearance Angle $\beta = 51^\circ$
RH Bar Shown

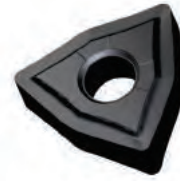
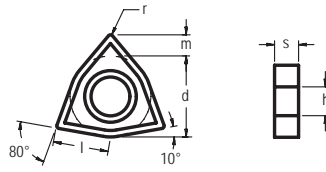
S.. MVUNL/R Spare Parts

Item Description	Clamp Screw EDP	Clamp EDP	Clamp Key EDP	Lock Pin EDP	Lock Pin Key EDP	Anvil EDP						
S25T MVUNL/R 16	034493	1186	034491	CL2614	018286	KH5003	034511	1665	028578	KH5002	001695	IVSN322
S32U MVUNL/R 16	028575	1086										
S40V MVUNL/R 16												



Turning Inserts

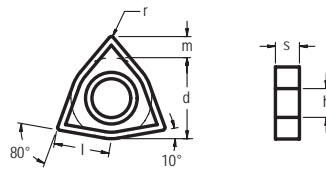
WNGG
3F Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _ε	h		
031552	WNGG080402F-3F	SP0819	12,70	8,69	4,76	0,20	5,16		Medium
031553	WNGG080404F-3F	SP0819	12,70	8,69	4,76	0,40	5,16		Medium
031554	WNGG080408F-3F	SP0819	12,70	8,69	4,76	0,80	5,16		Medium

For Toolholders External: see page C168 | Internal: see page C169

WNGG
Flat Top



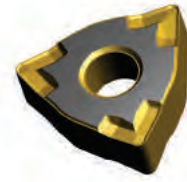
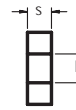
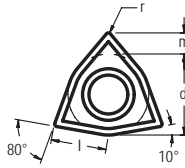
EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _ε	h		
032877	WNMA080408E	NL250	12,70	8,69	4,76	0,80	5,16		Heavy Roughing
032878	WNMA080412E	NL250	12,70	8,69	4,76	1,20	5,16		Heavy Roughing

For Toolholders External: see page C168 | Internal: see page C169

Material Guide – Key to Recommended Inserts

Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials


WNMG
1B Geometry


Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
030884	WNMG060404E-1B	SP0819	9,53	6,52	4,76	0,40	3,81		Finishing
032879	WNMG060408E-1B	NL250	9,53	6,52	4,76	0,80	3,81		Finishing
030885	WNMG060408E-1B	SP0819	9,53	6,52	4,76	0,80	3,81		Finishing
032880	WNMG080404E-1B	NL250	12,70	8,69	4,76	0,40	5,16		Finishing
030886	WNMG080404E-1B	SP0819	12,70	8,69	4,76	0,40	5,16		Finishing
032881	WNMG080408E-1B	NL250	12,70	8,69	4,76	0,80	5,16		Finishing
030887	WNMG080408E-1B	SP0819	12,70	8,69	4,76	0,80	5,16		Finishing
032882	WNMG080412E-1B	NL250	12,70	8,69	4,76	1,20	5,16		Finishing
030888	WNMG080412E-1B	SP0819	12,70	8,69	4,76	1,20	5,16		Finishing

For Toolholders External: see page C168 | Internal: see page C169

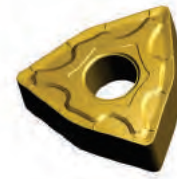
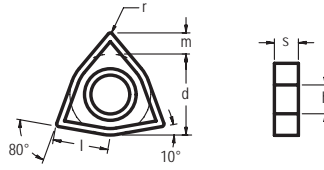
Material Guide – Key to Recommended Inserts
Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



Turning Inserts

WNMG
2N Geometry



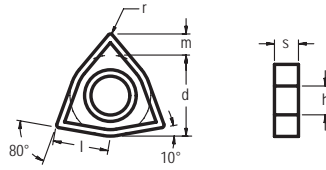
EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032884	WNMG060404E-2N	NL250	9,53	6,52	4,76	0,40	3,81		Medium
032885	WNMG060408E-2N	NL300	9,53	6,52	4,76	0,80	3,81		Medium
032886	WNMG060408E-2N	NL920	9,53	6,52	4,76	0,80	3,81		Medium
032887	WNMG080404E-2N	NL250	12,70	8,69	4,76	0,40	5,16		Medium
032888	WNMG080404E-2N	NL300	12,70	8,69	4,76	0,40	5,16		Medium
032889	WNMG080404E-2N	NL920	12,70	8,69	4,76	0,40	5,16		Medium
032890	WNMG080408E-2N	NL250	12,70	8,69	4,76	0,80	5,16		Medium
032891	WNMG080408E-2N	NL300	12,70	8,69	4,76	0,80	5,16		Medium
032892	WNMG080408E-2N	NL920	12,70	8,69	4,76	0,80	5,16		Medium
032893	WNMG080412E-2N	NL250	12,70	8,69	4,76	1,20	5,16		Medium
032894	WNMG080412E-2N	NL300	12,70	8,69	4,76	1,20	5,16		Medium
032895	WNMG080412E-2N	NL920	12,70	8,69	4,76	1,20	5,16		Medium
032896	WNMG080416E-2N	NL250	12,70	8,69	4,76	1,60	5,16		Medium
032897	WNMG080416E-2N	NL300	12,70	8,69	4,76	1,60	5,16		Medium
032898	WNMG080416E-2N	NL920	12,70	8,69	4,76	1,60	5,16		Medium

For Toolholders External: see page C168 | Internal: see page C169

Material Guide – Key to Recommended Inserts

Material Designation

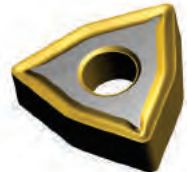
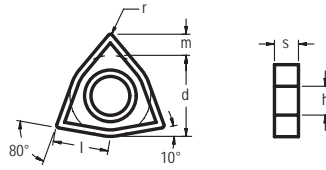
- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials


WNMG
 3J Geometry


Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032899	WNMG060404E-3J	SP4019	9,53	6,52	4,76	0,40	3,81		Medium
032900	WNMG060408E-3J	SP4019	9,53	6,52	4,76	0,80	3,81		Medium
032901	WNMG080404E-3J	SP4019	12,70	8,69	4,76	0,40	5,16		Medium
032902	WNMG080408E-3J	SP4019	12,70	8,69	4,76	0,80	5,16		Medium
032903	WNMG080412E-3J	SP4019	12,70	8,69	4,76	1,20	5,16		Medium

For Toolholders External: see page C168 | Internal: see page C169

WNMG
 4E Geometry


EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
030519	WNMG060404E-4E	SP0819	9,53	6,52	4,76	0,40	3,81		Medium-Roughing
030520	WNMG060408E-4E	SP0819	9,53	6,52	4,76	0,80	3,81		Medium-Roughing
031183	WNMG060412E-4E	SP0819	9,53	6,52	4,76	1,20	3,81		Medium-Roughing
030521	WNMG080404E-4E	SP0819	12,70	8,69	4,76	0,40	5,16		Medium-Roughing
032904	WNMG080404E-4E	NL400	12,70	8,69	4,76	0,40	5,16		Medium-Roughing
030522	WNMG080408E-4E	SP0819	12,70	8,69	4,76	0,80	5,16		Medium-Roughing
032905	WNMG080408E-4E	NL400	12,70	8,69	4,76	0,80	5,16		Medium-Roughing
032906	WNMG080412E-4E	NL400	12,70	8,69	4,76	1,20	5,16		Medium-Roughing
030523	WNMG080412E-4E	SP0819	12,70	8,69	4,76	1,20	5,16		Medium-Roughing

For Toolholders External: see page C168 | Internal: see page C169

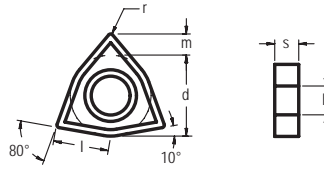
Material Guide – Key to Recommended Inserts
Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



Turning Inserts

WNMG
4T Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
034458	WNMG060408E-4T	NL300	9,53	6,52	4,76	0,80	3,81		Roughing
034459	WNMG060408E-4T	NL920	9,53	6,52	4,76	0,80	3,81		Roughing
032909	WNMG060412E-4T	NL300	9,53	6,52	4,76	1,20	3,81		Roughing
032910	WNMG060412E-4T	NL920	9,53	6,52	4,76	1,20	3,81		Roughing
032911	WNMG080408E-4T	NL250	12,70	8,69	4,76	0,80	5,16		Roughing
032912	WNMG080408E-4T	NL300	12,70	8,69	4,76	0,80	5,16		Roughing
032913	WNMG080408E-4T	NL400	12,70	8,69	4,76	0,80	5,16		Roughing
032914	WNMG080408E-4T	NL920	12,70	8,69	4,76	0,80	5,16		Roughing
032915	WNMG080412E-4T	NL250	12,70	8,69	4,76	1,20	5,16		Roughing
032916	WNMG080412E-4T	NL300	12,70	8,69	4,76	1,20	5,16		Roughing
032917	WNMG080412E-4T	NL400	12,70	8,69	4,76	1,20	5,16		Roughing
032918	WNMG080412E-4T	NL920	12,70	8,69	4,76	1,20	5,16		Roughing
032919	WNMG080416E-4T	NL300	12,70	8,69	4,76	1,60	5,16		Roughing
032920	WNMG080416E-4T	NL400	12,70	8,69	4,76	1,60	5,16		Roughing
032921	WNMG080416E-4T	NL920	12,70	8,69	4,76	1,60	5,16		Roughing

For Toolholders External: see page C168 | Internal: see page C169

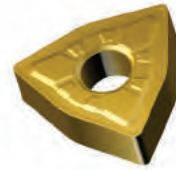
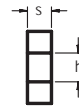
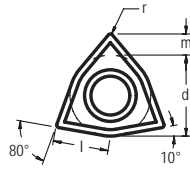
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



WNMG
4U Geometry



Turning Inserts

EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032922	WNMG080408E-4U	NL200	12,70	8,69	4,76	0,80	5,16		Roughing
032923	WNMG080412E-4U	NL200	12,70	8,69	4,76	1,20	5,16		Roughing

For Toolholders External: see page C168 | Internal: see page C169

Material Guide – Key to Recommended Inserts

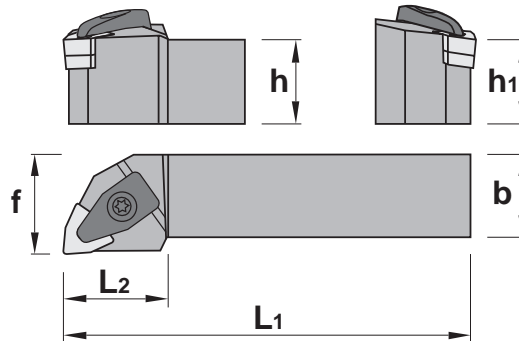
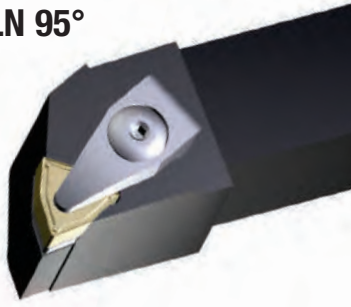
Material Designation

- P Unalloyed Steels
- P Alloyed Steels
- M Stainless Steels
- M PH Stainless
- K Cast Irons
- N Aluminum & Alloys
- S High Temp. Alloys
- H Hard Materials



Turning Inserts

DWLN 95°



DWLN LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
033430	DWLN _L 2020 K06	LH	WN_0604	20	20	25	125	25
033431	DWLN _L 2525 M06	LH	WN_0604	25	25	32	150	25
033432	DWLN _R 2020 K06	RH	WN_0604	20	20	25	125	25
033433	DWLN _R 2525 M06	RH	WN_0604	25	25	32	150	25
033434	DWLN _L 2020 K08	LH	WN_0804	20	20	25	125	34
033435	DWLN _L 2525 M08	LH	WN_0804	25	25	32	150	34
033436	DWLN _L 3232 P08	LH	WN_0804	32	32	40	170	34
033437	DWLN _R 2020 K08	RH	WN_0804	20	20	25	125	34
033438	DWLN _R 2525 M08	RH	WN_0804	25	25	32	150	34
033439	DWLN _R 3232 P08	RH	WN_0804	32	32	40	170	34



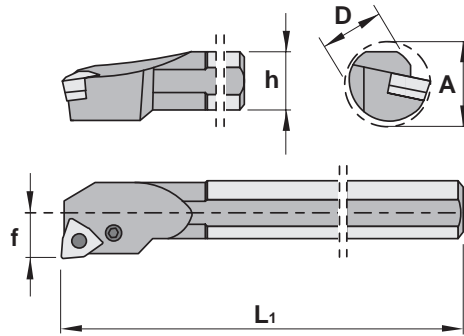
D Style External Toolholder
for Negative Inserts:
WN_0604, & WN_0804
Application: O/D Face and Turn
Axial Approach 95°
Axial -6°
Radial -6°
Profiling Clearance Angle $\beta = 0^\circ$
RH Holder Shown

DWLN_L/R Spare Parts

Item Description	Clamp Screw EDP	Clamp EDP	Clamp Spring EDP	Anvil EDP	Anvil Screw EDP	Clamp & Anvil Screw Key						
DWLN _L /R 2020 K06	033711	1695	033709	DC2708	033720	4294	030973	IWSN323	033718	1764	018286	KH5003
DWLN _L /R 2525 M06												
DWLN _L /R 2020 K08	033710	1696	033707	DC2712	033719	4295	009251	IWSN433	033716	1766	018287	KH5004
DWLN _L /R 2525 M08												
DWLN _L /R 3232 P08												



S..PWLN 95°



Turning Inserts

S.. PWLN LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					Through Coolant
				Min Bore Ø A	ØD	f	L1	h	
033450	S16R PWLNL 06	LH	WN_06	20	16	11	200	15	⊘
033451	S20S PWLNL 06	LH	WN_06	27	20	13	250	18	⊘
033452	S25T PWLNL 06	LH	WN_06	31	25	17	300	23	⊘
033453	S16R PWLNR 06	RH	WN_06	20	16	11	200	15	⊘
033454	S20S PWLNR 06	RH	WN_06	27	20	13	250	18	⊘
033455	S25T PWLNR 06	RH	WN_06	31	25	17	300	23	⊘
033456	S25T PWLNL 08	LH	WN_08	31	25	17	300	23	⊘
033457	S32U PWLNL 08	LH	WN_08	39	32	22	350	30	⊘
034457	*S40V PWLNL 08	LH	WN_08	48	40	27	400	37	⊘
033458	S25T PWLNR 08	RH	WN_08	31	25	17	300	23	⊘
033459	S32U PWLNR 08	RH	WN_08	39	32	22	350	30	⊘
033460	*S40V PWLNR 08	RH	WN_08	48	40	27	400	37	⊘



P Style External Toolholder
for Negative Inserts:
WN_0604 & WN_0804
Application:- O/D Face and Turn
Axial Approach 95°
Axial -6°
Raial -13,5°
Profiling Clearance Angle $\beta = 0^\circ$
RH Bar Shown

* Non Stock Items, subject to extended delivery time

S.. PWLNL/R Spare Parts

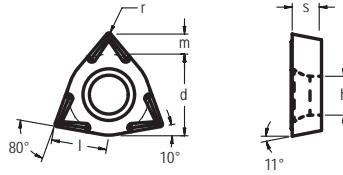
Item Description	Lever EDP	Lever Screw EDP	Anvil EDP	Anvil Clip EDP	Clip Punch EDP	Key EDP
S16R PWLNL/R 06 S20S PWLNL/R 06	022652	PL8216	028741	PLS1605	-	028578
S25T PWLNL/R 06	017442	PL8009	017447	PLS1606	028460	018285
S25T PWLNL/R 08	028047	PL8312	022625	PLS1648	-	-
S32U PWLNL/R 08 *S40V PWLNL/R 08	017443	PL8012	017448	PLS1608	028461	018286

* Non Stock Items, subject to extended delivery time



Turning Inserts

WPMT
61 Geometry



EDP	ISO Description	Grade	Dimensions (mm)					Material	Application
			d	l	s	r _e	h		
032293	WPMT020102E-61	SP4019	3,97	2,92	1,59	0,20	1,95		Finishing
032291	WPMT050304E-61	SP4019	7,94	5,43	3,18	0,40	3,40		Finishing

For Toolholders External: see page C171 | Internal: see page C172

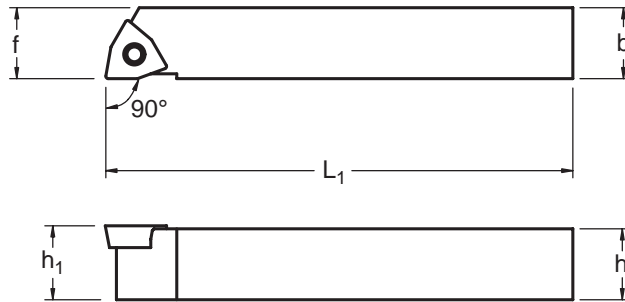
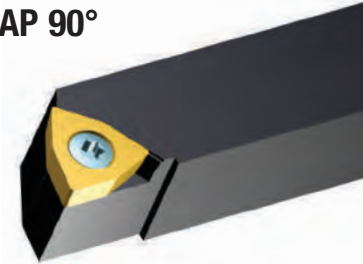
Material Guide – Key to Recommended Inserts

Material Designation

- Unalloyed Steels
- Alloyed Steels
- Stainless Steels
- PH Stainless
- Cast Irons
- Aluminum & Alloys
- High Temp. Alloys
- Hard Materials



SWAP 90°



Turning Inserts

SWAP LH & RH External Square Shank Toolholders

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)				
				h = h ₁	b	f	L ₁	L ₂
025257	SWAPL 1212 F05	LH	WP_05	12	12	12,5	80	-
025256	SWAPR 1212 F05	RH	WP_05	12	12	12,5	80	-



S Style External Toolholder
for Positive Inserts: WPMT_0503
Application: Face & Turn O/D
Approach Angle 90°
Axial 0°
Radial 0°
Profiling Clearance Angle $\beta = 7^\circ$
RH Holder Shown

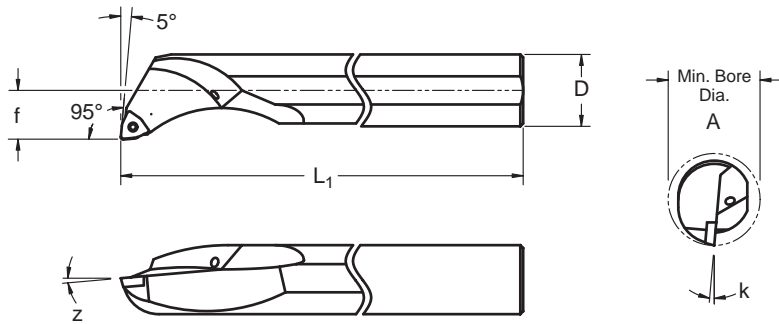
SWAPL/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
SWAPL/R 1212 F09	017032	A3006T	013214	T9	-	-	-	-



Turning Inserts

SWLP 95°



A.. SWLP LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes	Dimensions (mm)					Through Coolant
				Min Bore Ø A	ØD	f	L1	L2	
033688	S06F SWLPL 02	LH	WP_0201	7,50	6,00	3,20	80,00	-	
018450	A08H SWLPL 02	LH	WP_0201	11,00	8,00	6,00	100,00	-	
018451	A10H SWLPL 02	LH	WP_0201	13,00	10,00	7,00	100,00	-	
033689	S06F SWLPR 02	RH	WP_0201	7,50	6,00	3,20	80,00	-	
018327	A08H SWLPR 02	RH	WP_0201	11,00	8,00	6,00	100,00	-	
018328	A10H SWLPR 02	RH	WP_0201	13,00	10,00	7,00	100,00	-	
018453	A12K SWLPL 05	LH	WP_0503	16,00	12,00	9,00	125,00	-	
033690	A12K SWLPR 05	RH	WP_0503	16,00	12,00	9,00	125,00	-	



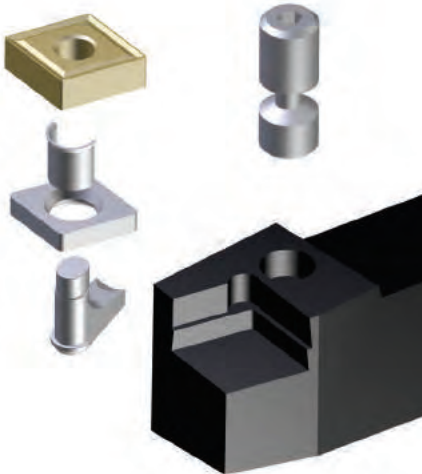
S Style Boring Bar
for Positive Inserts:
WP0503 & WP0201
Application: Facing and Profiling
Approach Angle 95°
Axial 0°
Radial 5°
Profiling Clearance Angle $\beta = 0^\circ$
RH Boring Bar Shown

SWLPL/R Spare Parts

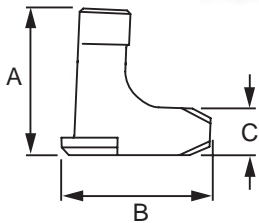
Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
S06F SWLPL/R 02	018489	55F1803T	018487	T6	-	-	-	-
A08H SWLPL/R 02								
A10H SWLPL/R 02								
A12K SWLPL/R 05	017032	A3006T	013214	T9	-	-	-	-



P - Lever Lock (Negative Inserts)



This system has a pivoted lever which tilts when the clamping screw is adjusted pulling the insert back against the pocket walls, for a strong location for the insert, with no obstruction to the chip flow. Also only one key is needed to facilitate the installation and removal of the insert.

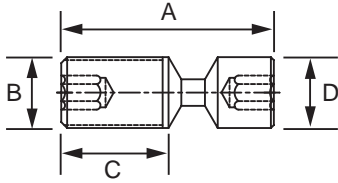


Lever Lock				
EDP	Item Description	Dimensions (mm)		
		A	B	C
017442	PL8009	12	10,2	3,4
017443	PL8012	13,1	13,5	4,2
017445	PL8016	17,1	16,5	5,4
017446	PL8019	20,8	20,4	7,3
028408	PL8025	25,2	25,7	8,2
034475	PL8110	11,7	11	4
034476	PL8112	13,3	13	4,4
034477	PL8116	18	18,6	6,7
034478	PL8120	18,7	20,4	6,7
034479	PL8125	23	24	7,5
028742	PL8212	12,1	13,4	4,7
022652	PL8216	9,5	10,1	3,4
028047	PL8312	13,2	13,5	4,2
017444	PL8415	14,7	16,2	5,1

Turning Inserts



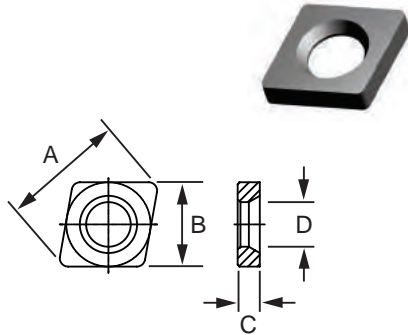
Turning Inserts



Lever Screws					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
028741	PLS1605	12	M5x0,8	6,10	M5x0,8
017447	PLS1606	16,7	M6x1	8,65	M6x1
017448	PLS1608	20,7	M8x1	8,75	M8x1
028409	PLS1612	36	M12x1	17,30	M12x1
017450	PLS1618	22,5	M8X1	11,25	M8X1
017449	PLS1638	21,1	M8X1	10,35	M8X1
022625	PLS1648	17	M8X1	9,1	M8X1
017451	PLS1610	27,2	M10x1	13,35	M10x1
028743	PLS1626	13,4	M6x1	8	M6x1
034480	PLS1705	14	M5x0,8	8,1	M5x0,8
034481	PLS1706	20,7	M6x1	12,65	M6x1
028458	PLS1708	23,5	M8X1	11,25	M8X1
034482	PLS1710	30,4	M10x1	16,35	M10x1

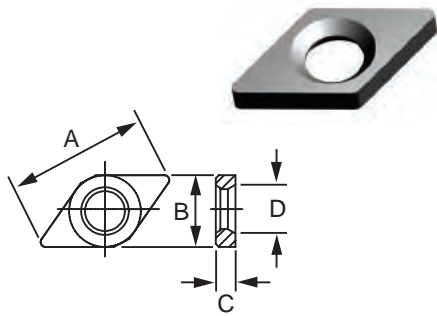


Turning Inserts



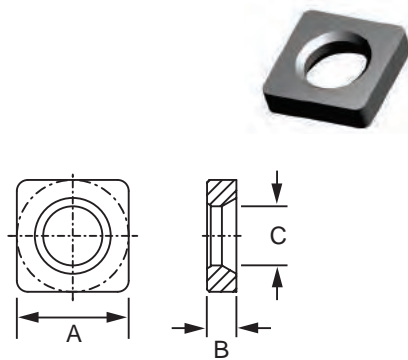
Anvils C-Style

EDP	Item Description	Dimensions (mm)			
		A	B	C	D
017456	PA3612	17,16	11,68	3,18	6,8
017457	PA3616	20,9	10,94	4,76	9,5
034483	PA3625	36	24,9	6,6	12,8



Anvils D-Style

EDP	Item Description	Dimensions (mm)			
		A	B	C	D
028376	PA3711	17	8,5	2,7	4,9
017459	PA3715	23,4	11,6	3,18	6,4

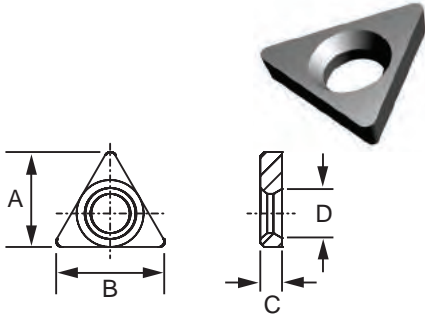


Anvils S-Style

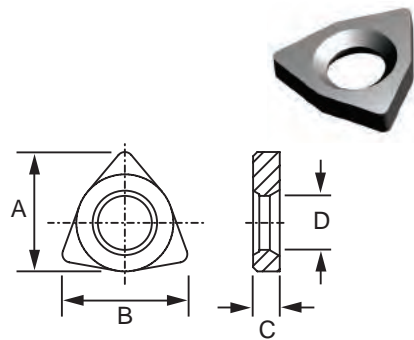
EDP	Item Description	Dimensions (mm)		
		A	B	C
017460	PA3512	11,66	3,18	6,35
017461	PA3515	14,5	4,76	7,9
017462	PA3519	18,1	4,76	7,9
028416	PA3525	24,6	4,76	13



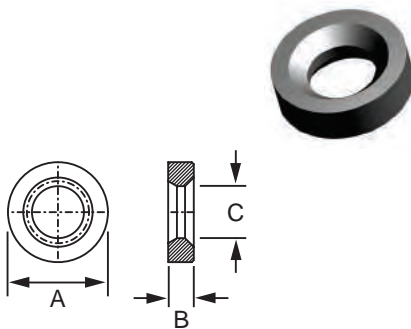
Turning Inserts



Anvils T-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
017463	PA3416	11,98	13,52	2,76	4,9
017464	PA3422	16,6	18,92	3,18	6,4



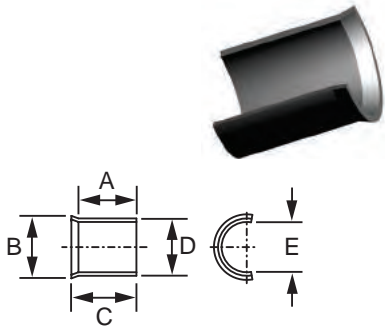
Anvils W-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
028460	PA3007	10,85	11,3	3,18	6,4
028461	PA3008	15,2	15,88	3,18	6,4



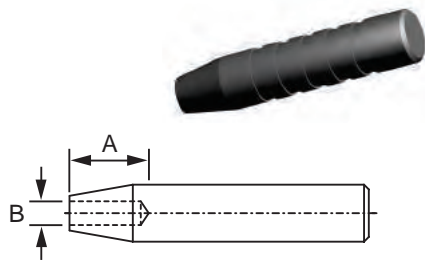
Anvils R-Style				
EDP	Item Description	Dimensions (mm)		
		A	B	C
034484	PA3810	8,34	3,18	4,9
034485	PA3812	9,9	3,18	4,9
034486	PA3816	13,55	4,76	6,4
034487	PA3820	17,25	4,76	8,05
034488	PA3825	21,9	6,35	9,6
034489	PA3925	24,8	6,35	12,9
001670	IRS84	25,15	6,35	14,5



Turning Inserts



Clips						
EDP	Item Description	Dimensions (mm)				
		A	B	C	D	E
034503	PC4109	4,6	5,76	5,2	4,9	4,4
028417	PC4110	6,1	5,6	6,8	4,9	3,8
017453	PC4112	5,2	7	5,8	6,6	5,5
028051	PC4115	7,7	9	8,7	8,2	7
034504	PC4116	8,5	6,82	9,1	6,5	5,4
017455	PC4119	9,8	10,57	11	9,7	8,5
028418	PC4125	9,7	14,7	11,8	13,2	10,5



Clip Fixing Pin			
EDP	Item Description	Dimensions (mm)	
		A	B
028053	PCP009	9	4
028054	PCP0012	9	4,750
034505	PCP0015	12	6,5
028056	PCP0019	12	8
034506	PCP0025	20	12,5

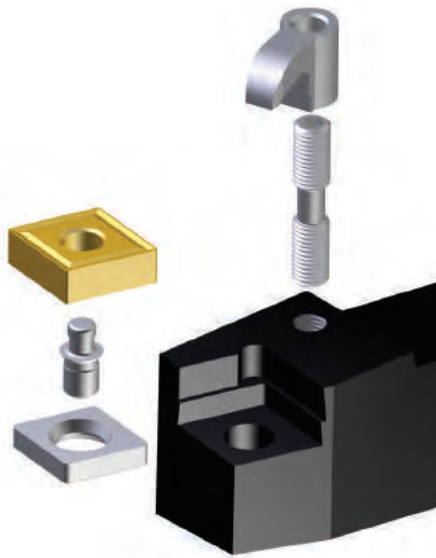


Keys		
EDP	Item Description	mm
028578	KH5002	2
018286	KH5003	3
018287	KH5004	4
018288	KH5005	5
018285	KH5025	2,5

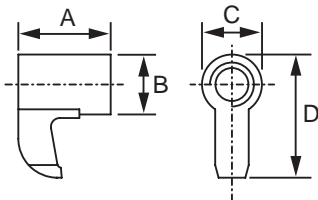


Turning Inserts

M - Clamp Lock (Negative Inserts)



The combination of lock pin and top clamp makes this one of the most secure clamping systems available. The lock pin locates the insert against the pocket wall while the top clamp secures the insert down.

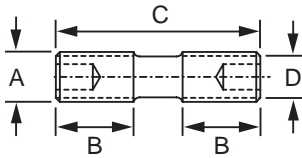


M Style Clamps

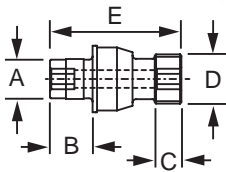
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
030974	CL6	10,90	3,99	7,62	14,73
029071	CL12	16,6	5,99	10,77	22,50
028996	CL20	13	5,31	9,35	18,34
029072	CL22	13,36	5,99	9,35	21,74
029073	CL30	16,84	5,84	10,74	24,64
034490	CL2613	13,5	-	9,5	18,5
034491	CL2614	13,5	-	9,5	21,7
034492	CL2616	13,5	-	9,5	24



Turning Inserts



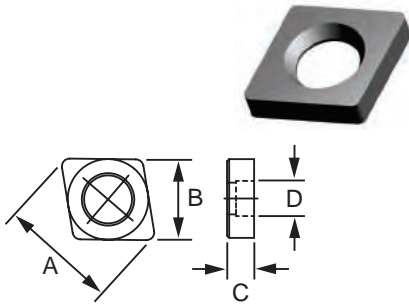
Clamp Screws					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
029074	XNS36	-	6,99	19,17	-
029075	XNS47	-	6,78	20,5	-
028997	XNS48	-	4,6	25,4	-
029076	XNS510	-	5,31	31,7	-
028575	1086	M6x1 (LH)	11,4	29,4	M6x1 (RH)
034493	1186	M6x1 (LH)	7,11	20,50	M6x1 (LH)



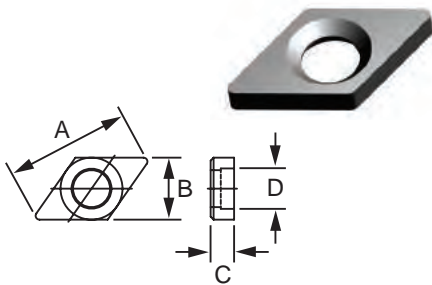
NL Pins						
EDP	Item Description	A	B	C	D	E
		mm	mm	mm	mm	Thread Form
004703	NL33L	5,00	14,71	5,21	6,71	8-32 UNC
004705	NL34L	3,66	13,13	5	2,69	10-32L
004707	NL44	5	13,2	5,4	3,2	1/4-28 UNC
004708	NL46	5	13,2	5,4	3,2	1/4-28 UNC
004710	NL58	6,25	22	6,9	5,3	5/16-24 UNC
004713	NL68	6,25	22	6,9	4,8	3/8-24
004716	NL810	9	29,69	9,8	5,58	7/16-20
034511	1665	3,68	13	5	2,3	M5X0,8



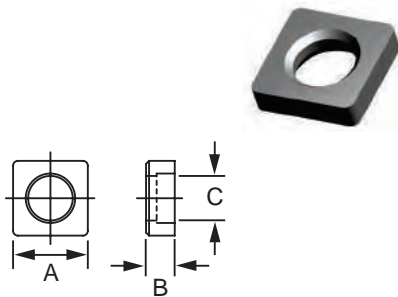
Turning inserts



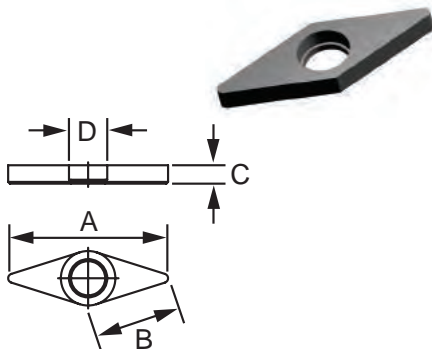
Anvils C-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
029079	ICSN432	18,39	12,45	4,75	7,44
001685	ICSN533	22,94	15,62	4,75	9,78



Anvils D-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
001689	IDSN433	25,07	12,57	4,76	7,47



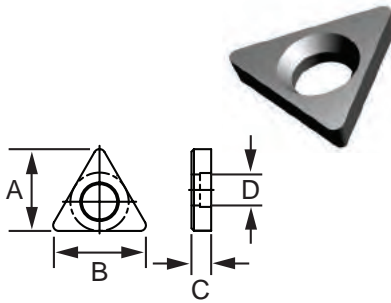
Anvils S-Style				
EDP	Item Description	Dimensions (mm)		
		A	B	C
001704	ISSN433	12,45	4,75	7,49
001707	ISSN533	15,65	4,75	9,83
001709	ISSN633	18,72	4,75	11,38



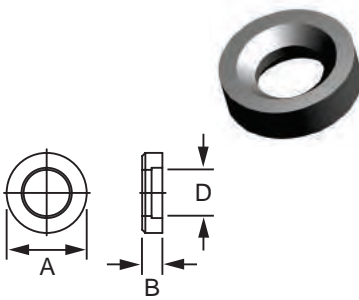
Anvils V-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
001695	IVSN322	28,70	9,19	3,18	5,99



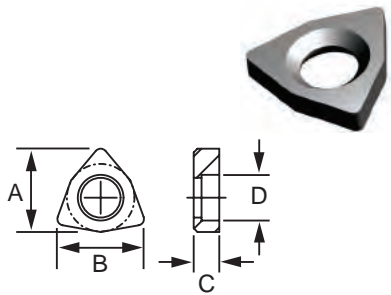
Turning Inserts



Anvils T-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
001714	ITSN323	12,9	14,6	3,18	5,9
001718	ITSN433	17,3	19,7	4,76	7,4



Anvils R-Style				
EDP	Item Description	Dimensions (mm)		
		A	B	C
001670	IRSN84	25,15	6,35	14,5



Anvils W-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
009251	IWSN433	15,34	16,00	4,76	7,416

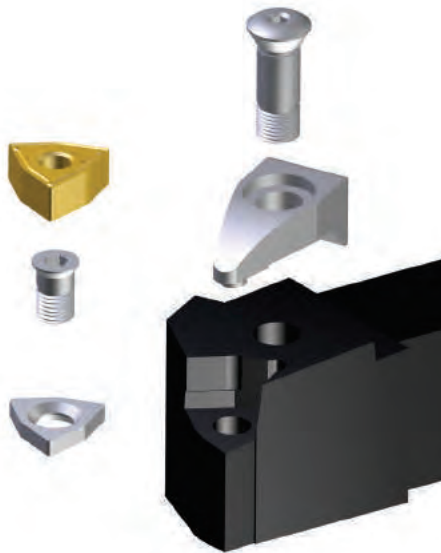


Keys		
EDP	Item Description	mm
028578	KH5002	2
018286	KH5003	3
018285	KH5025	2,5



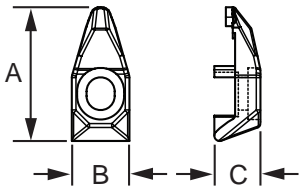
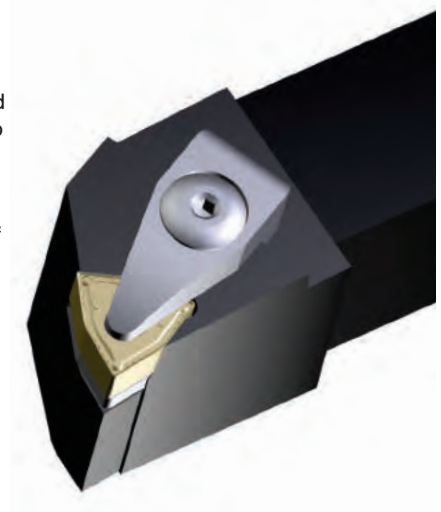
Turning Inserts

D - Dimple Lock (Negative Inserts)



This system combines a pull back pin and top clamp in one, using a wedge action to locate the insert into the pocket, with the clamp screw pulling down on the insert. This clamping method provides a strong and rigid set-up, with the added benefit of only one key for replacement of inserts.

The "D" clamping system ensures zero insert movement during high feed or heavy interrupted machining, due to its accurate positioning that holds the insert securely clamped.

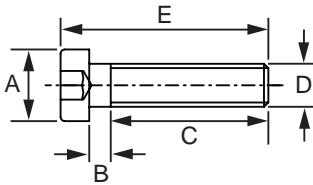


D Style Clamps

EDP	Item Description	Dimensions (mm)		
		A	B	C
034494	DC 2312	28,90	14,00	12,00
033709	DC 2708	24,90	10,90	9,20
033707	DC 2712	29,00	12,50	10,00
034495	DC 2716	33,80	13,00	10,50
033708	DC 2719	35,20	13,50	10,50

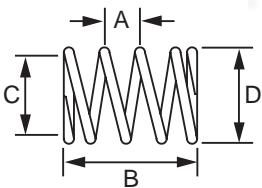


Turning Inserts



Clamp Screws

EDP	Item Description	Dimensions (mm)				
		A	B	C	D	E
033711	1695	8,4	-	20	M5x0,8	23,5
033710	1696	9,8	-	25	M6x1	29
034512	1907	10,7	10,6	14	M7X0,75	27,5

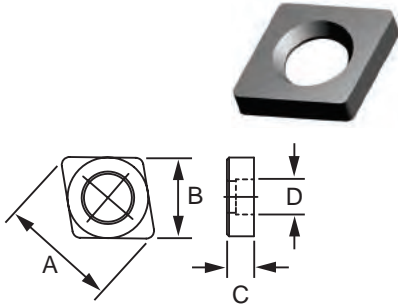


Clamp Spring

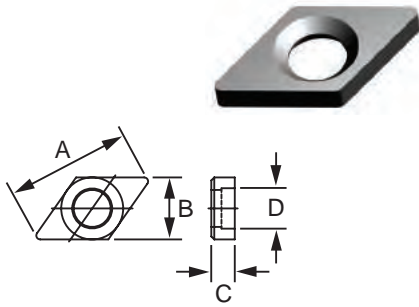
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
033720	4294	3	11,20	5	6,50
033719	4295	3,50	13	7	9,50



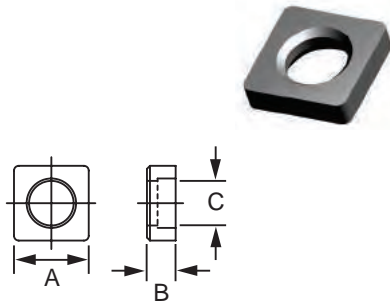
Turning Inserts



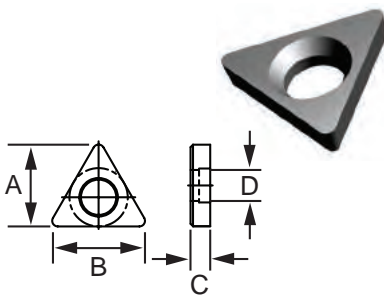
Anvils C-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
017456	PA3612	17,17	11,68	3,18	6,81
029079	ICSN432	18,39	12,45	4,75	7,44
033712	ICSN442	18,39	12,45	6,35	7,44
001685	ICSN533	22,94	15,62	4,75	9,78
001686	ICSN633	25,527	18,8	4,76	11,3



Anvils D-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
034496	IDSN-322	18,72	9,40	3,18	6,48
001689	IDSN-433	25,66	12,57	4,76	7,40



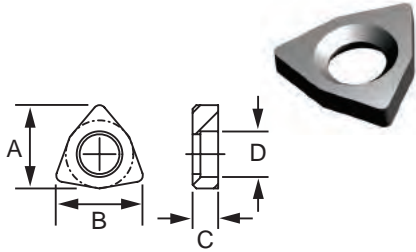
Anvils S-Style				
EDP	Item Description	Dimensions (mm)		
		A	B	C
001704	ISSN433	12,45	4,75	7,49
033715	ISSN442	12,45	6,35	7,49
001707	ISSN533	15,65	4,76	9,83
001709	ISSN633	18,72	4,76	11,38



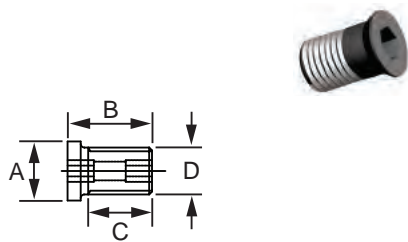
Anvils T-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
033714	ITSN342	12,93	14,63	3,18	5,99



Turning Inserts



Anvils W-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
030973	IWSN323	11,32	11,82	3,18	5,89
009251	IWSN433	15,35	15,95	4,76	7,4



Anvil Screw					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
034507	1160	8	13,5	9,5	M6x1
034508	1161	8	10,5	6,5	M6x1
033718	1764	6,20	9,00	7,60	M5x0,8
029095	1765	7,5	10	6	M6x0,75
033716	1766	7,8	13,0	10,6	1/4 -26
034509	1768	10,5	15,5	13,3	M8x1
033717	1770	11,90	15,00	12,80	3/8 -24



Keys		
EDP	Item Description	mm
018287	KH5004	4
018285	KH5025	2,5
018286	KH5003	3

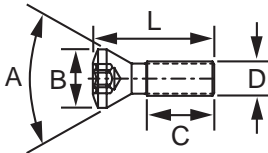


Turning Inserts

S - Screw Lock (Positive Inserts)



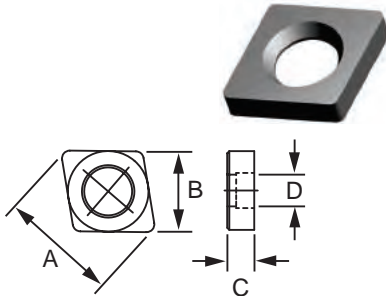
This innovated system was first introduced into the marketplace by Stellram as Posicut® S - Style. Its benefits are secure clamping, repeatability, minimal number of spare parts and no obstruction of the chip flow. Which make this ideal for internal boring bars and places where accessibility is limited.



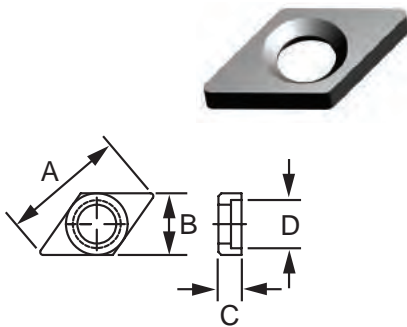
Insert Screws						
EDP	Item Description	Dimensions (mm)				
		A	B	C	L	D
017032	A3006T	48°	4,4	4	6	M3x0,5
023081	A5025T	43°	6,6	6,9	25	M5x0,8
015059	F2004T	43°	3	2,50	4,50	M2x0,4
015060	F2505T	43°	3,8	3,5	5	M2,5x0,45
015061	F2507T	43°	3,8	4	7	M2,5x0,45
015262	D4010T	43°	5,1	5,1	10	M4x0,7
034497	1335	55°	5,30	10,20	15	M3,5x0,6
034498	1425	55°	3,30	3	5,50	M2,5x0,45
034499	1440	55°	5,30	4	7	M4x0,7
034500	1540	60°	6,80	7,90	14,10	M4x0,7
015063	F3008T	48°	4,4	5	8	M3x0,5
018489	55F1803T	55°	2,75	1,60	3,30	M1,8x0,2



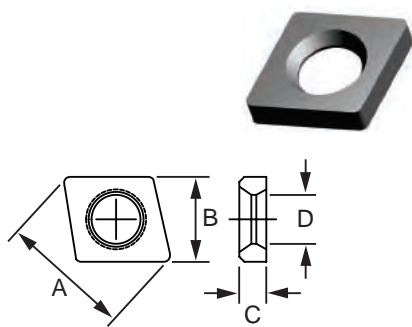
Turning Inserts



Anvils C-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
028571	SA3614	17,40	11,40	39,50	6,50



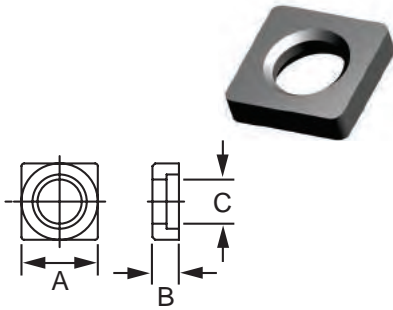
Anvils D-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
028477	SA3714	17,48	8,50	3,18	6,60



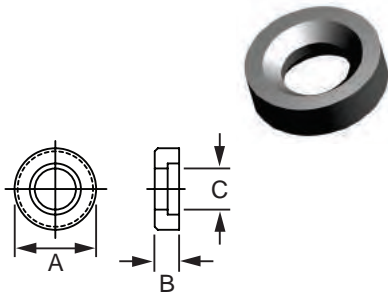
Anvils E-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
029091	SA3712	16,9	11,0	3,18	6,5



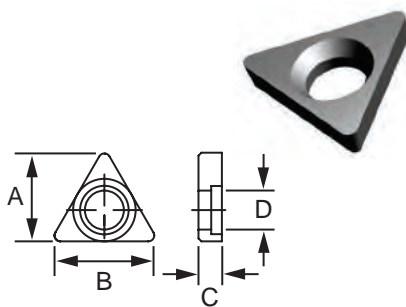
Turning Inserts



Anvils S-Style				
EDP	Item Description	Dimensions (mm)		
		A	B	C
028738	SA3514	11,40	3,96	8,10



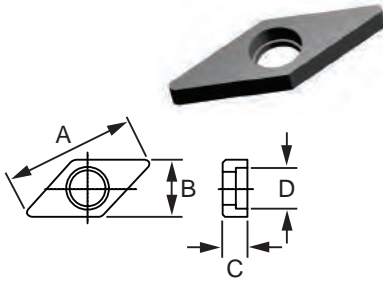
Anvils R-Style				
EDP	Item Description	Dimensions (mm)		
		A	B	C
034501	SA3811	8,80	3,18	6,60
034502	SA3814	10,60	3,18	6,60



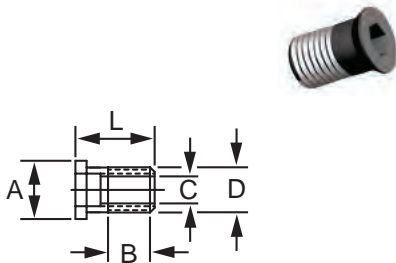
Anvils T-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
028580	SA3414	11,95	13,55	3,18	6,60



Turning Inserts



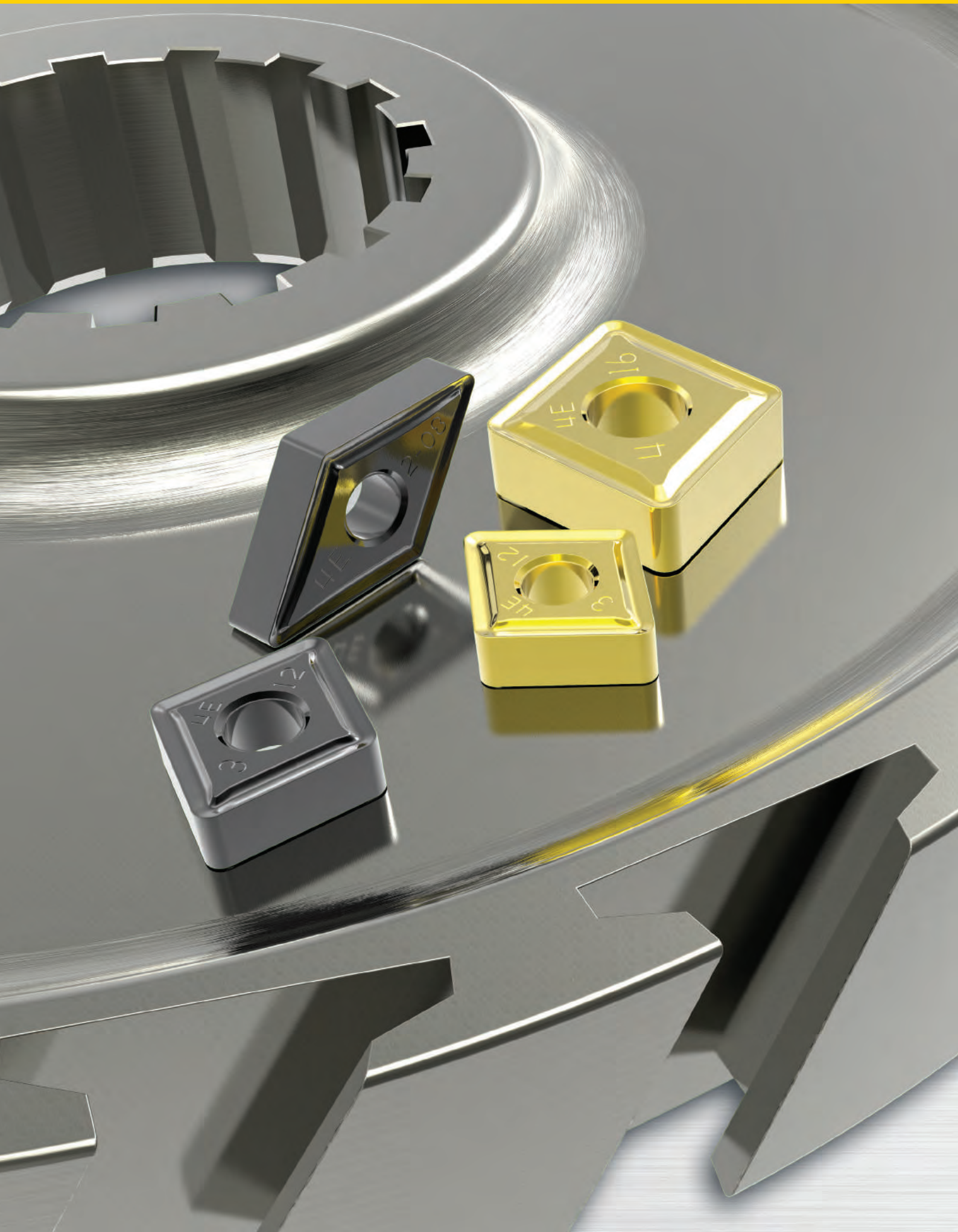
Anvils V-Style					
EDP	Item Description	Dimensions (mm)			
		A	B	C	D
028740	SA3718	26,4	8,4	3,18	5,5



Anvil Screw						
EDP	Item Description	Dimensions (mm)				
		A	B	L	C	D
028478	SAS1750	6,25	5	8,5	M3,5x0,6	M5x0,5
028739	SAS1760	7,60	5,5	10	M4x0,5	M6x0,75
029095	1765	7,5	6	10	M4x0,5	M6x0,75



Torx Driver		
EDP	Item Description	Torx Number
018487	T6	T6
018488	T7	T7
013214	T9	T9
015240	T15	T15
028475	K5516	T16
034577	K5517	T17
015241	T20	T20





All Kennametal's products are supported by a confident technical sales team backed by an extensive customer care policy.

Please contact us for additional information on any of the products illustrated in this catalog or any other part of Kennametal's comprehensive tooling program.

**CUSTOMER SERVICE &
TECHNICAL HELPLINE**


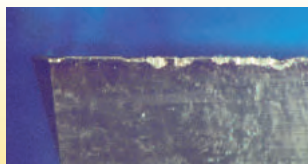

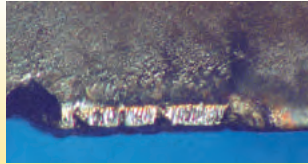


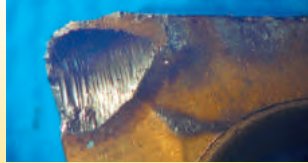
UNITED KINGDOM
TEL: 0800 731 6660
FAX: 0800 731 6662

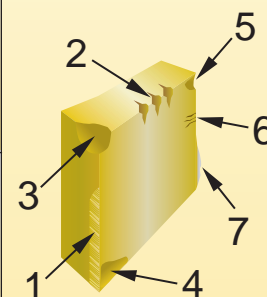
SUISSE ROMANDE
TEL: 0800 807 778
FAX: 0800 807 701

DEUTSCHE SCHWEIZ
TEL: 0800 807 721
FAX: 0800 807 701

SVIZZERA ITALIANA
TEL: 0800 807 722
FAX: 0800 807 701



Cause	Correction	Failure																				
Intermittent heating of the cutting edge. High V_C and high volume metal removal.	<p>A Use a heat resistant grade increased TaC.</p> <p>B Use positive rake tools.</p> <p>C Increase nose radius.</p> <p>D Reduce in the following order: surface speed, feed or depth of cut.</p> <p>E Avoid use of coolant.</p>	 <p>Thermal Cracking</p>	<table border="1"> <thead> <tr> <th>N°</th> <th>Failure type</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Flank wear</td> <td rowspan="3">Physical</td> </tr> <tr> <td>2</td> <td>Chipping</td> </tr> <tr> <td>3</td> <td>Partial fracture</td> </tr> <tr> <td>4</td> <td>Crater wear</td> <td rowspan="4">Chemical</td> </tr> <tr> <td>5</td> <td>Deformation</td> </tr> <tr> <td>6</td> <td>Thermal Crack</td> </tr> <tr> <td>7</td> <td>Built up edge</td> </tr> </tbody> </table>	N°	Failure type		1	Flank wear	Physical	2	Chipping	3	Partial fracture	4	Crater wear	Chemical	5	Deformation	6	Thermal Crack	7	Built up edge
N°	Failure type																					
1	Flank wear	Physical																				
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6	Thermal Crack																					
7	Built up edge																					
Cutting tool excessively brittle. Tool too hard for application conditions.	<p>A Use a tougher grade.</p> <p>B Use negative rake angle inserts.</p> <p>C Increase nose radius.</p> <p>D Use increased edge land.</p> <p>E Increase cutting speed.</p>	 <p>Chipping</p>																				
Grade not hard enough for application. High surface speed.	<p>A Use a harder, more wear resistant grade.</p> <p>B Decrease surface speed.</p> <p>C Increase feed.</p> <p>D Use coolant.</p>	 <p>Excessive Flank Wear</p>																				
Notching occurs at depth of cut line. Usually due to work hardened surface, scale or abrasion.	<p>A Increase approach angle to maximum.</p> <p>B Increase nose radius for shallow cuts.</p> <p>C Reduce V_C surface speed and feed.</p> <p>D Vary the depth of cut.</p>	 <p>Notching</p>																				
Surface speed too low for material being machined.	<p>A Increase surface speed.</p> <p>B Use inserts that reduce friction. i.e. TiALN PVD Coated</p> <p>C Use high lubricity coolant.</p>	 <p>Built-Up-Edge</p>																				
Heavy feed or high surface speed.	<p>A Reduce surface speed.</p> <p>B Reduce feed.</p> <p>C Use a harder grade.</p> <p>D Use a more heat resistant grade.</p>	 <p>Deformation</p>																				
Excessive heat and pressure causing chip to weld to rake angle.	<p>A Use a harder grade.</p> <p>B Reduce surface speed.</p> <p>C Reduce feed.</p> <p>D Increase the rake angle.</p>	 <p>Crater Wear</p>																				





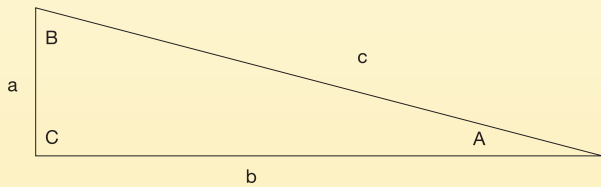
Turning Inserts

Formula

$V_c = \frac{D_m \times \pi \times n}{1000}$	Cutting speed (m/min)
$n = \frac{V_c \times 1000}{D_m \times \pi}$	Spindle speed (rev/min)
$P_c = \frac{V_c \times a_p \times f_n \times k_c}{60 \times 1000 \times \eta}$	Power demand (kW)
$Q_z = V_c \times f_n \times a_p$	Metal removal (cm³/min)
$T_c = \frac{l_m}{f_n \times n}$	Period of engagement (min)

Terminology

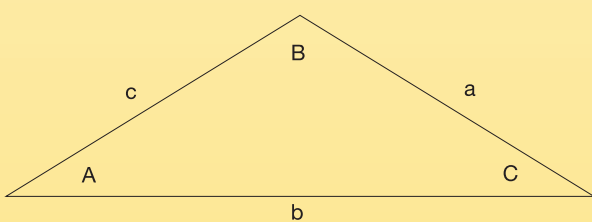
D_m	=	Machined diameter	mm
V_c	=	Cutting speed	m/min
n	=	Spindle speed	rev/min
T_c	=	Period of engagement	min
Q_z	=	Metal removal	cm ³ /min
l_m	=	Machined length	mm
P_c	=	Power demand	kW
K_c	=	Specific cutting force	N/mm ²
f_n	=	Feed per revolution	mm/rev
k_r	=	Cutting edge angle	degree
R_{max}	=	Profile depth	µm
r_ϵ	=	Insert nose radius	mm
a_p	=	Depth of cut	mm
η	=	Efficiency	



Trigonometrical Equivalents

Dimension Given	Part to be Found				
	A	B	a	b	c
a & c	$\sin A = a \div c$	$\cos B = a \div c$		$b = \sqrt{c^2 - a^2}$	
a & b	$\tan A = a \div b$	$\cos B = a \div b$			$c = \sqrt{a^2 + b^2}$
c & b	$\cos A = b \div c$	$\sin B = b \div c$	$a = \sqrt{c^2 - b^2}$		
A & a		$B = 90^\circ - A$		$b = a \times \cot A$	$c = a \div \sin A$
A & b		$B = 90^\circ - A$	$a = b \times \tan A$		$c = b \div \cos A$
A & c		$B = 90^\circ - A$	$a = c \times \sin A$	$b = c \times \cos A$	

Trigonometrical Equivalents



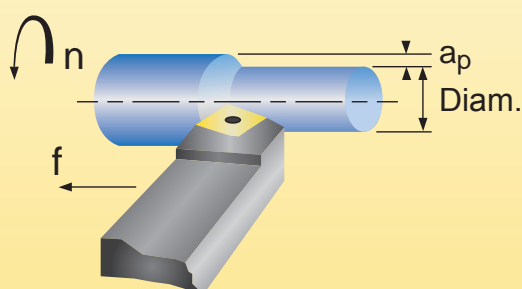
Dimension Given	Parts to be Found	Formula
a b c	A	$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$
a b A	B	$\sin B = b \times \sin A \div a$
a b A	C	$C = 180 - (A + B)$
a A B	b	$b = a \times \sin B \div \sin A$
a A B	c	$c = \frac{a \times \sin C + \sin A \times (a \times \sin (180 - A - B) \div \sin A)}$
a b C	B	$B = 180 - (A + C)$



Cutting Data

In the turning operation we can distinguish three important elements:

- Work piece' s rotation at a determined speed of the spindle, "n"
- linear movement of the tool at a determined feed, "f"
- Cut depth, a_p



Terminology

V_c - Indicated in meters/min. It refers to the speed at the insert edge removing the material at the periphery of the work piece. The cutting speed is related to the diameter of the work piece.

F - Defined in mm/rev and it is the distance covered by the tool during every rotation of the work piece. "F"- refers to the distance covered by the tool in a one minute, that is the feed v_f (mm/min)

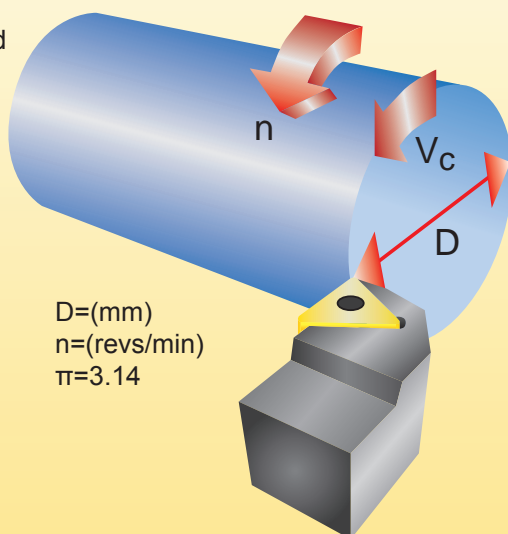
- a_p - Depth of Cut

Cutting Parameters

The spindle speed n is the number of rotations the work piece rotates in one minute and it is indicated in revolutions/minute.

The Surface Speed can be calculated with the following formula:

D=Diameter
n=Spindle speed
 π =Constant



Formula

Volume "Q_Z": Metal Removal Rate
This value takes into consideration V_c , A_p and feed to calculate the amount of material removed.

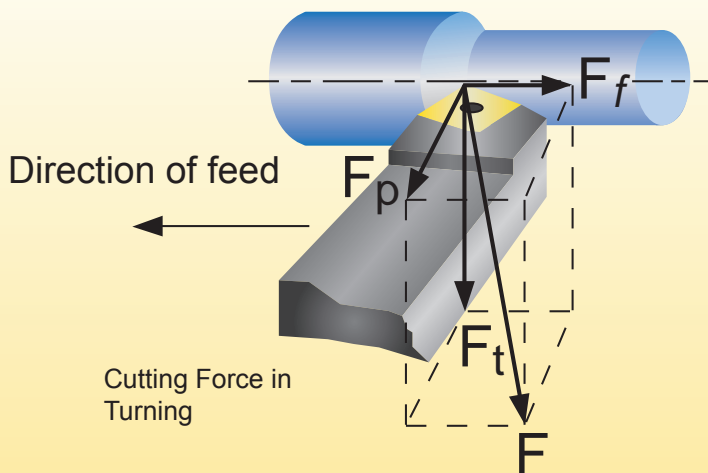
$$Q_Z = V_c \times f \times a_p \text{ (cm}^3\text{/min)}$$

Metric

$$V_c = \frac{D \times \pi \times n}{1000} \text{ (m/min)}$$



Calculations of Cutting Forces



* The specific cutting force (k_c) is constant for each material. It is unique for each material and it refers to the material machinability. See catalog page C196.

Calculations of Power

The availability for the power calculation for the material removal is particularly important for roughing, so it is necessary to verify if the machine's power is enough for the application.

The parameters for the power calculation are v_c and F_C .

The machine efficiency η , is also a factor to be considered referring to the energy loss because of the drive and the motor efficiency. This value is between 0,7-0,9 depending on the machine.

Terminology

The main force F can be split into 3 different forces:

F_t (N)= Tangential force, downward and usually the largest

F_f (N)= Axial force or feed force, toward the longitudinal axis of the workpiece

F_p (N)= Radial force on the perpendicular of the centre line of the workpiece

Formula

Values F_f and F_p are affected by the approach angle, the cutting depth and the nose radius of the tool. The following formula can be used for the tangential cutting force:

$$F_c = K_c \times a_r \times f$$

in which:

K_c = Specific cutting force(N/mm²)*

a_r = Cutting depth (mm)

f = Feed (mm/rev)

Formula

The formula for the net cutting power calculation is:

$$P = \frac{v_c \times F_c}{\eta \times 60 \times 1000} \quad (\text{KW})$$

$$\text{Where } F_c = a_p \times f \times K_c$$

$$\text{then } P = \frac{v_c \times a_p \times f \times K_c}{\eta \times 60 \times 1000} \quad (\text{KW})$$

KW to HP conversion: 1 KW = 1.34102209 hp



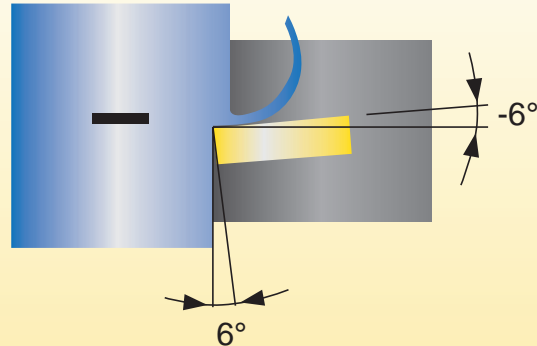
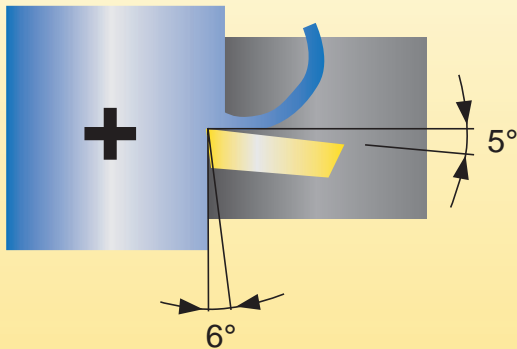
Turning Inserts

Speed vc (feet/min)			
ISO	Materials	Rm	Kc:N/mm ²
P	Unalloyed Steel	400-600 N/mm ² 120-180 HBN	2050
		600-950 N/mm ² 180-200 HBN	2300
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	2599
		950-1200 N/mm ² 280-355 HBN	2851
		1200-1400 N/mm ² 355-415 HBN	3172
Tool Steel	1200-1400 N/mm ² 355-415 HBN	3895	
M	Stainless Steel	Austenitic + Ferritic 300 series	1847
		Martensitic 400 series	2599
	PH Stainless	Refractory P.H.	3199
K	Cast Iron	Grey GG-Ft	1200
		Spheroidal-Ductile GGG-FGS	1500
		Nodular GGNi - L - N	1600
		Malleable GTS - MN/MP	1050
N	Aluminium & Alloys	Aluminium & Alloys < 16% 116 HBN	827
		Aluminium + Silicon > 16% 92 HBN	965
S	High Temperature Alloys	Iron Based	2999
		Cobalt Based	3799
		Nickel Based	3500
		Titanium Based 425-456 HBN	1500



Top Rake

Positive: Produces low shearing stress and may eliminate vibration during finish machining, machining of long workpieces, or poor workholding.

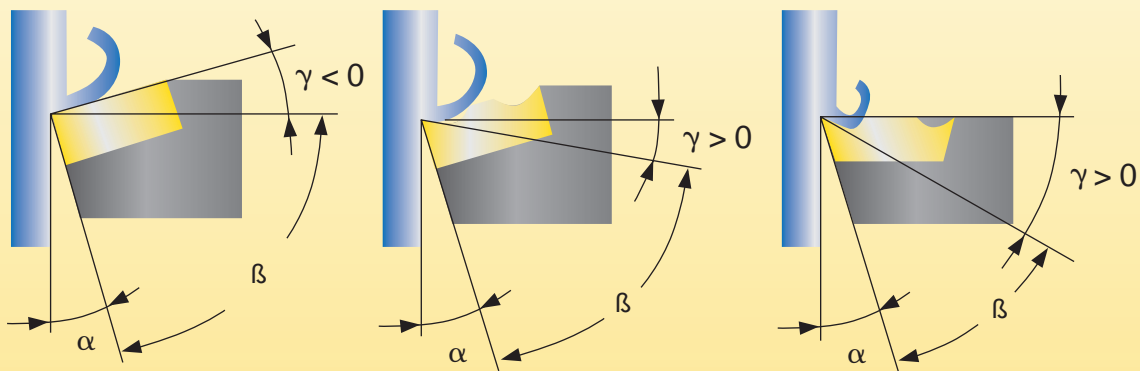


Negative: Produces larger shearing stress which causes a high chip strain. It is much stronger in comparison to the positive rake and requires good workpiece and tool stability.

Effective Cutting Angle

The position of the insert seat determines the cutting rake:

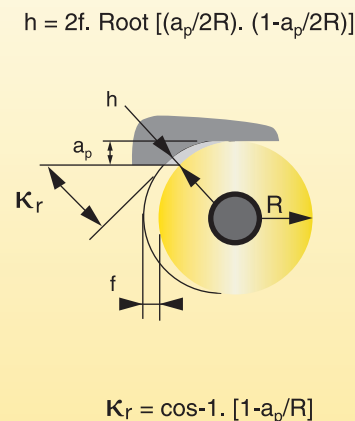
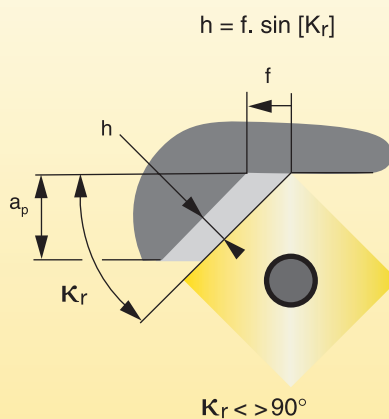
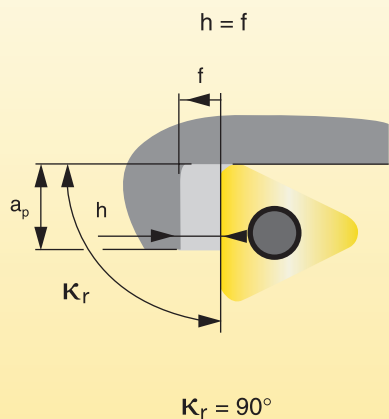
- This can be negative or 0°.
- The effective cutting angle is also determined by the insert geometry located on the seat, as this could be flat face or a chip breaker and it could change the effective cutting angle.
- The effective cutting angle is the sum of the angle in the insert seat and the geometry of the seated inserts.





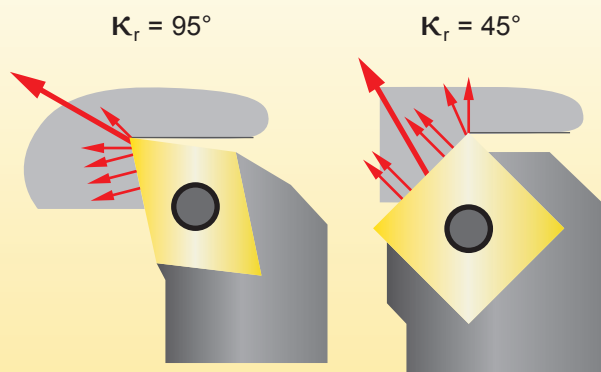
The approach angle or attack angle is very important because it influences the tool life.

In the first picture we can see how it affects the chip thickness.



- h is the same as the feed f when the entering angle is 90° or equal to the sin of the approach angle * f
- A 45° approach angle will produce a lower chip thickness with a higher feed

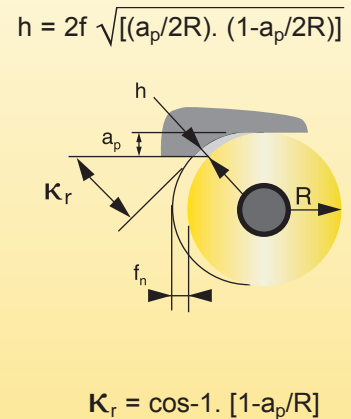
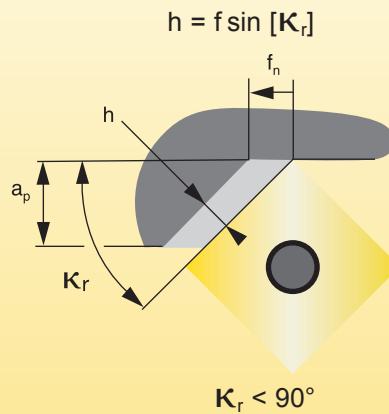
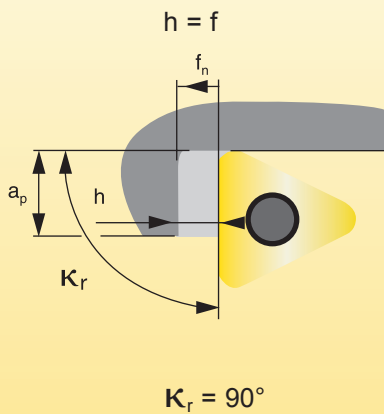
In the second picture we can see the effect on cutting the force distribution.



- In the first case the first contact is between the workpiece and the insert point, and it is focused on the radius making the situation difficult
- On the second case, the approach angle on the workpiece is softer and the cutting forces, are distributed in a more uniform way, and not directly on the insert point.



When deciding on the maximum depth of cut (a_p) for a given insert, the angle of the principal edge plays a significant role in the type of the chip formed. For an angle close to 90° , the thickness of the chip will be equal to the feed. In the other cases, it will be necessary to calculate it.



The type of insert used plays a significant role in the rigidity of the cutting edge. A cutting edge angle of 75° or 45° allows for difficult machining operations, i.e. interrupted and heavy roughing, but reduces the capacity to machine profiles. The most robust insert shape is round and the most fragile standard insert is the 35° diamond (V).

The size and type of insert determines the maximum depth of cut. In general, it is advisable to select a cutting edge length in relation to the maximum depth of cut to be machined.

Cutting Edge Length for a given depth of cut (a_p) and K_r angle

A low depth of cut can still generate a large edge engagement

K_r/a_p	1,00	2,00	3,00	4,00	5,00	6,00	7,00	8,00	9,00	10,00
90	1,00	2,00	3,00	4,00	5,00	6,00	7,00	8,00	9,00	10,00
75	1,04	2,06	3,10	4,14	5,18	6,20	7,24	8,28	9,32	10,34
60	1,14	2,31	3,45	4,62	5,77	6,93	8,08	9,25	10,39	11,56
45	1,42	2,82	4,24	5,66	7,06	8,48	9,91	11,30	12,73	14,15
30	2,00	4,00	6,00	8,00	10,00	12,00	14,00	16,00	18,00	20,00



Radius Value / Surface Finish

The radius of the insert has a significant role to play in the quality of the surface finish, which is directly in relation to the feed rate (f_n). With a larger radius, better surface finishes can be maintained at higher feeds. The use of a larger radius gives a larger surface contact area and causes an increase in power and cutting force.

For roughing operations, it is preferable to choose a large radius to ensure corner strength of the insert. However, for some materials it is preferable to use a smaller radius to maintain a softer cut. The insert is more fragile but can qualify for operations that are sensitive to vibration.

Generally an insert is used with a maximum feed equal to half its radius. The minimum feed is related to edge preparation or to the start of its chip control. An increase in cutting speed can also contribute to surface quality.

Formula

The formula to calculate the feed rate:

$$f = \sqrt{\frac{R_a \times r_\epsilon}{50}}$$

$$R_{\max} = \frac{f^2}{8 \times r_\epsilon}$$

The mean value R_a , can be calculated with following formula:

$$R_a = \frac{f^2 \times 50}{r_\epsilon}$$

Average value of feed for each radius

Radius (mm)	0,4	0,8	1,2	1,6	2,4
f (mm/turn)	0,12-0,25	0,25-0,5	0,36-0,7	0,5-1	0,7-1,6

R_{\max} = profile depth

r_ϵ = nose radius

f_n = feed

In finishing operations the insert radius and the feed effect the superficial roughness and the dimensional accuracy.

Surface finishing		Radius of insert				
Ra	Rt	0,4	0,8	1,2	1,6	2,4
μm	μm	f mm/r				
0,60	2	0,07	0,10	0,12	0,14	0,17
1,60	4	0,11	0,15	0,19	0,22	0,26
3,20	10	0,17	0,24	0,29	0,34	0,42
6,30	16	0,22	0,30	0,37	0,43	0,53
8,00	25	0,27	0,38	0,47	0,54	0,66

Surface finishing		Diameter of round inserts				
Ra	Rt	10	12	16	20	25
μm	μm	f mm/r				
0,60	2	0,25	0,28	0,32	0,36	0,40
1,60	4	0,40	0,44	0,51	0,57	0,63
3,20	10	0,63	0,69	0,80	0,89	1,00
6,30	16	0,80	0,83	1,01	1,13	1,26
8,00	25	1,00	1,10	1,26	1,42	1,51

Summary: Value of R_a & R_t based on the radius value and feed.



Turning Inserts

Conversion Value Chart for Surface Finishing

R _{max} µm	R _a = CLA = AA		RMS		Operation
	µm	µinch	µm	µinch	
1,6	0,30	11.8	0,33	13.1	
1,8	0,35	13.8	0,39	15.3	
2,0	0,40	15.7	0,44	17.4	
2,2	0,44	17.5	0,49	19.4	
2,4	0,49	19.2	0,54	21.3	
2,6	0,53	20.8	0,59	23.1	
2,8	0,58	22.7	0,64	25.2	
3,0	0,63	24.6	0,70	27.3	
3,5	0,71	27.8	0,79	30.9	
4,0	0,80	31.4	0,89	34.8	
4,5	0,90	35.2	1,00	39.1	
5,0	0,99	38.8	1,10	43.1	
6,0	1,20	47.2	1,30	52.4	
7,0	1,40	55.1	1,50	61.2	
8,0	1,60	63.0	1,80	70.0	
9,0	1,80	71.0	2,00	78.8	
10,0	2,00	79.0	2,20	87.7	
15,0	3,20	126.0	3,10	140.0	
20,0	4,40	173.0	4,90	192.0	
25,0	5,80	238.0	6,40	264.0	
27,0	6,30	247.0	7,00	274.0	
30,0	7,40	292.0	8,20	324.0	
35,0	8,80	346.0	9,80	384.0	
40,0	10,70	422.0	11,00	468.0	
45,0	12,50	485.0	13,90	538.0	
50,0	14,00	552.0	15,50	613.0	

Difference of hardness (HBN):

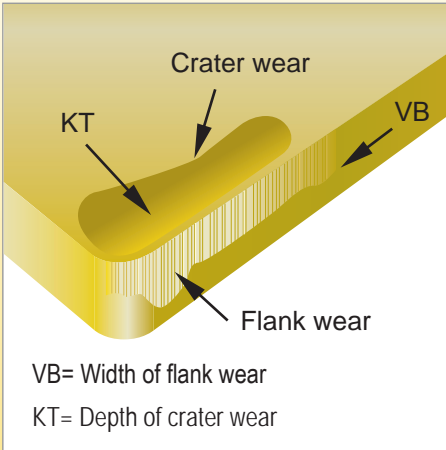
When the hardness of a workpiece is different from the value shown in the grade speed charts, multiply the cutting speed you have obtained by the factor below to calculate a new cutting speed.

Workpiece Hardness and Cutting Speeds

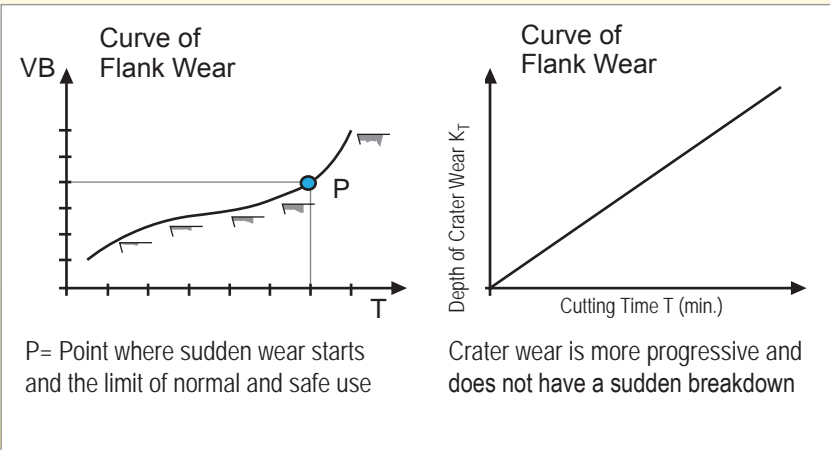
ISO/ANSI	120HBN	140HBN	160HBN	180HBN	200HBN	220HBN	240HBN	260HBN	280HBN	300HBN	320HBN	340HBN
P	1,42	1,25	1,13	1,0	0,93	0,86	0,75	0,71	0,66	-	-	-
M	1,40	1,22	1,10	1,0	0,93	0,86	0,80	0,70	0,69	-	-	-
K	1,40	1,34	1,30	1,25	1,20	1,10	1,05	1,0	0,94	0,90	0,85	0,82



Types of Wear



Trend of Crater and Flank Wear Based on Cutting Time



Factors that could Influence the Tool Life

Tool life depends on many factors, including the type of clamp, type of coolant, (percentage of mix) and type of machine tool. Following, you will see how the surface speed and other data can influence tool life.

Chart "A" below, shows how a different surface speed (V_c) can influence the tool life of the insert. The higher the V_c , the lower the acceptable time life is where $V_1 > V_2 > V_3 > V_4$ you can see respectively that $T_4 > T_3 > T_2 > T_1$.

Chart "B" shows how the wear is influenced by the higher machining data.

Tool Life Criteria

We change the insert when

- It does not create the requested finish or tolerances.
- When the wear under the cutting edge line is too high, causing premature failure
- When the crater depth on the insert face is excessive, causing premature failure
- When the power consumption increases suddenly during the cut

Chart A

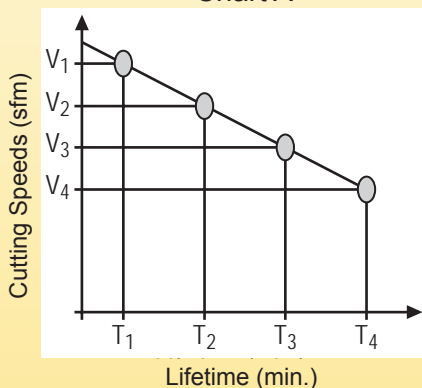
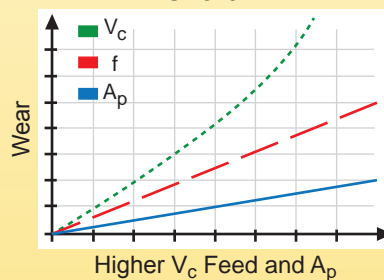


Chart B





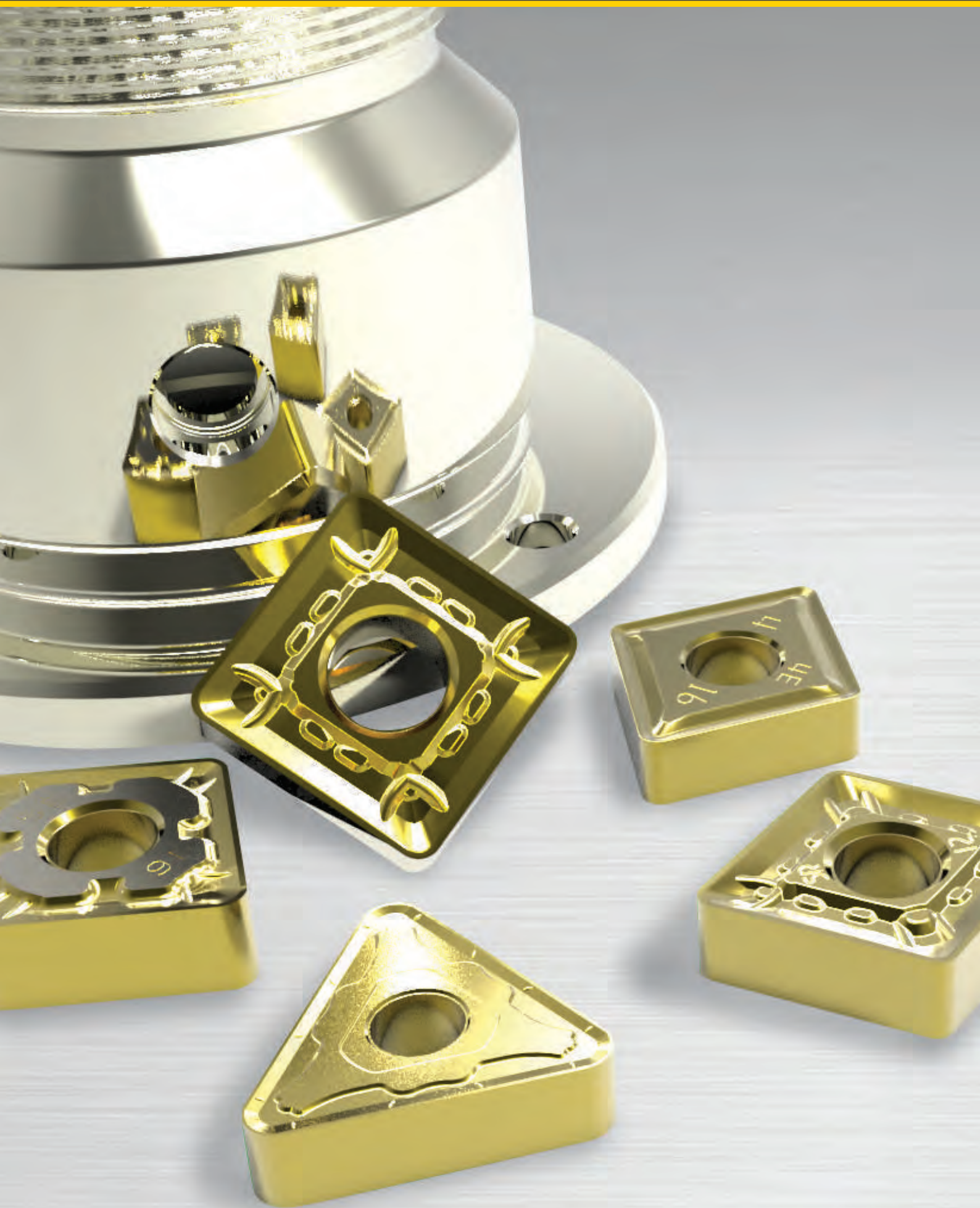
Turning Inserts

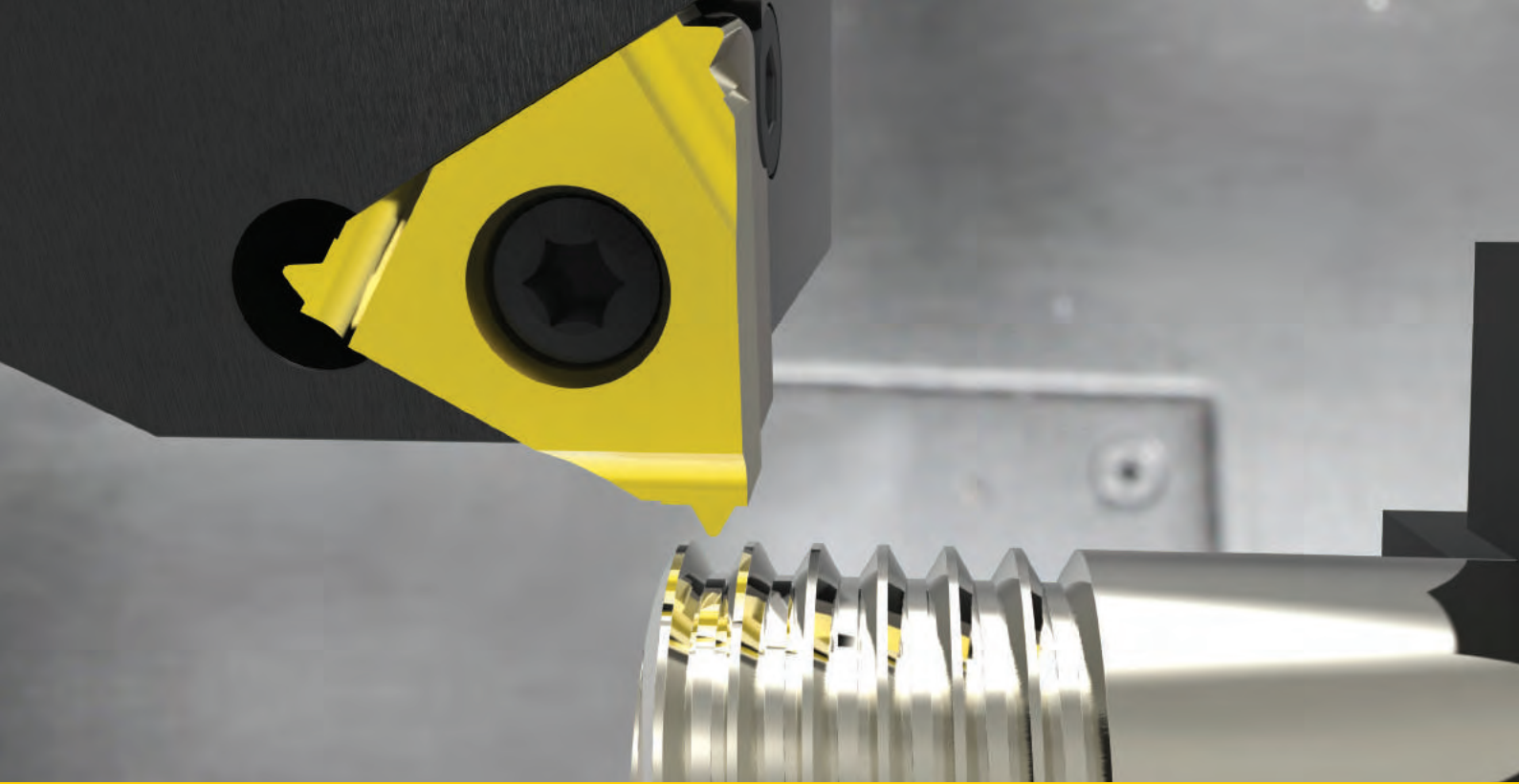
Tensile strength	Vickers	Brinell	Rockwell	
			HRC	HRB
N/mm ²	HV	HBN	HRC	HRB
255	80	76,0	-	-
270	85	80,7	-	41,0
285	90	85,5	-	48,0
305	95	90,2	-	52,0
320	100	95,0	-	56,2
350	110	105	-	62,3
385	120	114	-	66,7
415	130	124	-	71,2
450	140	133	-	75,0
480	150	143	-	78,7
510	160	152	-	81,7
545	170	162	-	85,0
575	180	171	-	87,5
610	190	181	-	89,5
640	200	190	-	91,5
660	205	195	-	92,5
675	210	199	-	93,5
690	215	204	-	94,0
705	220	209	-	95,0
720	225	214	-	96,0
740	230	219	-	96,7
770	240	228	20,3	98,1
800	250	238	22,2	99,5
820	255	242	23,1	-
835	260	247	24,0	(101)
850	265	252	24,8	-
865	270	257	25,6	(102)
900	280	266	27,1	-
930	290	276	28,5	(105)
950	295	280	29,2	-
965	300	285	29,8	-
995	310	295	31,0	-

Tensile strength	Vickers	Brinell	Rockwell
			HRC
N/mm ²	HV	HBN	HRC
1030	320	304	32,2
1060	330	314	33,3
1095	340	323	34,4
1125	350	333	35,5
1155	360	342	36,6
1190	370	352	37,7
1220	380	361	38,8
1255	390	371	39,8
1290	400	380	40,8
1320	410	390	41,8
1350	420	399	42,7
1385	430	409	43,6
1420	440	418	44,5
1485	460	437	46,1
1555	480	450	47,7
1595	490	457	48,4
1630	500	465	49,1
1665	510	474	49,8
1700	520	482	50,5
1740	530	489	51,1
1775	540	496	51,7
1810	550	503	52,3
1845	560	511	53,0
1880	570	520	53,6
1920	580	527	54,1
1955	590	533	54,7
1995	600	538	55,2
2030	610	543	55,7
2070	620	549	56,3
2105	630	555	56,8
2145	640	561	57,3
2180	650	568	57,8

HV = Vickers hardness
HBN = Brinell hardness

HRC = Rockwell hardness, C scale
HRB = Rockwell hardness, B scale





THREADING

Threading





Kennametal's comprehensive threading program is available in a wide range of thread forms. Partial and full profile inserts are offered for thread turning.

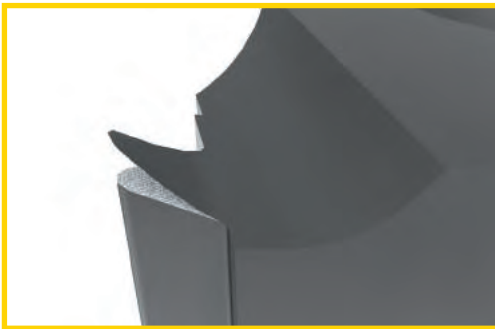
Kennametal offers high performance grades suitable for all machining applications, in a wide range of materials, for maximum productivity.

Kennametal offers both external toolholders and internal bars with through coolant. Internal holders to a minimum bore of 6,0mm. Anti vibration holders are also available for difficult applications.



Threading Grade Descriptions

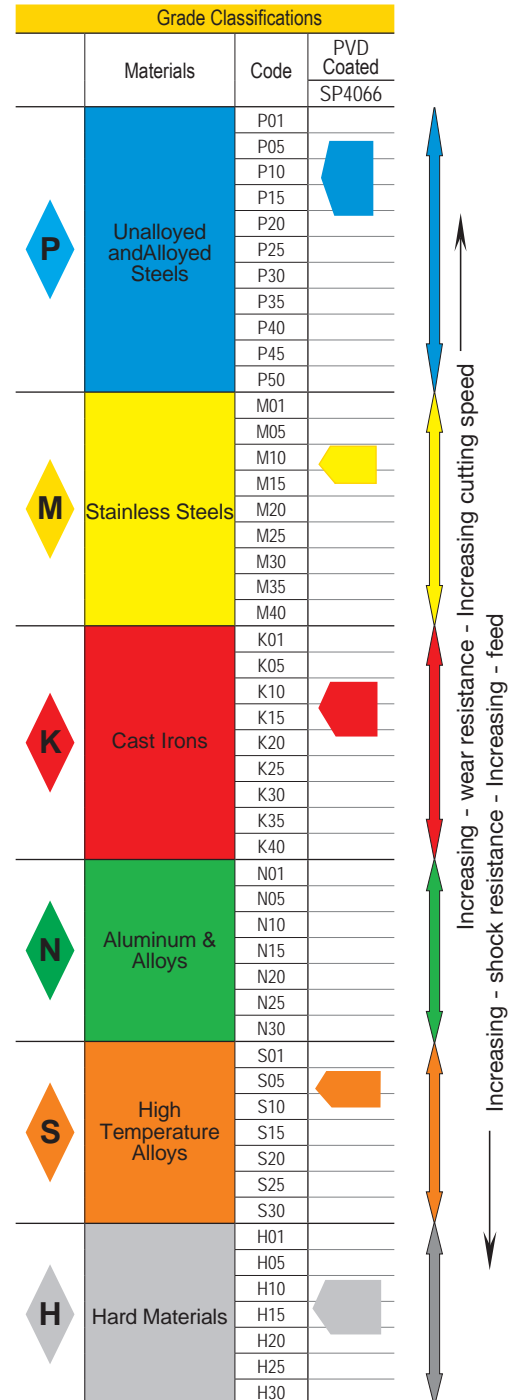
SP4066 has the perfect balance between wear resistance and toughness enabling multiple applications to be covered by one insert. This new grade also allows for longer tool life and is ideal for machining a variety of materials at elevated cutting speeds.



Cutting Speed v_c

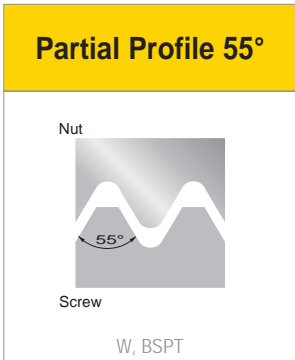
ISO	Materials	Rm and Hardness	PVD
			SP4066
			m/min
			min. - max.
P	Unalloyed Steel	<600 N/mm ² <180 HBN	230 - 485
		<950 N/mm ² <280 HBN	150 - 315
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	135 - 290
		950-1200 N/mm ² 280-355 HBN	115 - 240
M	Stainless Steel	Austenitic + Ferritic 300 series	155 - 330
		Martensitic 400 series	160 - 340
	PH Stainless	Refractory P.H.	80 - 175
K	Cast Iron	Grey GG-Ft	225 - 480
		Spheroidal-Ductile GGG-FGS	195 - 415
		Malleable GTS - MN/MP	130 - 280
S	High Temperature Alloys	Iron Based	35 - 70
		Cobalt Based	30 - 60
		Nickel Based	30 - 60
		Titanium Based	45 - 95

Optimum Grade Performance

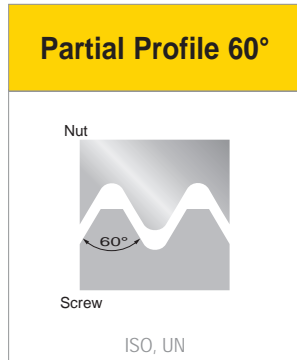




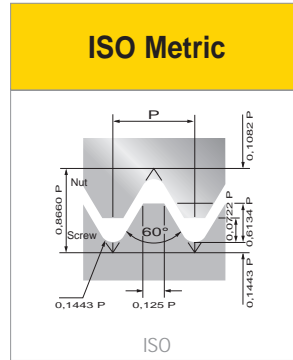
Threading



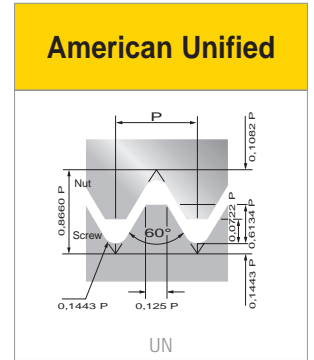
PAGES C210



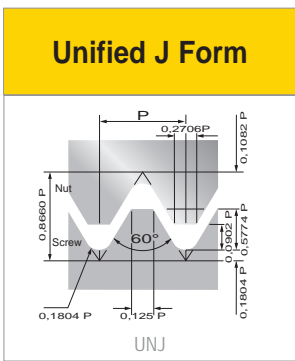
PAGES C211 - C212



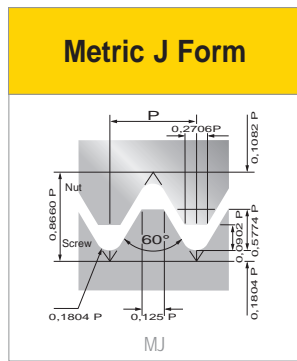
PAGES C213 - C217



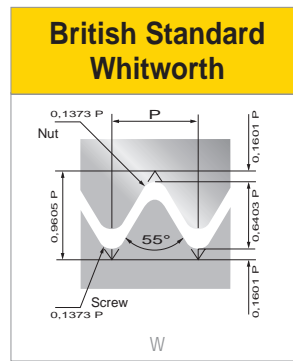
PAGES C218 - C220



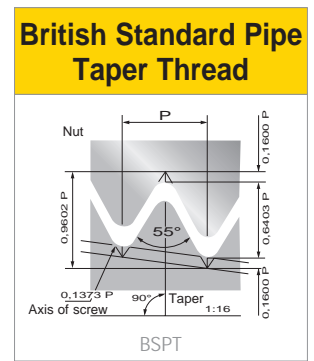
PAGE C221



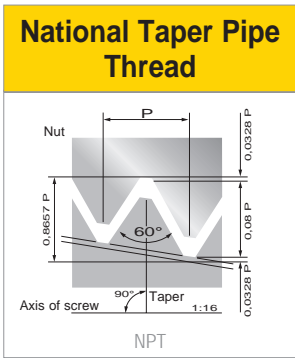
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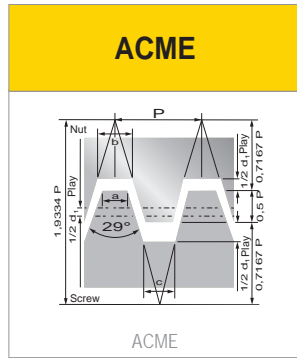
PAGES C223 - C224



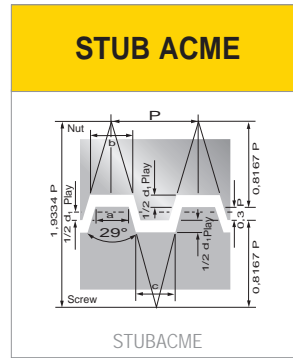
PAGE C225



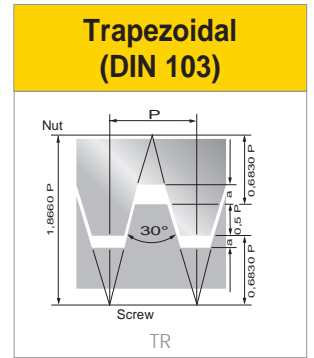
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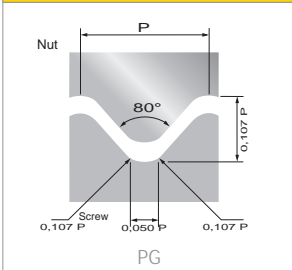
PAGE C228



PAGE C229



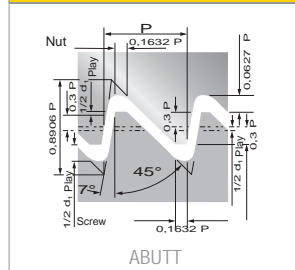
**Panzer Gewinde
(DIN 40431)**



PG

PAGE C230

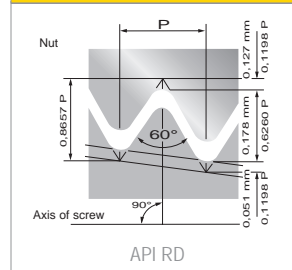
**American Buttress
45/7°**



ABUTT

PAGES C231 - C232

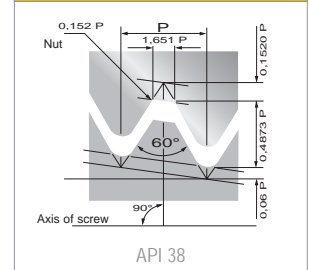
**API Casing &
Tubing Round**



API RD

PAGE C233

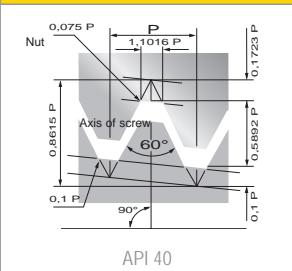
API V0.038



API 38

PAGES C234 - C235

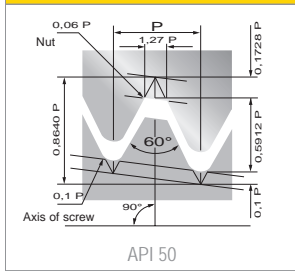
API V0.040



API 40

PAGES C234 - C235

API V0.050



API 50

PAGES C234 - C235

Threading

NOTE: Other thread forms available by quotation.



16
1

E
2

R
3

20
4

1 Size

L mm	IC Inch
06	5/32
08	3/16
11	1/4
16	3/8
22	1/2
22U	1/2U
27	5/8
27U	5/8U

2 Utilisation

E

External

I

Internal

U

Neutral

3 Design

I

Left Hand

R

Right Hand

4 Thread Pitch or TPI

Partial Profile 60° or 55°

	mm		Thread Pitch		TPI	
A	0,5	- 1,5	48	-	16	
G	1,75	- 3	14	-	8	
AG	0,5	- 3	48	-	8	
N	3,5	- 5	7	-	5	
Q	5,5	- 6	4 1/2	-	4	
U (22)	5,5	- 8	4 1/2	-	3 1/4	
U (27)	6,5	- 9	2 3/4	-	4	

Full Profile
0,35 to 8,0 mm (72-3 TPI)
Pitch sizes stated on all thread form part numbers



UN

5

-

6

GRADE

7

5 Thread Form

Partial Profile		Full Profile	
	60° 60		60° MJ
	55° 55		60° NPT
Full Profile			60° NPTF
	45°/7° ABUTT		60° PAC
	29° ACME		80° PG
	60° API RD		30° RD
	60° API		3°/30° SAGE
	47,5° BA		29° STACME
	45°/7° BBUTT		30° TR
	55° BSPT		60° UN
	3°/10° BUTT		60° UNJ
	12° ELC		3°/10° VAM
	60° ISO		55° W

6 Other

SC	M	T	Z
Swarf control style		Multi-tooth style and number of teeth	

7 Type of Grade

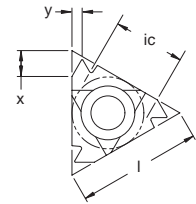
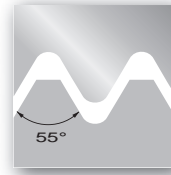
For grade descriptions, refer to page: C205

Threading



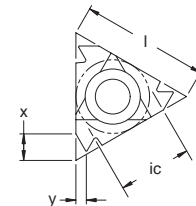
Threading

External Partial Profile 55° Form
For British Standard Whitworth & British Standard Parallel Pipe

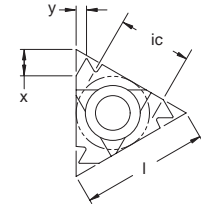
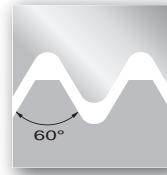


External Right Hand		Partial Profile 55°		Pitch Range	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033826	16	16ERA55	SP4066	0,5 - 1,5	48 - 16	0,07	0,80	0,90
033828	16	16ERAG55	SP4066	0,5 - 3,0	48 - 8	0,07	1,20	1,70
033830	16	16ERG55	SP4066	1,75 - 3,0	14 - 8	0,25	1,20	1,70

Internal Partial Profile 55° Form
For British Standard Whitworth & British Standard Parallel Pipe



Internal Right Hand		Partial Profile 55°		Pitch Range	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033763	8	08IRA55	SP4066	0,5 - 1,5	48 - 16	0,07	0,60	0,70
032048	11	11IRA55	SP4066	0,5 - 1,5	48 - 16	0,07	0,80	0,90
033865	16	16IRAG55	SP4066	0,5 - 3,0	48 - 8	0,07	1,20	1,70
033867	16	16IRG55	SP4066	1,75 - 3,0	14 - 8	0,13	1,20	1,70

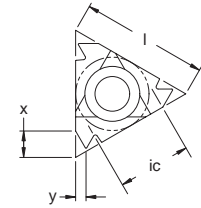
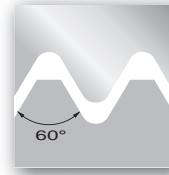

External Partial Profile 60° Form
 For Unified & ISO metric thread forms


<i>External Right Hand</i>		Partial Profile 60°		Pitch Range	TPI Range	Nose Radius	X	Y
<i>EDP</i>	L (mm)	Description	Grade	mm		mm	mm	mm
033827	16	16ERA60	SP4066	0,5 - 1,5	48 - 16	0,09	1,20	1,70
033829	16	16ERAG60	SP4066	0,5 - 3,0	48 - 8	0,10	1,20	1,70
033831	16	16ERG60	SP4066	1,75 - 3,0	14 - 8	0,15	1,20	1,70
033884	22	22ERN60	SP4066	3,5 - 5,0	7 - 5	0,48	1,70	2,50

<i>External Left Hand</i>		Partial Profile 60°		Pitch Range	TPI Range	Nose Radius	X	Y
<i>EDP</i>	L (mm)	Description	Grade	mm		mm	mm	mm
033772	16	16ELAG60	SP4066	0,5 - 3,0	48 - 8	0,10	1,20	1,70



Internal Partial Profile 60° Form
For Unified & ISO metric thread forms



Threading

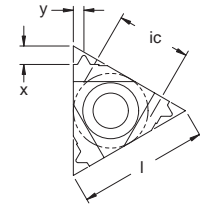
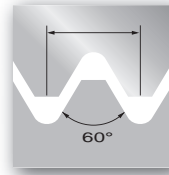
Internal Right Hand		Partial Profile 60°		Pitch Range	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033739	6	06IRA60	SP4066	0,5 - 1,25	48 - 20	0,70	0,60	0,80
033764	8	08IRA60	SP4066	0,5 - 1,5	48 - 16	0,09	0,60	0,70
032045	11	11IRA60	SP4066	0,5 - 1,5	48 - 16	0,15	0,80	0,90
033864	16	16IRA60	SP4066	0,5 - 1,5	48 - 16	0,10	1,20	1,70
033866	16	16IRAG60	SP4066	0,5 - 3,0	48 - 8	0,10	1,20	1,70
033868	16	16IRG60	SP4066	1,75 - 3,0	14 - 8	0,15	1,20	1,70
033899	22	22IRN60	SP4066	3,5 - 5,0	7 - 5	0,32	1,70	2,50

Internal Left Hand		Partial Profile 60°		Pitch Range	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033766	11	11ILA60	SP4066	0,5 - 1,5	48 - 16	0,15	0,80	0,90


External ISO Metric

Standard reference: ISO 262 (DIN 13)

Tolerance class: 6g / 6H



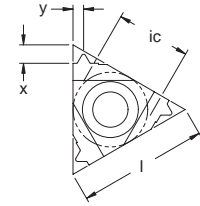
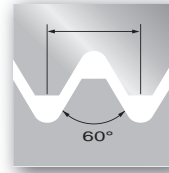
External Right Hand		ISO Metric		Pitch	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033773	16	16ER0.35ISO	SP4066	0,35	-	0,06	0,80	0,40
033775	16	16ER0.4ISO	SP4066	0,40	-	0,07	0,70	0,40
033774	16	16ER0.45ISO	SP4066	0,45	-	0,08	0,70	0,40
033776	16	16ER0.5ISO	SP4066	0,50	-	0,08	0,60	0,60
033777	16	16ER0.6ISO	SP4066	0,60	-	0,09	0,60	0,60
033779	16	16ER0.7ISO	SP4066	0,70	-	0,10	0,60	0,60
033778	16	16ER0.75ISO	SP4066	0,75	-	0,10	0,60	0,60
033780	16	16ER0.8ISO	SP4066	0,80	-	0,13	0,60	0,60
031999	16	16ER1.0ISO	SP4066	1,00	-	0,14	0,70	0,70
032000	16	16ER1.25ISO	SP4066	1,25	-	0,18	0,80	0,90
032001	16	16ER1.5ISO	SP4066	1,50	-	0,22	0,80	1,00
032002	16	16ER1.75ISO	SP4066	1,75	-	0,25	0,90	1,20
032003	16	16ER2.0ISO	SP4066	2,00	-	0,29	1,00	1,30
033799	16	16ER2.5ISO	SP4066	2,50	-	0,36	1,10	1,50
033813	16	16ER3.0ISO	SP4066	3,00	-	0,46	1,20	1,60
033814	16	16ER3.5ISO	SP4066	3,50	-	0,53	1,60	2,30



External ISO Metric

Standard reference: ISO 262 (DIN 13)

Tolerance class: 6g / 6H



Threading

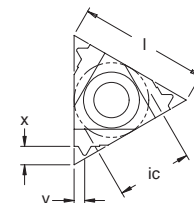
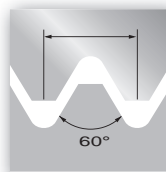
External Right Hand		ISO Metric		Pitch	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033870	22	22ER3.5ISO	SP4066	3,50	-	0,53	1,60	2,30
033871	22	22ER4.0ISO	SP4066	4,00	-	0,61	1,60	2,30
033872	22	22ER4.5ISO	SP4066	4,50	-	0,68	1,70	2,40
033877	22	22ER5.0ISO	SP4066	5,00	-	0,76	1,70	2,50
033880	22	22ER6.0ISO	SP4066	6,00	-	0,89	1,80	2,70

External Left Hand		ISO Metric		Pitch	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033767	16	16EL1.0ISO	SP4066	1,00	-	0,14	0,70	0,70
033768	16	16EL1.5ISO	SP4066	1,50	-	0,22	0,80	1,00
033770	16	16EL2.5ISO	SP4066	2,50	-	0,36	1,10	1,50


Internal ISO Metric

Standard reference: ISO 262 (DIN 13)

Tolerance class: 6g / 6H


Threading

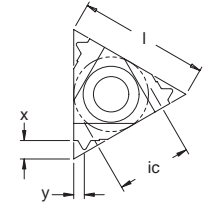
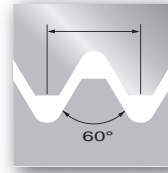
Internal Right Hand		ISO Metric		Pitch	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033735	6	06IR0.5ISO	SP4066	0,50	-	0,04	0,60	0,50
033736	6	06IR0.75ISO	SP4066	0,75	-	0,06	0,60	0,50
033737	6	06IR1.0ISO	SP4066	1,00	-	0,80	0,60	0,60
033738	6	06IR1.25ISO	SP4066	1,25	-	0,10	0,60	0,70
<hr/>								
033741	8	08IR0.5ISO	SP4066	0,50	-	0,04	0,60	0,50
033742	8	08IR0.75ISO	SP4066	0,75	-	0,06	0,60	0,50
033743	8	08IR1.0ISO	SP4066	1,00	-	0,11	0,60	0,60
033744	8	08IR1.25ISO	SP4066	1,25	-	0,10	0,60	0,70
033745	8	08IR1.5ISO	SP4066	1,50	-	0,11	0,60	1,00
033746	8	08IR1.75ISO	SP4066	1,75	-	0,13	0,60	1,00
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032067	11	11IR0.4ISO	SP4066	0,40	-	0,04	0,80	0,40
032064	11	11IR0.5ISO	SP4066	0,50	-	0,04	0,60	0,60
032057	11	11IR0.75ISO	SP4066	0,75	-	0,06	0,60	0,60
032042	11	11IR1.0ISO	SP4066	1,00	-	0,08	0,60	0,70
032043	11	11IR1.5ISO	SP4066	1,50	-	0,11	0,80	1,00
032062	11	11IR1.75ISO	SP4066	1,75	-	0,13	0,80	1,00
032051	11	11IR2.0ISO	SP4066	2,00	-	0,14	0,80	1,10
032059	11	11IR2.5ISO	SP4066	2,50	-	0,18	0,80	1,30



Internal ISO Metric

Standard reference: ISO 262 (DIN 13)

Tolerance class: 6g / 6H



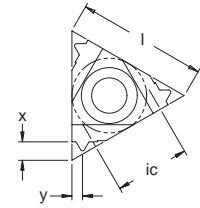
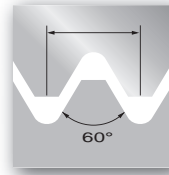
Threading

Internal Right Hand		ISO Metric		Pitch	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033833	16	16IR0.5ISO	SP4066	0,50	-	0,04	0,60	0,60
033834	16	16IR0.6ISO	SP4066	0,60	-	0,05	0,60	0,60
033836	16	16IR0.7ISO	SP4066	0,70	-	0,06	0,60	0,60
033835	16	16IR0.75ISO	SP4066	0,75	-	0,06	0,60	0,60
033837	16	16IR0.8ISO	SP4066	0,80	-	0,06	0,60	0,60
032004	16	16IR1.0ISO	SP4066	1,00	-	0,08	0,60	0,70
032005	16	16IR1.25ISO	SP4066	1,25	-	0,10	0,80	0,90
032006	16	16IR1.5ISO	SP4066	1,50	-	0,11	0,80	1,00
032007	16	16IR1.75ISO	SP4066	1,75	-	0,13	0,90	1,20
032008	16	16IR2.0ISO	SP4066	2,00	-	0,14	1,00	1,30
033849	16	16IR2.5ISO	SP4066	2,50	-	0,18	1,10	1,50
033856	16	16IR3.0ISO	SP4066	3,00	-	0,23	1,10	1,50
033857	16	16IR3.5ISO	SP4066	3,50	-	0,25	1,20	1,80


Internal ISO Metric

Standard reference: ISO 262 (DIN 13)

Tolerance class: 6g / 6H



Internal Right Hand		ISO Metric		Pitch	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033885	22	22IR3.5ISO	SP4066	3,50	-	0,25	1,60	2,30
033886	22	22IR4.0ISO	SP4066	4,00	-	0,33	1,60	2,30
033887	22	22IR4.5ISO	SP4066	4,50	-	0,36	1,60	2,40
033892	22	22IR5.0ISO	SP4066	5,00	-	0,39	1,60	2,60

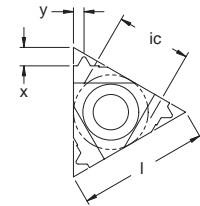
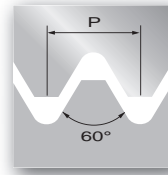
Internal Left Hand		ISO Metric		Pitch	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033740	8	08IL1.0ISO	SP4066	1,00	-	0,11	0,60	0,60
033832	16	16IL1.5ISO	SP4066	1,50	-	0,11	0,80	1,00



External American Unified (UN)

Standard reference: ANSI B1.1:74

Tolerance class: 2A / 2B



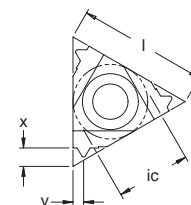
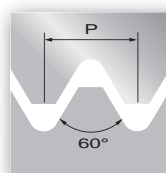
Threading

External Right Hand		American Unified (UN)		Pitch	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
031995	16	16ER8UN	SP4066	3,18	8	0,48	1,20	1,60
033824	16	16ER9UN	SP4066	2,82	9	0,38	1,20	1,70
033782	16	16ER10UN	SP4066	2,54	10	0,38	1,10	1,50
033784	16	16ER11UN	SP4066	2,31	11	0,33	1,10	1,50
031996	16	16ER12UN	SP4066	2,12	12	0,29	1,10	1,40
033787	16	16ER13UN	SP4066	1,95	13	0,28	1,00	1,30
033788	16	16ER14UN	SP4066	1,81	14	0,25	1,00	1,20
033793	16	16ER16UN	SP4066	1,59	16	0,22	0,90	1,10
033796	16	16ER18UN	SP4066	1,41	18	0,20	0,80	1,00
033802	16	16ER20UN	SP4066	1,27	20	0,18	0,80	0,90
033805	16	16ER24UN	SP4066	1,06	24	0,17	0,70	0,80
033809	16	16ER27UN	SP4066	0,94	27	0,15	0,70	0,80
033810	16	16ER28UN	SP4066	0,91	28	0,14	0,60	0,70
033815	16	16ER32UN	SP4066	0,79	32	0,13	0,60	0,60
034611	16	16ER36UN	SP4066	0,71	36	0,11	0,60	0,60
033819	16	16ER40UN	SP4066	0,64	40	0,09	0,60	0,60
033879	22	22ER5UN	SP4066	5,08	5	0,76	1,70	2,50
033882	22	22ER6UN	SP4066	4,23	6	0,64	1,60	2,30
033883	22	22ER7UN	SP4066	3,63	7	0,53	1,60	2,30


Internal American Unified (UN)

Standard reference: ANSI B1.1:74

Tolerance class: 2A / 2B


Threading

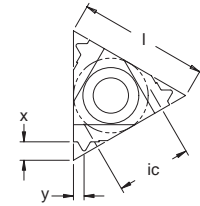
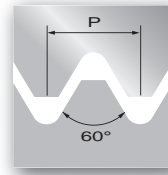
Internal Right Hand		American Unified (UN)		Pitch	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033747	08	08IR14UN	SP4066	1,81	14	0,15	0,60	0,80
033748	08	08IR16UN	SP4066	1,59	16	0,11	0,60	0,70
033751	08	08IR18UN	SP4066	1,41	18	0,11	0,60	0,70
033754	08	08IR20UN	SP4066	1,27	20	0,11	0,60	0,70
033756	08	08IR24UN	SP4066	1,06	24	0,09	0,60	0,60
033761	08	08IR28UN	SP4066	0,91	28	0,09	0,60	0,60
032056	11	11IR32UN	SP4066	0,79	32	0,09	0,60	0,60
032068	11	11IR28UN	SP4066	0,91	28	0,09	0,60	0,70
032055	11	11IR27UN	SP4066	0,94	27	0,09	0,70	0,80
032060	11	11IR24UN	SP4066	1,06	24	0,09	0,70	0,80
032044	11	11IR20UN	SP4066	1,27	20	0,10	0,80	0,90
032049	11	11IR18UN	SP4066	1,41	18	0,11	0,80	1,00
032053	11	11IR16UN	SP4066	1,59	16	0,11	0,09	1,10
032058	11	11IR12UN	SP4066	2,12	12	0,18	0,90	1,10



Internal American Unified (UN)

Standard reference: ANSI B1.1:74

Tolerance class: 2A / 2B



Threading

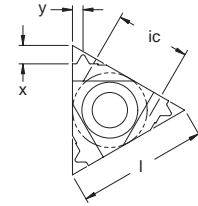
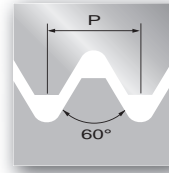
External Right Hand		Partial Profile 55°		Pitch Range	TPI Range	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
031997	16	16IR8UN	SP4066	3,18	8	0,24	1,10	1,50
033863	16	16IR9UN	SP4066	2,82	9	0,20	1,20	1,70
033839	16	16IR10UN	SP4066	2,54	10	0,20	1,10	1,50
033840	16	16IR11UN	SP4066	2,31	11	0,18	1,10	1,50
031998	16	16IR12UN	SP4066	2,12	12	0,18	1,10	1,40
033842	16	16IR13UN	SP4066	1,95	13	0,17	1,00	1,30
033843	16	16IR14UN	SP4066	1,81	14	0,15	0,90	1,10
033846	16	16IR16UN	SP4066	1,59	16	0,11	0,90	1,10
033848	16	16IR18UN	SP4066	1,41	18	0,11	0,80	1,00
033852	16	16IR20UN	SP4066	1,27	20	0,10	0,80	0,90
033853	16	16IR24UN	SP4066	1,06	24	0,09	0,70	0,80
033855	16	16IR28UN	SP4066	0,91	28	0,09	0,60	0,60
033858	16	16IR32UN	SP4066	0,79	32	0,06	0,60	0,60
033859	16	16IR36UN	SP4066	0,71	36	0,05	0,60	0,60
033860	16	16IR40UN	SP4066	0,64	40	0,05	0,60	0,60
033895	22	22IR5UN	SP4066	5,08	5	0,37	1,60	2,30
033897	22	22IR6UN	SP4066	4,23	6	0,33	1,60	2,30
033898	22	22IR7UN	SP4066	3,63	7	0,29	1,60	2,30



External Unified J Form (UNJ)

Standard reference: MIL-S8879C

Tolerance class: 3A / 3B



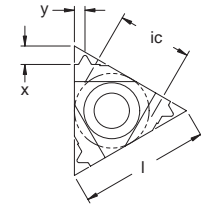
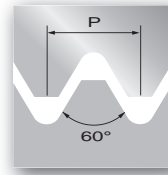
External Right Hand		Unified J Form (UNJ)		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
032345	16	16ER32UNJ	SP4066	0,79	32	0,60	0,60
032346	16	16ER28UNJ	SP4066	0,91	28	0,60	0,60
032347	16	16ER24UNJ	SP4066	1,06	24	0,70	0,80
032348	16	16ER20UNJ	SP4066	1,27	20	0,80	0,90
032349	16	16ER18UNJ	SP4066	1,41	18	0,80	1,00
032350	16	16ER16UNJ	SP4066	1,59	16	0,80	1,00
032351	16	16ER14UNJ	SP4066	1,81	14	1,00	1,20
032352	16	16ER12UNJ	SP4066	2,12	12	1,10	1,40



External Unified J Form (UNJ)

Standard reference: ISO 5855

Tolerance class: 4h/6h - 4H/5H



Threading

External Right Hand		Metric J Form (MJ)		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
032353	16	16ER0.8MJ	SP4066	0,80	-	0,60	0,70
032354	16	16ER1.0MJ	SP4066	1,00	-	0,60	0,70
032355	16	16ER1.25MJ	SP4066	1,25	-	0,70	0,90
032356	16	16ER1.5MJ	SP4066	1,50	-	0,80	1,00
032357	16	16ER2.0MJ	SP4066	2,00	-	1,00	1,30
032358	16	16ER2.5MJ	SP4066	2,50	-	1,10	1,50
032359	16	16ER3.0MJ	SP4066	3,00	-	1,20	1,60

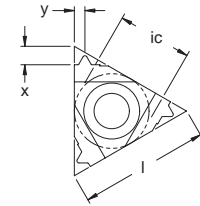
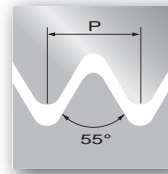


External British Standard Whitworth (W)

Standard reference: ISO 228/1: 1982,

B.S. 84:1956, DIN 259

Tolerance class: Medium Class A



External Right Hand		British Standard Whitworth (W)		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
033823	16	16ER8W	SP4066	3,18	8	1,20	1,50
033825	16	16ER9W	SP4066	2,82	9	1,20	1,70
033783	16	16ER10W	SP4066	2,54	10	1,10	1,50
031982	16	16ER11W	SP4066	2,31	11	1,10	1,50
033786	16	16ER12W	SP4066	2,12	12	1,10	1,40
031981	16	16ER14W	SP4066	1,81	14	1,00	1,20
033794	16	16ER16W	SP4066	1,59	16	0,90	1,10
033797	16	16ER18W	SP4066	1,41	18	0,80	1,00
031980	16	16ER19W	SP4066	1,34	19	0,80	1,00
033803	16	16ER20W	SP4066	1,27	20	0,80	0,90
033804	16	16ER22W	SP4066	1,15	22	0,80	0,90
033806	16	16ER24W	SP4066	1,06	24	0,70	0,80
033807	16	16ER26W	SP4066	0,98	26	0,70	0,80
031979	16	16ER28W	SP4066	0,91	28	0,60	0,70
033816	16	16ER32W	SP4066	0,79	32	0,60	0,60
033818	16	16ER36W	SP4066	0,71	36	0,60	0,60
033820	16	16ER40W	SP4066	0,64	40	0,60	0,60

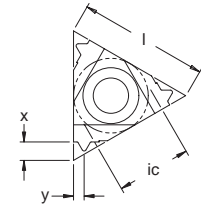
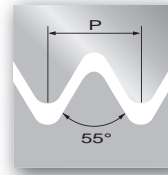


Internal British Standard Whitworth (W)

Standard reference: ISO 228/1: 1982,

B.S. 84:1956, DIN 259

Tolerance class: Medium Class A



Threading

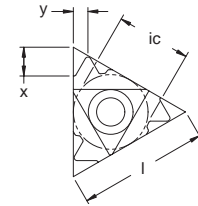
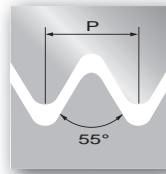
Internal Right Hand		British Standard Whitworth (W)		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
033749	08	08IR16W	SP4066	1,59	16	0,60	0,70
033752	08	08IR18W	SP4066	1,41	18	0,60	0,70
033753	08	08IR19W	SP4066	1,34	19	0,60	0,70
033755	08	08IR20W	SP4066	1,27	20	0,60	0,70
033757	08	08IR24W	SP4066	1,06	24	0,60	0,70
033759	08	08IR26W	SP4066	0,98	26	0,60	0,60
033762	08	08IR28W	SP4066	0,91	28	0,60	0,60
<hr/>							
032069	11	11IR28W	SP4066	0,91	28	0,60	0,70
032063	11	11IR26W	SP4066	0,98	26	0,70	0,80
032046	11	11IR19W	SP4066	1,34	19	0,80	1,00
032047	11	11IR14W	SP4066	1,81	14	0,90	1,10
032066	11	11IR11W	SP4066	2,31	11	0,90	1,20
<hr/>							
031983	16	16IR28W	SP4066	0,91	28	0,60	0,70
031984	16	16IR19W	SP4066	1,34	19	0,80	1,00
031985	16	16IR14W	SP4066	1,81	14	1,00	1,20
031986	16	16IR11W	SP4066	2,31	11	1,10	1,50



External British Standard Pipe Taper Thread (BSPT)

Standard reference: B.S 21: 1985

Tolerance class: Standard BSPT

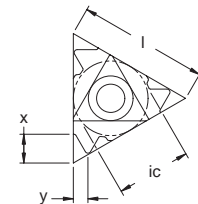


<i>External Right Hand</i>		British Standard Pipe Taper Thread (BSPT)		Pitch	TPI	X	Y
<i>EDP</i>	L (mm)	Description	Grade	mm		mm	mm
031987	16	16ER28BSPT	SP4066	0,91	28	0,70	0,80
031988	16	16ER19BSPT	SP4066	1,34	19	0,80	1,00
031989	16	16ER14BSPT	SP4066	1,81	14	0,90	1,20
031990	16	16ER11BSPT	SP4066	2,31	11	1,10	1,50

Internal British Standard Pipe Taper Thread (BSPT)

Standard reference: B.S 21: 1985

Tolerance class: Standard BSPT



<i>Internal Right Hand</i>		British Standard Pipe Taper Thread (BSPT)		Pitch	TPI	X	Y
<i>EDP</i>	L (mm)	Description	Grade	mm		mm	mm
032050	11	11IR19BSPT	SP4066	1,34	19	0,80	1,00
032061	11	11IR14BSPT	SP4066	1,81	14	0,80	1,00
031991	16	16IR28BSPT	SP4066	0,91	28	0,70	0,80
031992	16	16IR19BSPT	SP4066	1,34	19	0,80	1,00
031993	16	16IR14BSPT	SP4066	1,81	14	0,90	1,20
031994	16	16IR11BSPT	SP4066	2,31	11	1,10	1,50

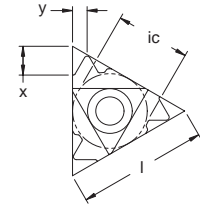
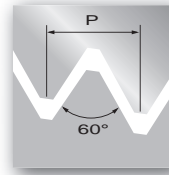


Threading

External National Taper Thread (NPT)

Standard reference: USAS B2:1: 1968

Tolerance class: Standard NPT

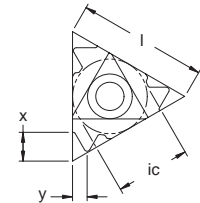


External Right Hand		National Taper Thread (NPT)		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
031971	16	16ER18NPT	SP4066	1,41	18	0,80	1,00
031972	16	16ER14NPT	SP4066	1,81	14	0,90	1,20
031973	16	16ER11.5NPT	SP4066	2,21	11,5	1,10	1,50
031974	16	16ER8NPT	SP4066	3,18	8	1,30	1,80

Internal National Taper Thread (NPT)

Standard reference: USAS B2:1: 1968

Tolerance class: Standard NPT



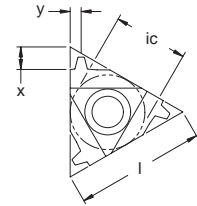
Internal Right Hand		National Taper Thread (NPT)		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
033760	08	08IR27NPT	SP4066	0,94	27	0,60	0,60
033750	08	08IR18NPT	SP4066	1,41	18	0,60	0,60
032054	11	11IR18NPT	SP4066	1,41	18	0,80	1,00
032052	11	11IR14NPT	SP4066	1,81	14	0,80	1,00
031975	16	16IR18NPT	SP4066	1,41	18	0,80	1,00
031976	16	16IR14NPT	SP4066	1,81	14	0,90	1,20
031977	16	16IR11.5NPT	SP4066	2,21	11,5	1,10	1,50
031978	16	16IR8NPT	SP4066	3,18	8	1,30	1,80



External ACME

Standard reference: ANSI B 1.5: 1988

Tolerance class: 3G

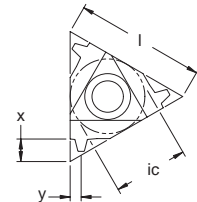


External Right Hand		ACME		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
032011	16	16ER12ACME	SP4066	2,12	12	1,10	1,20
032010	16	16ER10ACME	SP4066	2,54	10	1,30	1,30
032009	16	16ER8ACME	SP4066	3,18	8	1,50	1,50
032022	22	22ER6ACME	SP4066	4,23	6	1,80	2,10
032021	22	22ER5ACME	SP4066	5,08	5	2,00	2,30
032029	27	27ER4ACME	SP4066	6,35	4	2,30	2,70

Internal ACME

Standard reference: ANSI B 1.5: 1988

Tolerance class: 3G



Internal Right Hand		ACME		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
032014	16	16IR12ACME	SP4066	2,12	12	1,10	1,20
032013	16	16IR10ACME	SP4066	2,54	10	1,30	1,30
032012	16	16IR8ACME	SP4066	3,18	8	1,50	1,50
032024	22	22IR6ACME	SP4066	4,23	6	1,80	2,10
032023	22	22IR5ACME	SP4066	5,08	5	2,00	2,30
032031	27	27IR4ACME	SP4066	6,35	4	2,30	2,70

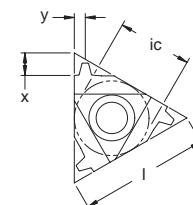
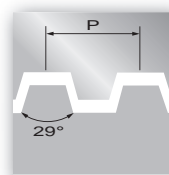


Threading

External Stub ACME (STACME)

Standard reference: ANSI B1.8:1988

Tolerance class: 2G

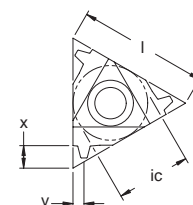


External Right Hand		Stub ACME (STACME)		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
032017	16	16ER12STACME	SP4066	2,12	12	1,20	1,20
032016	16	16ER10STACME	SP4066	2,54	10	1,30	1,30
032015	16	16ER8STACME	SP4066	3,18	8	1,50	1,50
033821	16	16ER6STACME	SP4066	4,23	6	1,50	1,80
032026	22	22ER6STACME	SP4066	4,23	6	1,80	1,80
032025	22	22ER5STACME	SP4066	5,08	5	2,00	2,30
032030	27	27ER4STACME	SP4066	6,35	4	2,30	2,40

Internal Stub ACME (STACME)

Standard reference: ANSI B1.8:1988

Tolerance class: 2G



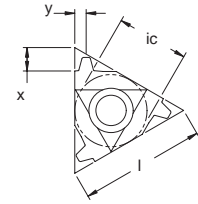
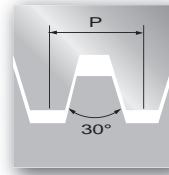
Internal Right Hand		ACME		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
032020	16	16IR12STACME	SP4066	2,12	12	1,20	1,20
032019	16	16IR10STACME	SP4066	2,54	10	1,30	1,30
032018	16	16IR8STACME	SP4066	3,18	8	1,50	1,50
033861	16	16IR6STACME	SP4066	4,23	6	1,50	1,80
032028	22	22IR6STACME	SP4066	4,23	6	1,80	1,80
032027	22	22IR5STACME	SP4066	5,08	5	2,00	2,30
032032	27	27IR4STACME	SP4066	6,35	4	2,30	2,40



External Trapezoidal (TR)

Standard reference: DIN 103

Tolerance class: 7e/7H

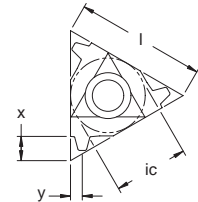


External Right Hand		Trapezoidal (TR)		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
033876	22	22ER4.0TR	SP4066	4,00	-	1,80	1,90
033878	22	22ER5.0TR	SP4066	5,00	-	2,00	2,40
033881	22	22ER6.0TR	SP4066	6,00	-	2,10	2,70

Internal Trapezoidal (TR)

Standard reference: DIN 103

Tolerance class: 7e/7H



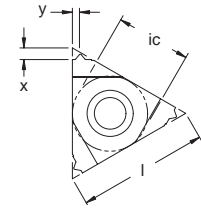
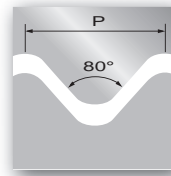
Internal Right Hand		Trapezoidal (TR)		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
033891	22	22IR4.0TR	SP4066	4,00	-	1,80	1,90
033894	22	22IR5.0TR	SP4066	5,00	-	2,00	2,40
033896	22	22IR6.0TR	SP4066	6,00	-	2,10	2,70



External Panzer Gerwinde (PG)

Standard reference: DIN 40430

Tolerance class: Standard



Threading

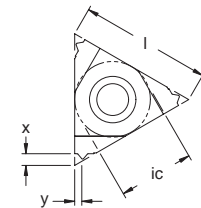
External Right Hand		Panzer Gerwinde (PG) DIN40431		Pitch	TPI	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033792	16	16ER16PG	SP4066	1,59	16	Pg 21-29-36-42-48	0,80	1,00
033795	16	16ER18PG	SP4066	1,41	18	Pg 9-11-13.5-16	0,80	0,90
033801	16	16ER20PG	SP4066	1,27	20	Pg 7	0,70	0,80

External Left Hand		Panzer Gerwinde (PG) DIN40431		Pitch	TPI	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
033769	16	16EL16PG	SP4066	1,59	16	Pg 21-29-36-42-48	0,80	1,00

Internal Panzer Gerwinde (PG)

Standard reference: DIN 40430

Tolerance class: Standard



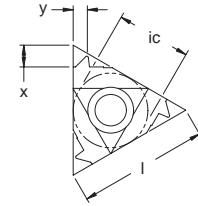
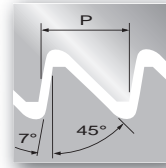
Internal Right Hand		Panzer Gerwinde (PG) DIN40431		Pitch	TPI	Nose Radius	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm	mm
032065	11	11IR18PG	SP4066	1,41	18	Pg 9-11-13.5-16	0,80	0,90
033845	16	16IR16PG	SP4066	1,59	16	Pg 21-29-36-42-48	0,80	1,00
033847	16	16IR18PG	SP4066	1,41	18	Pg 9-11-13.5-16	0,80	0,90
033851	16	16IR20PG	SP4066	1,27	20	Pg 7	0,70	0,80



External American Buttress

Standard reference: ANSI B1.9 :1973

Tolerance class: Class 2



External Right Hand		American Buttress		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
034604	16	16ER10ABUTT	SP4066	2,54	10	1,50	2,30
033785	16	16ER12ABUTT	SP4066	2,12	12	1,40	2,00
033791	16	16ER16ABUTT	SP4066	1,59	16	1,00	1,50
033800	16	16ER20ABUTT	SP4066	1,27	20	1,00	1,30
034605	22	22ER8ABUTT	SP4066	3,18	8	2,10	3,30
034606	22	22ER12ABUTT	SP4066	2,12	12	1,60	2,10

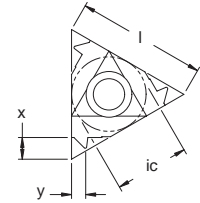
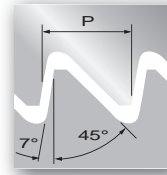


Threading

Internal American Buttress

Standard reference: ANSI B1.9 :1973

Tolerance class: Class 2



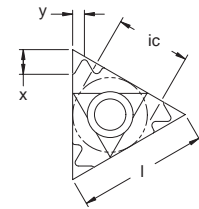
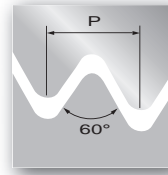
Internal Right Hand		American Buttress		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
034608	16	16IR10ABUTT	SP4066	2,54	10	1,50	2,30
033841	16	16IR12ABUTT	SP4066	2,12	12	1,40	2,00
033844	16	16IR16ABUTT	SP4066	1,59	16	1,00	1,30
033850	16	16IR20ABUTT	SP4066	1,27	20	1,00	1,30
<hr/>							
034609	22	22IR8ABUTT	SP4066	3,18	8	2,10	3,30
034610	22	22IR12ABUTT	SP4066	2,12	12	1,60	2,10



External API Round (APIRD)

Standard reference: API Standard 5B :1979

Tolerance class: Standard API Round

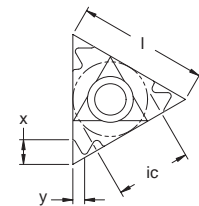


External Right Hand		API Round (APIRD)		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
033822	16	16ER8APIRD	SP4066	3,18	8	1,30	1,50
033781	16	16ER10APIRD	SP4066	2,54	10	1,20	1,40
032035	22	22ER8APIRD	SP4066	3,18	8	1,60	2,10

Internal API Round (APIRD)

Standard reference: API Standard 5B :1979

Tolerance class: Standard API Round



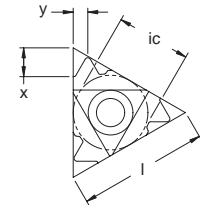
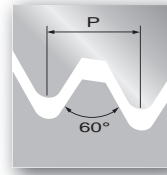
Internal Right Hand		API Round (APIRD)		Pitch	TPI	X	Y
EDP	L (mm)	Description	Grade	mm		mm	mm
033862	16	16IR8APIRD	SP4066	3,18	8	1,30	1,50
033838	16	16IR10APIRD	SP4066	2,54	10	1,20	1,40
032036	22	22IR8APIRD	SP4066	3,18	8	1,60	2,10



External API (Oilfield)

Standard reference: API Specification 7: 1990

Tolerance class: Standard API



Threading

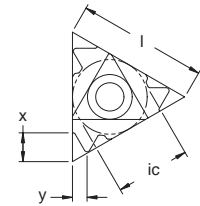
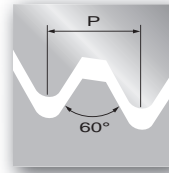
External Right Hand		API (Oilfield)		Pitch Range	TPI	Taper		X	Y
EDP	L (mm)	Description	Grade	mm		IPF	Angle	mm	mm
032039	22	22ER5API403	SP4066	5,08	5	3	7° - 1'	1,80	2,50
032034	22	22ER4API383	SP4066	6,35	4	3	7° - 1'	2,10	2,80
032033	22	22ER4API382	SP4066	6,35	4	2	4° - 43'	2,10	2,80
033874	22	22ER4API502	SP4066	6,35	4	2	4° - 43'	2,00	3,00
033875	22	22ER4API503	SP4066	6,35	4	3	7° - 1'	2,00	3,00
032037	27	27ER4API382	SP4066	6,35	4	2	4° - 43'	2,10	2,80
032038	27	27ER4API383	SP4066	6,35	4	3	7° - 1'	2,10	2,80
032040	27	27ER4API502	SP4066	6,35	4	2	4° - 43'	2,00	3,00
032041	27	27ER4API503	SP4066	6,35	4	3	7° - 1'	2,00	2,00




Internal API (Oilfield)

Standard reference: API Specification 7: 1990

Tolerance class: Standard API



Internal Right Hand		API (Oilfield)		Pitch Range	TPI	Taper		X	Y
EDP	L (mm)	Description	Grade	mm		IPF	Angle	mm	mm
033132	22	22IR5API403	SP4066	5,08	5	3	7° - 1'	1,80	2,50
033133	22	22IR4API383	SP4066	6,35	4	3	7° - 1'	2,10	2,80
033134	22	22IR4API382	SP4066	6,35	4	2	4° - 43'	2,10	2,80
033888	22	22IR4API502	SP4066	6,35	4	2	4° - 43'	2,00	3,00
033889	22	22IR4API503	SP4066	6,35	4	3	7° - 1'	2,00	3,00
033135	27	27IR4API382	SP4066	6,35	4	2	4° - 43'	2,10	2,80
033136	27	27IR4API383	SP4066	6,35	4	3	7° - 1'	2,10	2,80
033137	27	27IR4API502	SP4066	6,35	4	2	4° - 43'	2,00	3,00
033138	27	27IR4API503	SP4066	6,35	4	3	7° - 1'	2,00	2,00

OILFIELD CONNECTORS

Reference to Part Number	TPI	Taper IPF	Connector No. or size
API V 0.038R	4	2	NC23, NC28, NC31, NC35, NC38, NC40, NC44, NC46 NC50, 4 FH, 2 3/8" IF, 3 1/2" IF, 4 1/2" IF, 5 1/2" IF
API V 0.038R	4	3	NC56, NC61, NC70, NC77
API V 0.040	5	3	2 3/8" REG, 2 7/8" REG, 3 1/2" REG, 4 1/2" REG 3 1/2" FH, 4 1/2" FH
API V 0.050	4	3	5 1/2" REG, 7 5/8" REG, 8 5/8" REG
API V 0.050	4	2	6 5/8" REG, 5 1/2" FH, 6 5/8" FH
API V 0.055	6	1.5	NC10, NC12, NC13, NC16
API V 0.065	4	2	Superceded by API V 0.038R



Threading

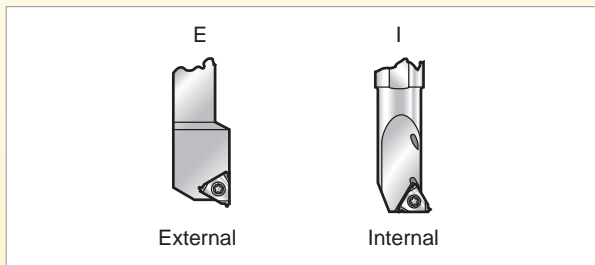
API Rotary Connections					
API Connections	TPI	TPF	API Code	Stellram Part Number	Catalog Page Number
API Number					
NC10 - NC16	6.0	1.5	V-0.055	6API551.5	-
NC23 - NC50	4.0	2.0	V-0.038R	4API382	238 - 239
NC56 - NC77	4.0	3.0	V-0.038R	4API383	238 - 239
API Regular					
2 3/8 REG - 4 1/2 REG	5.0	3.0	V-0.040	5API403	238 - 239
5 1/2 REG - 7 5/8 REG, 8 5/8 REG	4.0	3.0	V-0.050	4API503	238 - 239
6 5/8 REG	4.0	2.0	V-0.050	4API502	238 - 239
Internal Flush					
2 3/8 IF - 6 5/8 IF	4.0	2.0	V-0.038R	4API382	238 - 239
Full Hole					
3 1/2 FH, 4 1/2 FH	5.0	3.0	V-0.040	5API403	238 - 239
4FH	4.0	2.0	V-0.038R	4API382	238 - 239
5 1/2 FH, 6 5/8 FH	4.0	2.0	V-0.050	4API502	238 - 239
Hughes External Flush					
2 3/8, 2 7/8	6.0	2.0	Drawing On Request		-
3 1/2, 4 1/2	4.0	2.0	V-0.038R	4API382	238 - 239
Hughes Xtra Hole					
2 7/8 -5	4.0	2.0	V-0.038R	4API382	238 - 239
Hughes Slim Hole					
2 3/8 - 4 1/2	4.0	2.0	V-0.038R	4API382	238 - 239
Hughes Double Streamline					
3 1/2 - 5 1/2	4.0	2.0	V-0.038R	4API382	238 - 239
Hughes H90					
3 1/2 - 6 5/8	3.5	2.0	Drawing On Request		-
7 - 8 5/8	3.5	3	Drawing On Request		-
Hughes Slimline H90					
2 3/8 - 3 1/2	3.0	1.25	Drawing On Request		-
PAC					
2 3/8 PAC - 2 7/8 PAC	4.0	1.5	-	4 PAC	-



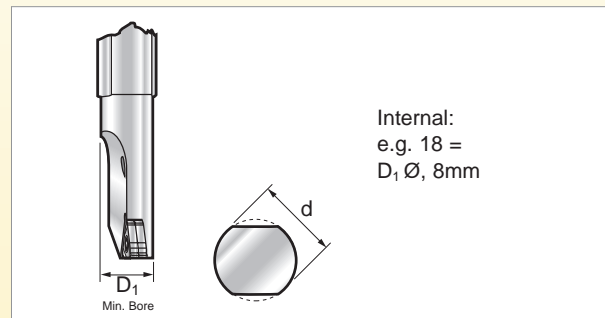
External	E	R	-	20	20	K	16	-
	1	2	3	4	5	6	7	8
Internal	I	R	N	16	18	M	16	-

Threading

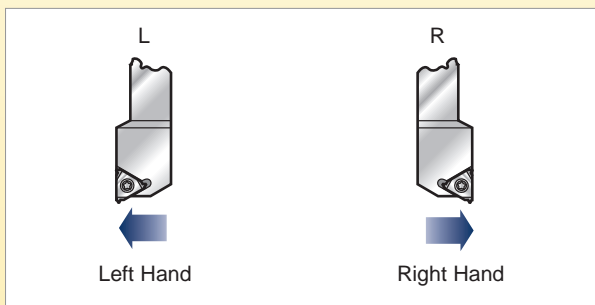
1 Utilisation



5 Minimum Bore Size (Internal)



2 Hand



6 Tool Length

D = 60	Q = 180	
F = 80	R = 200	
H = 100	S = 250	
K = 125	T = 300	
L = 140	U = 350	
M = 150	V = 400	
P = 170		

3 Option

N = No Anvil

4 Shank Size or Tool Diameter

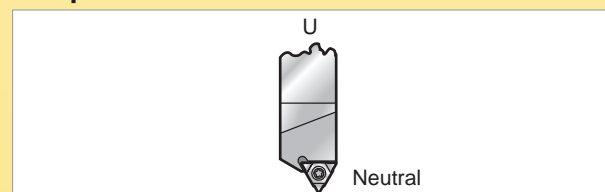
4. Internal Shank Diameter
e.g. 16 = d 16 mm

4 & 5. External Square Shank
e.g. 2020 = 20 x 20mm

7 Insert Size

L mm	IC Inch	
06	5/32	
08	3/16	
08U	3/16	
11	1/4	
16	3/8	
22	1/2	
22U	1/2U	
27	5/8	
27U	5/8U	

8 Option

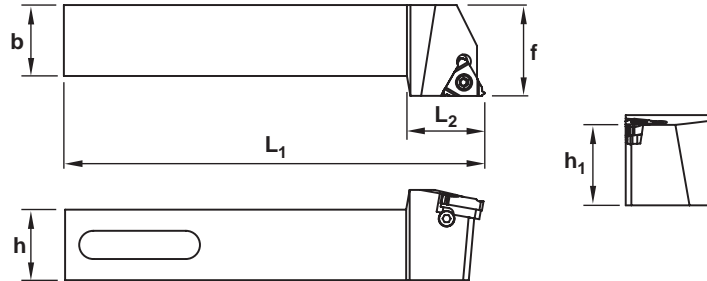
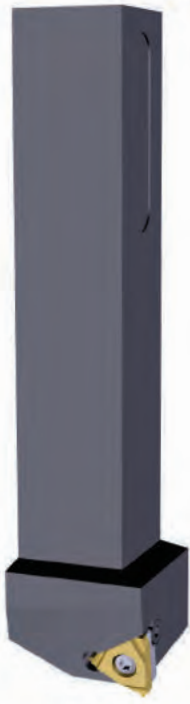




ER/EL 90°



Threading



LH & RH External Square Shank Tool Holder										
EDP	Item Description	Hand	Insert Sizes & Types	Dimensions (mm)					Anvil Type	
				h = h1	b	f	L1	L2	Anvil	Anvil Hand
021548	ERNM1010H11	RH	ER11	10	10	14	100	13	-	-
025179	ERN1010M16	RH	ER16	10	10	13	150	19	-	-
021361	EL1212F16	LH	EL16	12	12	16	80	22	Y13	
021363	EL1616H16	LH	EL16	16	16	20	100	22		
021365	EL2020K16	LH	EL16	20	20	25	125	27		
021367	EL2525M16	LH	EL16	25	25	32	150	27		
021369	EL3232Q16	LH	EL16	32	32	40	180	27		
021362	ER1212F16	RH	ER16	12	12	16	80	22	YE3	
021364	ER1616H16	RH	ER16	16	16	20	100	22		
021366	ER2020K16	RH	ER16	20	20	25	125	27		
021368	ER2525M16	RH	ER16	25	25	32	150	27		
021370	ER3232Q16	RH	ER16	32	32	40	180	27		
021371	EL2525M22	LH	EL22	25	25	32	150	30	Y14	
021373	EL3232Q22	LH	EL22	32	32	40	180	30		
021375	EL4040R22	LH	EL22	40	40	50	200	30		
021372	ER2525M22	RH	ER22	25	25	32	150	30	YE4	
021374	ER3232Q22	RH	ER22	32	32	40	180	30		
021376	ER4040R22	RH	ER22	40	40	50	200	30		
021381	EL3232Q27	LH	EL27	32	32	40	180	35	Y15	
021383	EL4040R27	LH	EL27	40	40	50	200	35		
021382	ER3232Q27	RH	ER27	32	32	40	180	35	YE5	
021384	ER4040R27	RH	ER27	40	40	50	200	35		

Right Hand Toolholders and Inserts, Specify R = RH | Left Hand Toolholders and Inserts, Specify L = LH



Threading

ER/EL 90° L/R Spare Parts

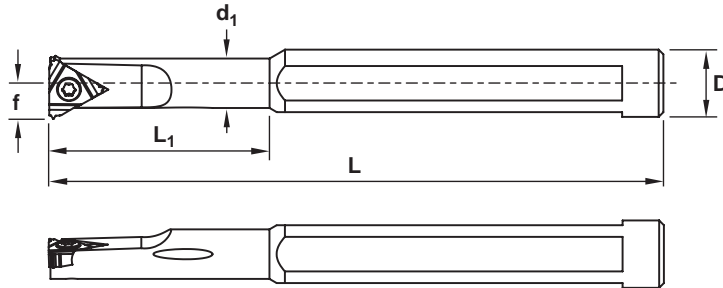
Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
ERNM1010H11	015558	SN2T	015554	T8F	-	-	-	-
ERN1010M16	015560	SA3T	023379	T10F	-	-	-	-
EL 1212F16	015560	SA3T	023379	T10F	015389	YI3	015551	SY3T
EL 1616H16								
EL 2020K16								
EL 2525M16								
EL 3232Q16	015560	SA3T	023379	T10F	015447	YE3	015551	SY3T
ER 1212F16								
ER 1616H16								
ER 2020K16								
ER 2525M16								
ER 3232Q16	015561	SA4T	015556	T20F	015483	YI4	015552	SY4T
EL2525M22								
EL3232Q22								
EL4040R22								
ER2525M22	015561	SA4T	015556	T20F	015463	YE4	015552	SY4T
ER3232Q22								
ER4040R22								
EL3232Q27	015562	SA5T	015557	T25F	015523	YI5	015553	SY5T
EL4040R27								
ER3232Q27								
ER4040R27	015562	SA5T	015557	T25F	015503	YE5	015553	SY5T



IR 90°



Threading



IR LH & RH Internal Boring Bars										
EDP	Item Description	Hand	Insert Sizes & Types	Dimensions (mm)						
				Min Bore Thread Ø A	ØD	d ₁	f	L	L ₁	Through Coolant
021394	IRN1206H06	IR	06IR	6	12	5,80	4,20	100	13	☰
021396	IRN1608K08	IR	08IR	8	16	6,30	5,10	125	17	☰
021400	IRN1610K08	IR	08IR	10	16	7,80	6	125	17	☰
021402	IRN1013K11	IR	11IR	13	10	9,50	7,30	125	25	☰
023231	IRN2013M11	IR	11IR	13	20	10	7,30	150	25	☰
021406	IRN1616M11	IR	11IR	16	16	12,50	8,90	150	40	☰
021408	IRN1618M16	IR	16IR	18	16	12	9,40	150	40	☰
021410	IRN2021Q16	IR	16IR	21	20	15,80	12,40	180	40	☰
021412	IR2024Q16	IR	16IR	24	20	18,50	13	180	50	☰
021414	IR2529R16	IR	16IR	29	25	24	16	200	60	☰
021416	IR3236S16	IR	16IR	36	32	31,50	19,60	250	60	☰
021418	IR4044T16	IR	16IR	44	40	40	23,80	300	-	☒
021422	IRN2027Q22	IR	22IR	27	20	20	15,60	180	-	☰
021424	IR2532R22	IR	22IR	32	25	24,50	17,80	200	-	☰
021426	IR3239S22	IR	22IR	39	32	32	21,50	250	-	☰
021428	IR4047T22	IR	22IR	47	40	40	25,80	300	-	☒
021446	IR3240S27	IR	27IR	40	32	32	22,40	250	-	☰
021448	IR4048T27	IR	27IR	48	40	40	26,40	300	-	☒

IL = Left Hand Tooling is available on request



Threading

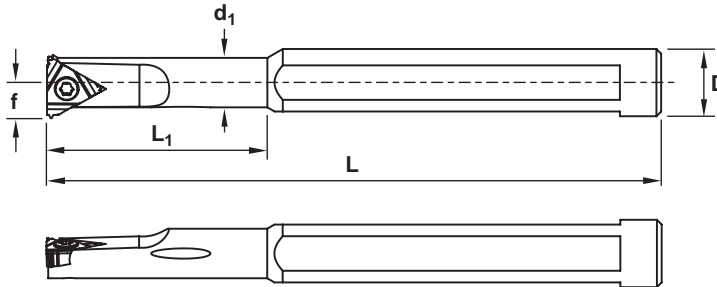
IR 90° L/R Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
IR1206H06	015563	S6T	018487	T6	-	-	-	-
IRN1608K08	015564	S8T	018487	T6	-	-	-	-
IRN1610K08								
IRN1013K11	015558	SN2T	015554	T8F	-	-	-	-
IRN2013M11								
IRN1616M11								
IRN1618M16	015560	SA3T	023379	T10F	-	-	-	-
IRN2021Q16								
IR2024Q16	015560	SA3T	023379	T10F	015389	Y13	015551	SY3T
IR2529R16								
IR3236S16								
IR4044T16								
IRN2027Q22	015561	SA4T	015556	T20F	015483	Y14	015552	SY4T
IR2532R22								
IR3239S22								
IR4047T22								
IR3240S27								
IR4048T27	015562	SA5T	015557	T25F	015523	Y15	015553	SY5T



IR 90° CF Anti Vibration

Threading



IR LH & RH Internal Boring Bars

EDP	Item Description	Hand	Insert Sizes & Types	Dimensions (mm)						
				Min Bore Thread Ø A	ØD	d ₁	f	L	L ₁	Through Coolant
021540	IRN1206H06CF	IR	06IR	6	12	5.80	4.20	100	18	
021498	IRN1608H08CF	IR	08IR	8	16	6.30	5.10	100	23	
021502	IRN1610H08CF	IR	08IR	10	16	8.10	6	100	23	
021504	IRN1013H11CF	IR	11IR	13	10	9.50	7.30	100	33	
021506	IRN1616M11CF	IR	11IR	16	16	12.50	8.90	150	53	
021508	IRN1618M16CF	IR	16IR	18	16	12	9.40	150	53	
021510	IRN2021M16CF	IR	16IR	21	20	15.80	12.40	150	53	
021512	IR2024R16CF	IR	16IR	24	20	18.50	13	200	67	

IL = Left Hand Tooling is available on request | CF = Chatter Free

IR 90° CF Spare Parts

Item Description	Insert Screw EDP		Insert Key EDP		Anvil EDP		Anvil Screw EDP	
IRN1206H06CF	015563	S6T	018487	T6	-	-	-	-
IRN1608H08CF	015564	S8T	018487	T6	-	-	-	-
IRN1610H08CF								
IRN1013H11CF	015558	SN2T	015554	T8F	-	-	-	-
IRN1616M11CF								
IRN1618M16CF	015560	SA3T	023379	T10F	-	-	-	-
IRN2021M16CF								
IR2024R16CF	015560	SA3T	023379	T10F	015389	Y13	015551	SY3T

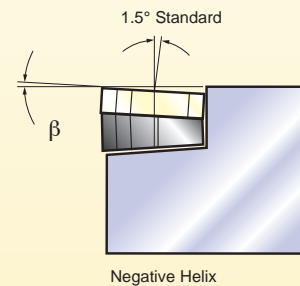
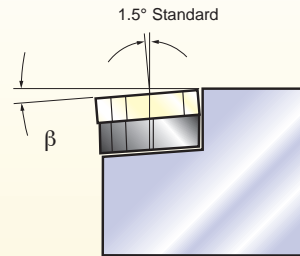


With the Stellram threading system, a wide range of thread helix angles can be obtained without changing or modifying toolholders. This is obtained by simply changing the carbide anvil.

Most toolholders are produced with 1.5° helix machined into the body. These tools are supplied with this angle as standard.

Interchangeable anvils allow helix variations between +4.5° and -1.5° with the insert cutting edge remaining constant.

Negative helix angles are used for producing right hand threads with left hand holders or left hand threads with right hand holders.



Insert size		Toolholder	β Helix Angle							
			4.5°	3.5°	2.5°	1.5°	0.5°	0°	-0.5°	-1.5°
mm	Inch	Anvil Part Numbers								
16	3/8"	EX RH / IN LH	YE33P	YE32P	YE31P	YE3	YE31N	YE31.5N	YE32N	YE33N
		EX LH / IN RH	YI33P	YI32P	YI31P	YI3	YI31N	YI31.5N	YI32N	YI33N
22	1/2"	EX RH / IN LH	YE43P	YE42P	YE41P	YE4	YE41N	YE41.5N	YE42N	YE43N
		EX LH / IN RH	YI43P	YI42P	YI41P	YI4	YI41N	YI41.5N	YI42N	YI43N
22U	1/2"	EX RH / IN LH	YE4U3P	YE4U2P	YE4U1P	YE4U	YE4U1N	YE4U1.5N	YE4U2N	YE4U3N
		EX LH / IN RH	YI4U3P	YI4U2P	YI4U1P	YI4U	YI4U1N	YI4U1.5N	YI4U2N	YI4U3N
27	5/8"	EX RH / IN LH	YE53P	YE52P	YE51P	YE5	YE51N	YE51.5N	YE52N	YE53N
		EX LH / IN RH	YI53P	YI52P	YI51P	YI5	YI51N	YI51.5N	YI52N	YI53N
27U	5/8"	EX RH / IN LH	YE5U3P	YE5U2P	YE5U1P	YE5U	YE5U1N	YE5U1.5N	YE5U2N	YE5U3N
		EX LH / IN RH	YI5U3P	YI5U2P	YI5U1P	YI5U	YI5U1N	YI5U1.5N	YI5U2N	YI5U3N

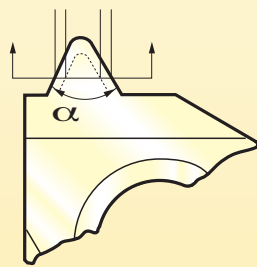
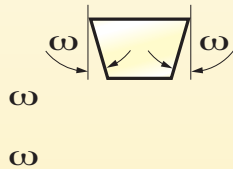
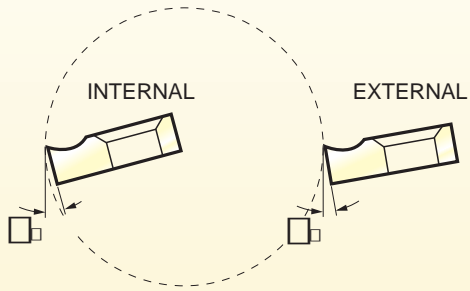
Note: Standard toolholders are supplied with 1.5° helix angle as standard.

Calculation of thread helix angle for a given thread

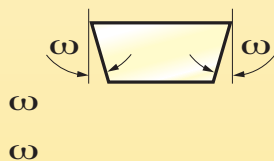
$$\text{Helix angle} - \tan^{-1} \theta = \frac{\text{Lead of the Thread}}{\text{Pitch/Effective Diameter} \times \pi}$$



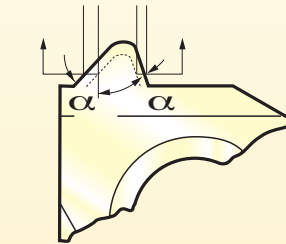
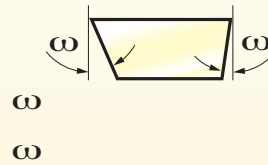
Flank Clearance Angle Selection



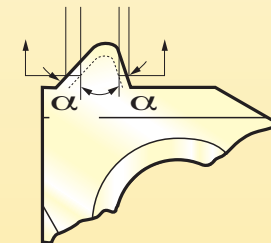
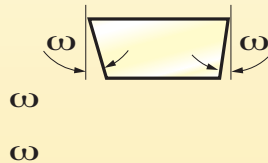
ISO
UN
PARTIAL 60°
NPT



TRAPEZOIDAL
ACME
STUB ACME

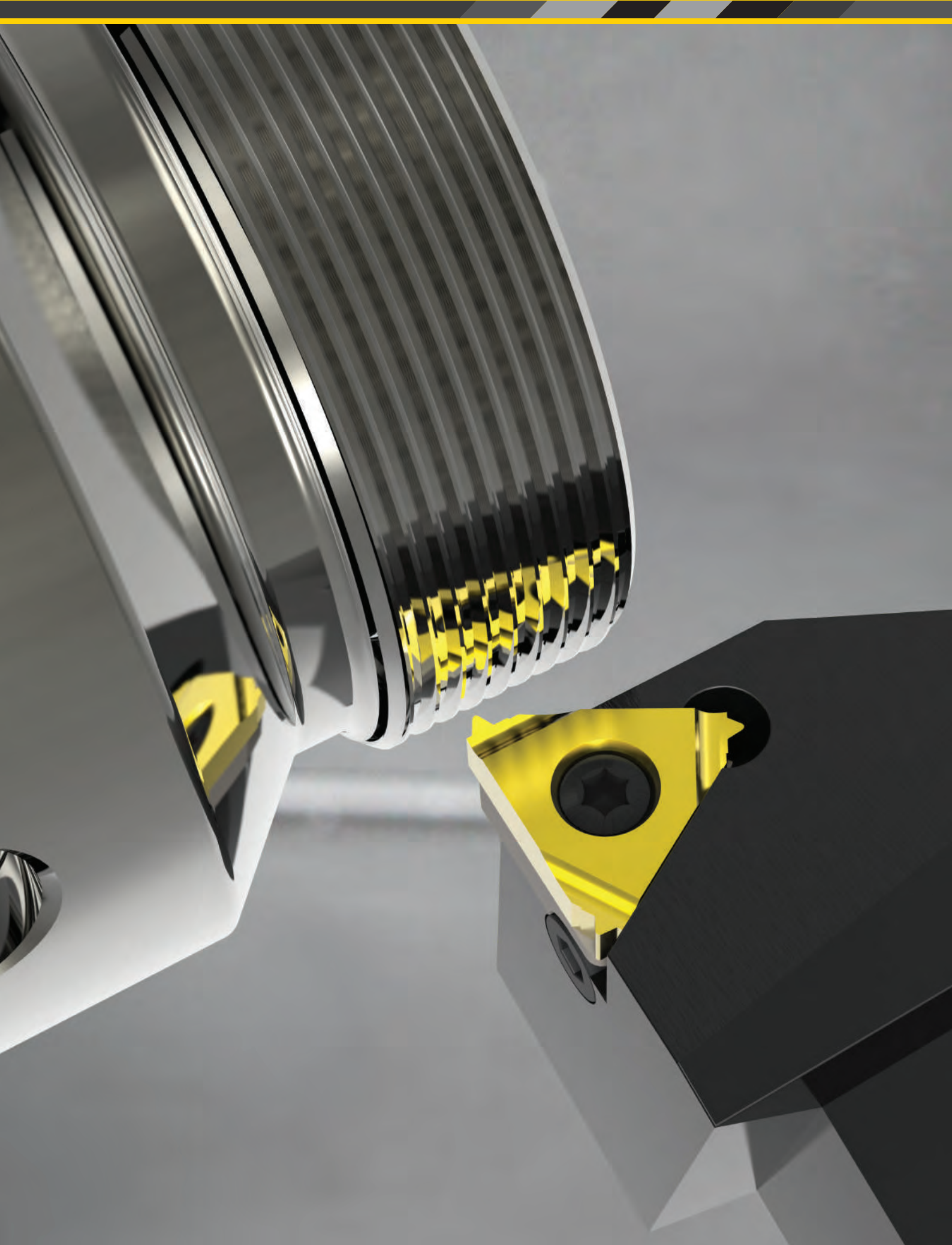


AMERICAN BUTTRESS



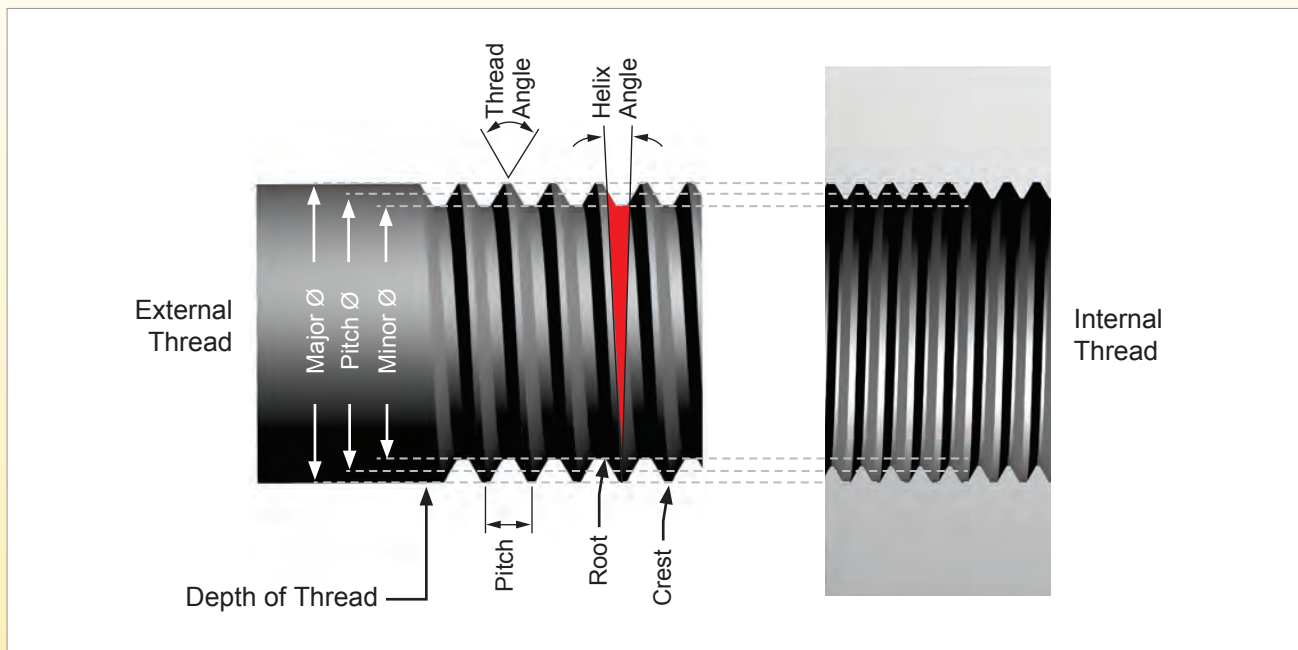
SAGE (DIN 513)







Depth of Thread



Depth of Thread

The distance between the Crest and Root.

Pitch

The distance between two thread form peaks, defined as TPI (thread per inch) in millimeters or as an inch decimal.

Pitch or Effective Diameter

Is where the theoretical cylinder diameter cuts the thread form, when the thread form width and groove depth are equal, applies to parallel/straight threads forms only.

Helix Angle: (Parallel/Straight Thread Forms)

Where the lead of the thread and the pitch diameter cylinder form a right angle. The helix angle is the angle opposite the lead.

Major Diameter

The largest diameter of the thread form.

Minor or Root Diameter

The smallest diameter of the thread form.

Thread Angle

The included angle between the individual flanks.

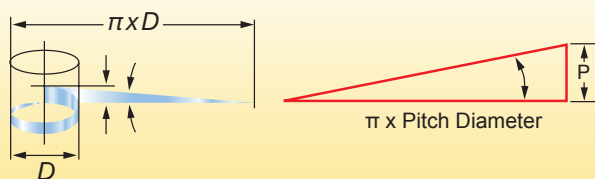
Root

The inner most surface of the thread, connecting the flanks.

Crest

The outer most surface of the thread, connecting the flanks.

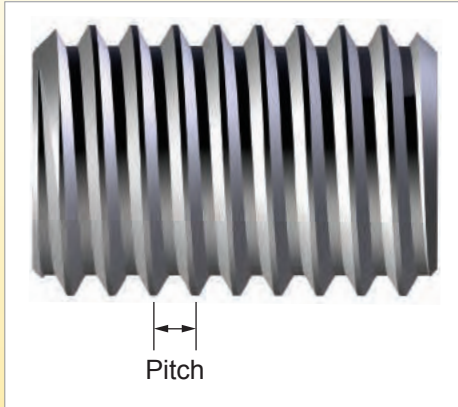
Helix Angle



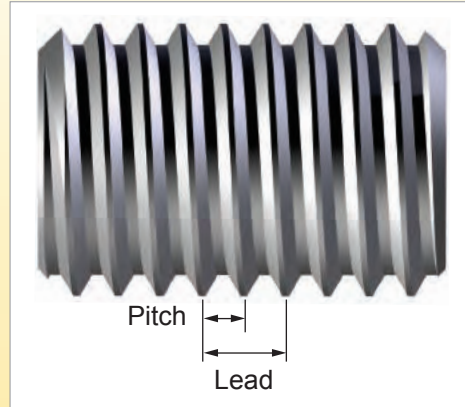
D = Pitch/Effectuated Diameter
 P = Pitch or Lead
 ϕ = Helix Angle



Pitch & Lead with Multi Start Thread



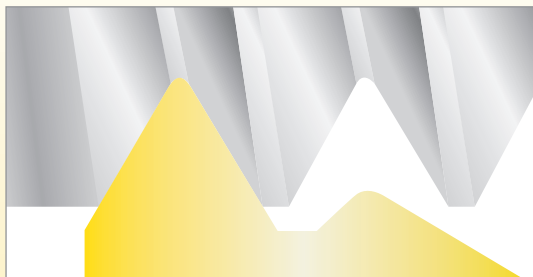
Pitch =
Axial distance from one thread point to the corresponding point on the next form



Lead =
Pitch x Number of starts
Or the distance travelled in one rotation of the work-piece

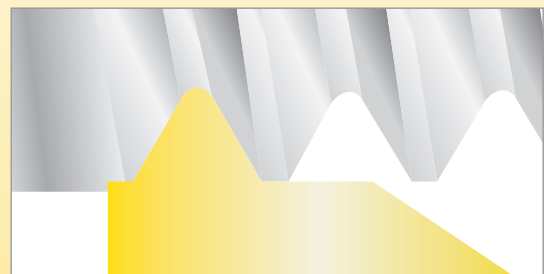
Example for two start thread

Threading Insert Profile Types



Partial Profile
The partial profile insert does not crest or top the outer diameter of the thread profile but, can be used on multi thread pitches with the same thread angle.

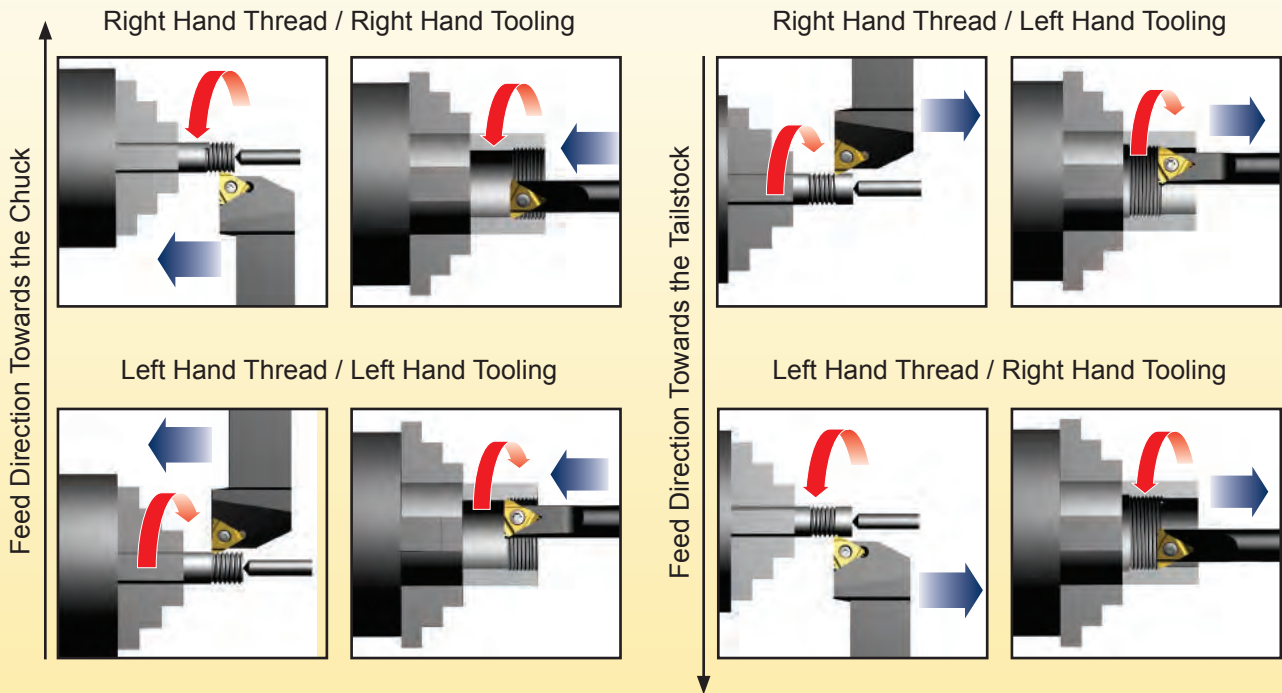
Full Profile
The full form insert controls the complete thread profile by cresting/topping the form. A different insert is required for each pitch.





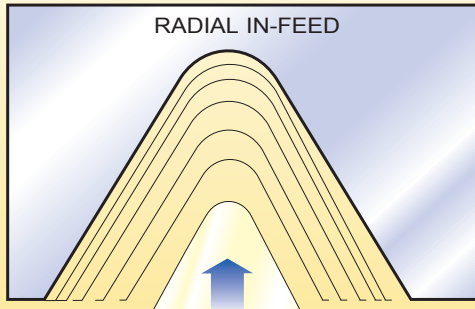
Direction of cut using LH & RH Tooling

Threading



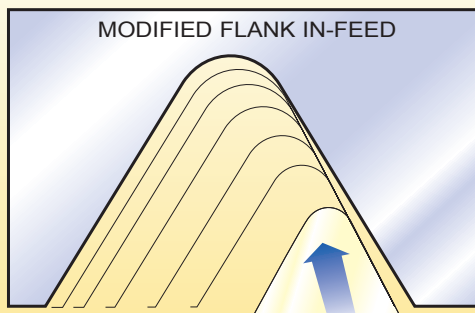


Radial In-Feed



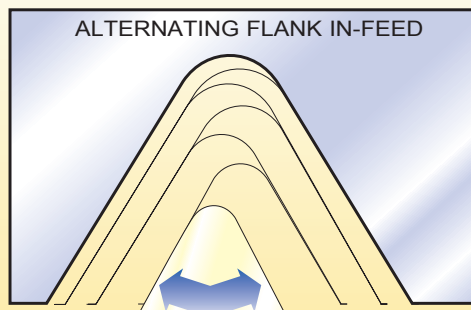
- Most commonly used method on manual lathes.
- Equal wear on leading and trailing edge.
- Good surface finish on trailing edge.
- Use on work hardening materials.
- Use on short chipping materials.
- For pitches of less than 1,5mm or 16 T.P.I.

Modified Flank In-Feed



- For threads greater than 1,5mm or 16 T.P.I.
- Reduced cutting pressure on larger pitches.
- Reduced chatter.
- Directs chip away from the cutting edge.
- Displaced in-feed angle improves surface finish.
- First choice for internal threading.

Alternating Flank In-Feed



- Recommended for large pitches, square ACME and trapezoidal forms.
- Recommended for long chipping materials.
- Method divides the work between both flanks.
- Results in equal wear.
- Less cutting pressure.
- Not available on all lathes.



Threading

Helix Angle Calculation (mm)

Outside Diameter mm	Pitch								
	1	1,25	1,5	1,75	2	3	4	5	6
Helix Angles (Degrees and Minutes)									
5	3° - 38'	4° - 33'	5° - 27'	-	-	-	-	-	-
6	3° - 2'	3° - 48'	4° - 33'	5° - 18'	6° - 33'	-	-	-	-
8	2° - 17'	2° - 51'	3° - 25'	3° - 59'	4° - 33'	6° - 49'	-	-	-
10	1° - 49'	2° - 16'	2° - 44'	3° - 11'	3° - 39'	5° - 27'	-	-	-
12	1° - 31'	1° - 54'	2° - 17'	2° - 39'	3° - 2'	4° - 33'	-	-	-
14	1° - 18'	1° - 38'	1° - 57'	2° - 17'	2° - 36'	3° - 54'	-	-	-
16	1° - 8'	1° - 42'	1° - 42'	2° - 0'	2° - 17'	3° - 25'	-	-	-
18	1° - 1'	1° - 16'	1° - 31'	1° - 46'	2° - 2'	3° - 2'	4° - 3'	-	-
20	55'	1° - 8'	1° - 22'	1° - 36'	1° - 49'	2° - 44'	3° - 39'	-	-
25	44'	55'	1° - 6'	1° - 16'	1° - 28'	2° - 11'	2° - 55'	-	-
30	36'	46'	55'	1° - 4'	1° - 13'	1° - 49'	2° - 26'	3° - 2'	3° - 39'
35	31'	39'	47'	55'	1° - 3'	1° - 33'	2° - 5'	2° - 36'	3° - 8'
40	27'	34'	41'	48'	55'	-	1° - 49'	2° - 17'	2° - 44'
45	24'	30'	36'	43'	48'	1° - 13'	1° - 37'	2° - 2'	2° - 26'
50	-	-	-	38'	44'	1° - 6'	1° - 28'	1° - 49'	2° - 11'
60	-	-	-	-	36'	55'	1° - 13'	1° - 31'	1° - 49'
70	-	-	23'	-	31'	47'	1° - 3'	1° - 18'	1° - 34'
80	-	-	-	-	-	41'	55'	1° - 8'	1° - 22'
90	-	-	-	21'	24'	36'	48'	1° - 1'	1° - 13'

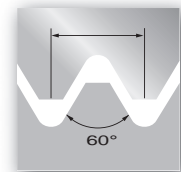
Calculation of thread helix angle for a given Thread

$$\text{Helix angle} - \tan^{-1} \theta = \frac{\text{Lead of the Thread}}{\text{Pitch} / \text{Effective Diameter} \times \pi}$$



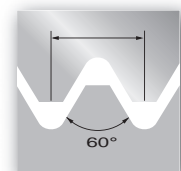
Threading

The table below provides recommendations for depths of cut for the different passes. These recommendations are intended as starting values for machining in steel and include stock 0,020mm - 0,075mm above crest. The suitable number of passes must be determined by optimum trials.



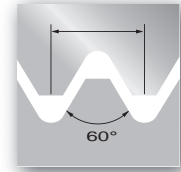
I.S.O Metric (ISO) 60°, External (mm)																	
Number of Passes	Pitch (mm)																
	0,5	0,75	0,8	1,0	1,25	1,5	1,75	2,0	2,5	3,0	3,5	4,0	4,5	5,0	5,5	6,0	
	Radial in-feed per pass (mm)																
1	0,102	0,178	0,178	0,178	0,178	0,229	0,229	0,254	0,279	0,279	0,330	0,330	0,381	0,406	0,432	0,457	
2	0,102	0,152	0,152	0,178	0,178	0,203	0,203	0,229	0,254	0,254	0,305	0,330	0,330	0,381	0,406	0,432	
3	0,076	0,102	0,127	0,127	0,152	0,178	0,152	0,178	0,203	0,203	0,254	0,254	0,279	0,330	0,330	0,356	
4	0,076	0,076	0,076	0,102	0,127	0,152	0,152	0,152	0,178	0,178	0,203	0,229	0,229	0,279	0,279	0,305	
5	0,356	0,508	0,533	0,076	0,102	0,127	0,127	0,152	0,152	0,152	0,178	0,178	0,229	0,229	0,229	0,279	
6				0,660	0,076	0,076	0,102	0,127	0,127	0,152	0,178	0,178	0,203	0,229	0,229	0,229	
7					0,813	0,965	0,102	0,102	0,127	0,127	0,152	0,152	0,178	0,203	0,203	0,229	
8							0,076	0,076	0,102	0,127	0,152	0,152	0,178	0,178	0,178	0,203	
9								1,143	1,270	0,102	0,127	0,152	0,152	0,152	0,178	0,178	0,203
10										0,076	0,102	0,127	0,127	0,152	0,178	0,178	0,178
11										1,600	0,102	0,102	0,127	0,152	0,152	0,152	0,178
12											0,076	0,076	0,127	0,127	0,152	0,152	0,152
13											1,880	2,210	0,102	0,127	0,127	0,127	0,152
14													0,076	0,102	0,102	0,127	0,152
15													2,515	2,819	3,124	0,127	0,127
16																0,102	0,102
																3,429	3,734

Last pass equals total depth of thread.



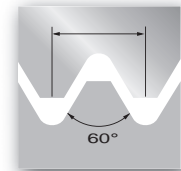
I.S.O Metric (ISO) 60°, Internal (mm)																	
Number of Passes	Pitch (mm)																
	0,5	0,75	1,0	1,25	1,5	1,75	2,0	2,5	3,0	3,5	4,0	4,5	5,0	5,5	6,0		
	Radial in-feed per pass (mm)																
1	0,102	0,178	0,178	0,203	0,254	0,229	0,254	0,279	0,279	0,305	0,330	0,356	0,381	0,381	0,406		
2	0,102	0,127	0,152	0,178	0,203	0,203	0,229	0,229	0,229	0,279	0,305	0,330	0,356	0,356	0,406		
3	0,076	0,102	0,102	0,127	0,152	0,152	0,178	0,178	0,203	0,229	0,229	0,279	0,305	0,305	0,356		
4	0,076	0,076	0,102	0,102	0,102	0,127	0,152	0,152	0,152	0,203	0,203	0,229	0,254	0,254	0,279		
5	0,356	0,483	0,076	0,102	0,102	0,102	0,127	0,152	0,152	0,178	0,178	0,203	0,229	0,229	0,229		
6			0,610	0,076	0,076	0,102	0,102	0,127	0,152	0,152	0,152	0,178	0,203	0,203	0,229		
7				0,787	0,889	0,102	0,102	0,102	0,127	0,152	0,152	0,152	0,178	0,178	0,203		
8						0,076	0,076	0,102	0,102	0,152	0,152	0,152	0,152	0,178	0,178		
9							1,092	1,219	0,102	0,102	0,127	0,127	0,152	0,152	0,152	0,178	
10									0,076	0,102	0,102	0,127	0,152	0,152	0,152	0,152	
11										1,499	0,102	0,102	0,102	0,127	0,152	0,152	0,152
12											0,076	0,076	0,102	0,127	0,152	0,152	0,152
13											1,778	2,057	0,102	0,102	0,127	0,152	0,152
14													0,076	0,102	0,102	0,127	0,152
15													2,337	2,642	2,896	0,127	0,127
16																0,102	0,102
																3,200	3,454

Last pass equals total depth of thread.



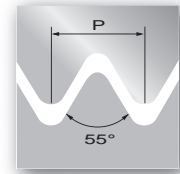
UNIFIED (UN) 60°, External (mm)																			
Number of Passes	T.P.I.																		
	32	28	24	20	18	16	14	13	12	11	10	9	8	7	6	5	4.5	4	
Radial in-feed per pass (mm)																			
1	0,178	0,178	0,178	0,203	0,229	0,229	0,229	0,254	0,279	0,279	0,279	0,279	0,305	0,356	0,356	0,432	0,406	0,483	
2	0,152	0,152	0,178	0,178	0,203	0,203	0,229	0,229	0,229	0,254	0,229	0,229	0,254	0,330	0,330	0,406	0,381	0,432	
3	0,127	0,127	0,152	0,152	0,152	0,152	0,178	0,178	0,203	0,203	0,203	0,203	0,229	0,254	0,254	0,330	0,330	0,356	
4	0,076	0,102	0,127	0,127	0,152	0,152	0,152	0,152	0,152	0,178	0,178	0,178	0,178	0,229	0,229	0,279	0,279	0,330	
5	0,533	0,076	0,076	0,102	0,127	0,127	0,127	0,152	0,152	0,152	0,152	0,152	0,178	0,178	0,203	0,229	0,254	0,305	
6		0,635	0,711	0,076	0,076	0,102	0,102	0,127	0,152	0,152	0,152	0,152	0,152	0,178	0,178	0,229	0,229	0,254	
7				0,838	0,940	0,076	0,102	0,102	0,127	0,127	0,152	0,152	0,152	0,152	0,178	0,203	0,203	0,229	
8						1,041	0,076	0,076	0,076	0,102	0,127	0,127	0,152	0,152	0,152	0,178	0,203	0,229	
9							1,194	1,270	1,372	0,076	0,102	0,127	0,127	0,152	0,152	0,178	0,178	0,229	
10										1,499	0,076	0,102	0,127	0,127	0,152	0,178	0,178	0,203	
11											1,651	0,076	0,102	0,102	0,152	0,178	0,152	0,178	
12												1,778	0,076	0,076	0,127	0,152	0,152	0,178	
13													2,032	2,286	0,102	0,127	0,152	0,152	
14															0,102	0,102	0,152	0,152	
15																2,667	3,200	0,152	0,127
16																		0,127	0,102
																		3,531	3,937

Last pass equals total depth of thread.



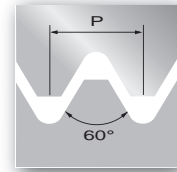
UNIFIED (UN) 60°, Internal (mm)																			
Number of Passes	T.P.I.																		
	32	28	24	20	18	16	14	13	12	11	10	9	8	7	6	5	4.5	4	
Radial in-feed per pass (mm)																			
1	0,178	0,178	0,178	0,203	0,229	0,229	0,229	0,254	0,279	0,279	0,279	0,279	0,305	0,330	0,356	0,406	0,406	0,457	
2	0,152	0,152	0,152	0,178	0,178	0,178	0,203	0,229	0,229	0,229	0,229	0,229	0,279	0,305	0,330	0,356	0,406	0,432	
3	0,102	0,102	0,152	0,127	0,152	0,152	0,152	0,152	0,178	0,178	0,152	0,178	0,203	0,229	0,229	0,305	0,330	0,356	
4	0,076	0,102	0,102	0,102	0,127	0,127	0,152	0,152	0,152	0,152	0,152	0,152	0,178	0,203	0,203	0,254	0,254	0,305	
5	0,508	0,076	0,076	0,102	0,102	0,102	0,102	0,127	0,127	0,152	0,152	0,152	0,152	0,178	0,178	0,229	0,229	0,254	
6		0,610	0,660	0,076	0,076	0,102	0,102	0,102	0,102	0,127	0,127	0,152	0,152	0,152	0,203	0,203	0,229	0,229	
7				0,787	0,864	0,076	0,102	0,102	0,102	0,102	0,102	0,127	0,127	0,152	0,152	0,178	0,178	0,229	
8						0,940	0,076	0,076	0,076	0,102	0,102	0,102	0,102	0,152	0,152	0,178	0,178	0,178	
9							1,118	1,194	1,245	0,076	0,102	0,102	0,102	0,127	0,152	0,152	0,178	0,178	
10										1,397	0,076	0,102	0,102	0,127	0,127	0,152	0,152	0,178	
11											1,499	0,076	0,102	0,102	0,127	0,152	0,152	0,178	
12												1,651	0,076	0,076	0,102	0,152	0,152	0,152	
13													1,880	2,134	0,102	0,127	0,152	0,152	
14															0,102	0,102	0,127	0,152	
15																2,464	2,946	0,127	0,127
16																		0,102	0,102
																		3,277	3,658

Last pass equals total depth of thread.



Whitworth (mm)																		
Number of Passes	T.P.I.																	
	28	26	20	19	18	16	14	12	11	10	9	8	7	6	5	4.5	4	
Radial in-feed per pass (mm)																		
1	0,203	0,203	0,203	0,229	0,229	0,203	0,254	0,279	0,279	0,305	0,279	0,305	0,356	0,356	0,381	0,406	0,457	
2	0,178	0,152	0,203	0,203	0,203	0,203	0,229	0,254	0,254	0,254	0,229	0,279	0,305	0,305	0,381	0,406	0,432	
3	0,127	0,152	0,152	0,152	0,178	0,152	0,178	0,203	0,203	0,203	0,229	0,229	0,279	0,279	0,356	0,356	0,356	
4	0,102	0,102	0,127	0,127	0,152	0,152	0,152	0,178	0,178	0,178	0,203	0,203	0,229	0,254	0,305	0,305	0,330	
5	0,076	0,076	0,102	0,127	0,127	0,127	0,127	0,152	0,152	0,152	0,178	0,178	0,203	0,203	0,279	0,279	0,330	
6	0,635	0,686	0,076	0,076	0,102	0,127	0,127	0,152	0,152	0,127	0,152	0,152	0,203	0,203	0,254	0,254	0,279	
7			0,864	0,914	0,076	0,102	0,102	0,127	0,127	0,127	0,152	0,152	0,178	0,203	0,229	0,229	0,279	
8					1,067	0,076	0,076	0,076	0,127	0,127	0,127	0,152	0,152	0,178	0,203	0,229	0,254	
9						1,143	1,245	1,422	0,076	0,127	0,127	0,127	0,152	0,152	0,203	0,203	0,254	
10									1,549	0,076	0,127	0,127	0,152	0,152	0,203	0,178	0,229	
11										1,676	0,076	0,127	0,127	0,152	0,178	0,178	0,203	
12											1,880	0,076	0,076	0,152	0,152	0,152	0,203	
13												2,108	2,413	0,127	0,127	0,152	0,178	
14														0,102	0,102	0,152	0,152	
15															2,819	3,353	0,147	0,127
16																	0,102	0,102
																	3,708	4,166

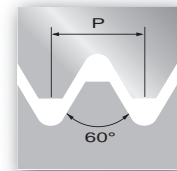
Last pass equals total depth of thread.



Threading

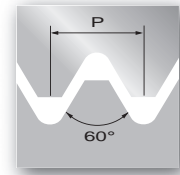
UNIFIED "J" for Aircraft (UNJ), External (mm)										
Number of Passes	T.P.I.									
	32	28	24	20	18	16	14	12	10	8
	Radial in-feed per pass (mm)									
1	0,178	0,178	0,178	0,203	0,229	0,229	0,229	0,279	0,279	0,305
2	0,152	0,152	0,152	0,178	0,203	0,203	0,203	0,229	0,229	0,279
3	0,127	0,102	0,152	0,152	0,152	0,152	0,152	0,203	0,203	0,203
4	0,076	0,102	0,102	0,102	0,127	0,127	0,127	0,152	0,152	0,178
5	0,533	0,076	0,076	0,102	0,102	0,102	0,127	0,152	0,152	0,152
6		0,610	0,660	0,076	0,076	0,102	0,102	0,102	0,127	0,152
7				0,813	0,889	0,076	0,102	0,102	0,127	0,127
8						0,991	0,076	0,076	0,102	0,127
9							1,118	1,295	0,102	0,127
10									0,076	0,102
11									1,549	0,102
12										0,076
										1,930

Last pass equals total depth of thread.



Metric "J" for Aircraft (MJ), External (mm)				
Number of Passes	Pitch (mm)			
	1,0	1,5	1,75	2,0
	Radial in-feed per pass (mm)			
1			0,2286	0,254
2			0,2032	0,2286
3			0,1524	0,1778
4			0,1524	0,1524
5			0,127	0,127
6			0,0762	0,127
7			0,9398	0,1016
8				0,0762
				1,2446

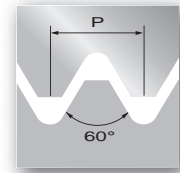
Last pass equals total depth of thread.



National Pipe Taper Dryseal (NPTF) External and Internal (mm)

Number of Passes	T.P.I.				
	27	18	14	11.5	8
Radial in-feed per pass (mm)					
1	0,178	0,229	0,254	0,254	0,254
2	0,152	0,203	0,229	0,254	0,229
3	0,127	0,152	0,152	0,203	0,229
4	0,102	0,127	0,152	0,152	0,203
5	0,102	0,102	0,127	0,152	0,178
6	0,076	0,102	0,127	0,127	0,152
7	0,737	0,102	0,102	0,102	0,152
8		0,076	0,102	0,102	0,152
9		1,092	0,102	0,102	0,127
10			0,076	0,102	0,127
11			1,422	0,102	0,127
12				0,076	0,127
13				1,727	0,102
14					0,102
15					0,102
16					0,102
					2,464

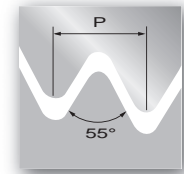
Last pass equals total depth of thread.



National Pipe Taper (NPT) External & Internal (mm)

Number of Passes	T.P.I.				
	27	18	14	11.5	8
Radial in-feed per pass (mm)					
1	0,203	0,229	0,229	0,229	0,254
2	0,152	0,178	0,203	0,203	0,229
3	0,127	0,152	0,178	0,178	0,203
4	0,102	0,152	0,152	0,152	0,203
5	0,102	0,127	0,152	0,152	0,178
6	0,076	0,127	0,127	0,152	0,178
7	0,762	0,102	0,127	0,152	0,178
8		0,076	0,102	0,127	0,178
9		1,143	0,102	0,127	0,152
10			0,076	0,102	0,152
11			1,448	0,102	0,152
12				0,076	0,127
13				1,753	0,127
14					0,102
15					0,076
					2,489

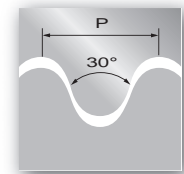
Last pass equals total depth of thread.



British Standard Pipe Taper (BSPT) External & Internal (mm)

Number of Passes	T.P.I.				
	27	18	14	11.5	8
Radial in-feed per pass (mm)					
1	0,178	0,229	0,254	0,254	0,279
2	0,152	0,203	0,203	0,229	0,279
3	0,127	0,152	0,178	0,203	0,229
4	0,102	0,127	0,152	0,178	0,203
5	0,076	0,127	0,127	0,152	0,178
6	0,660	0,076	0,127	0,152	0,152
7		0,914	0,102	0,127	0,152
8			0,076	0,127	0,152
9			1,219	0,076	0,127
10				1,499	0,127
11					0,127
12					0,076
					2,083

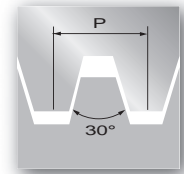
Last pass equals total depth of thread.



Round DIN 405, External & Internal (mm)

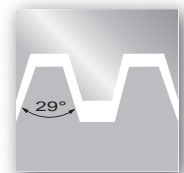
Number of Passes	T.P.I.			
	10	8	6	4
Radial in-feed per pass (mm)				
1	0,229	0,229	0,279	0,356
2	0,229	0,229	0,254	0,330
3	0,203	0,203	0,229	0,305
4	0,203	0,203	0,229	0,279
5	0,152	0,178	0,203	0,279
6	0,127	0,152	0,203	0,254
7	0,102	0,152	0,178	0,254
8	0,076	0,127	0,152	0,229
9	1,321	0,102	0,152	0,203
10		0,076	0,127	0,178
11		1,651	0,102	0,152
12			0,076	0,127
13			2,184	0,127
14				0,102
				3,200

Last pass equals total depth of thread.



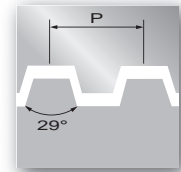
Trapezoidal DIN 103 (mm)								
Number of Passes	Pitch (mm)							
	1,5	2	3	4	5	6	7	8
	Radial in-feed per pass (mm)							
1	0,229	0,254	0,279	0,279	0,305	0,356	0,356	0,381
2	0,203	0,229	0,229	0,229	0,305	0,330	0,330	0,330
3	0,152	0,178	0,203	0,229	0,254	0,305	0,305	0,330
4	0,127	0,152	0,152	0,203	0,229	0,279	0,279	0,330
5	0,102	0,127	0,152	0,178	0,203	0,254	0,254	0,279
6	0,076	0,127	0,127	0,178	0,203	0,254	0,254	0,279
7	0,889	0,102	0,127	0,152	0,203	0,203	0,254	0,254
8		0,076	0,102	0,152	0,203	0,203	0,229	0,254
9		1,245	0,102	0,152	0,178	0,203	0,203	0,229
10			0,102	0,152	0,152	0,203	0,203	0,229
11			0,102	0,127	0,152	0,178	0,203	0,229
12			0,076	0,127	0,127	0,152	0,203	0,203
13			1,753	0,102	0,127	0,152	0,178	0,203
14				2,261	0,102	0,152	0,178	0,178
15					2,743	0,152	0,178	0,178
16						0,127	0,127	0,178
17						3,505	3,734	0,152
18								0,152
19								0,127
								4,496

Last pass equals total depth of thread.



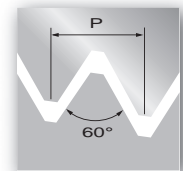
ACME (mm)									
Number of Passes	T.P.I.								
	16	14	12	10	8	6	5	4	3
	Radial in-feed per pass (mm)								
1	0,229	0,229	0,254	0,254	0,279	0,330	0,356	0,356	0,381
2	0,203	0,203	0,203	0,229	0,254	0,279	0,330	0,330	0,356
3	0,178	0,178	0,178	0,203	0,203	0,229	0,254	0,305	0,330
4	0,152	0,152	0,152	0,178	0,178	0,203	0,229	0,279	0,279
5	0,127	0,127	0,127	0,152	0,152	0,178	0,229	0,254	0,279
6	0,076	0,102	0,127	0,127	0,127	0,178	0,203	0,254	0,279
7	0,965	0,076	0,102	0,127	0,127	0,152	0,203	0,203	0,279
8		1,067	0,102	0,102	0,127	0,152	0,203	0,203	0,254
9			1,245	0,102	0,127	0,152	0,178	0,203	0,229
10				0,102	0,102	0,152	0,152	0,178	0,229
11				1,575	0,102	0,152	0,152	0,178	0,229
12					0,102	0,127	0,152	0,152	0,203
13					1,880	0,102	0,127	0,152	0,203
14						2,515	0,102	0,152	0,178
15							2,845	0,152	0,178
16								0,127	0,178
17								3,480	0,178
18									0,152
19									0,127
									4,521

Last pass equals total depth of thread.



STUB-ACME (mm)									
Number of Passes	T.P.I.								
	16	14	12	10	8	6	5	4	3
Radial in-feed per pass (mm)									
1	0,203	0,229	0,229	0,229	0,254	0,279	0,279	0,305	0,356
2	0,152	0,178	0,178	0,203	0,203	0,203	0,254	0,279	0,279
3	0,127	0,152	0,152	0,178	0,203	0,203	0,203	0,254	0,279
4	0,102	0,127	0,127	0,152	0,178	0,178	0,203	0,203	0,229
5	0,102	0,102	0,102	0,152	0,152	0,152	0,178	0,203	0,203
6	0,686	0,787	0,102	0,127	0,152	0,152	0,152	0,178	0,203
7			0,889	0,102	0,127	0,152	0,152	0,152	0,203
8				1,143	0,102	0,127	0,152	0,152	0,203
9					1,372	0,102	0,127	0,127	0,178
10						1,549	0,102	0,127	0,152
11							1,803	0,102	0,127
12								0,102	0,127
13								2,184	0,127
14									0,102
15									0,102
									3,099

Last pass equals total depth of thread.



API Thread Forms (mm)																
API Thread Forms	Total In-Feed	No. of passes/radial in-feed per pass (mm)														
		Passes														
API Rd																
16ER10APIRD	1,448	0,279	0,203	0,152	0,152	0,127	0,127	0,127	0,102	0,102	0,076	-	-	-	-	-
16IR10APIRD		0,279	0,229	0,203	0,152	0,152	0,152	0,127	0,127	0,127	0,127	0,102	0,076	-	-	-
16ER8APIRD	1,854	0,279	0,229	0,203	0,152	0,152	0,152	0,127	0,127	0,127	0,127	0,102	0,076	-	-	-
16IR8APIRD		0,279	0,229	0,203	0,152	0,152	0,152	0,127	0,127	0,127	0,127	0,102	0,076	-	-	-
API-V-0.038R																
22ER4API382	3,175	0,457	0,381	0,381	0,330	0,305	0,305	0,254	0,254	0,203	0,127	0,102	0,076	-	-	-
22IR4API382		0,457	0,381	0,381	0,330	0,305	0,305	0,254	0,254	0,203	0,127	0,102	0,076	-	-	-
22ER4API383	3,175	0,457	0,381	0,381	0,330	0,305	0,305	0,254	0,254	0,203	0,127	0,102	0,076	-	-	-
22IR4API383		0,457	0,381	0,381	0,330	0,305	0,305	0,254	0,254	0,203	0,127	0,102	0,076	-	-	-
API-V-0.050																
27ER4API502	3,861	0,457	0,381	0,356	0,330	0,305	0,305	0,279	0,254	0,254	0,229	0,203	0,203	0,127	0,102	0,076
27IR4API502		0,457	0,381	0,356	0,330	0,305	0,305	0,279	0,279	0,254	0,254	0,229	0,203	0,203	0,127	0,102
27ER4API503	3,835	0,457	0,381	0,356	0,330	0,305	0,279	0,279	0,254	0,254	0,229	0,203	0,203	0,127	0,102	0,076
27IR4API503		0,457	0,381	0,356	0,330	0,305	0,279	0,279	0,254	0,254	0,229	0,203	0,203	0,127	0,102	0,076
API-V-0.040																
22ER5API403	3,073	0,432	0,381	0,381	0,330	0,279	0,279	0,254	0,254	0,178	0,127	0,102	0,076	-	-	-
22IR5API403		0,432	0,381	0,381	0,330	0,279	0,279	0,254	0,254	0,178	0,127	0,102	0,076	-	-	-



Multi-Tooth Inserts (mm)														
External	Metric 60° (I.S.O) Pitch (mm)					Unified 60° (UN) T.P.I					Whitworth (W) T.P.I			NPT T.P.I
	1,0	1,5	2,0	2,5	3,0	20	18	16	14	12	19	14	11	11,5
Number of Passes	Radial in-feed per pass (mm)					Radial in-feed per pass (mm)					Radial in-feed per pass (mm)			
1	0,356	0,356	0,483	0,457	0,559	0,432	0,483	0,381	0,432	0,533	0,483	0,483	0,457	0,508
2	0,330	0,330	0,483	0,432	0,533	0,381	0,432	0,356	0,406	0,483	0,432	0,432	0,432	0,019
3	0,686	0,279	0,330	0,406	0,483	0,813	0,914	0,279	0,330	0,356	0,914	0,330	0,381	0,432
4		0,965	1,295	0,279	0,330			1,016	1,168	1,372		1,245	0,279	0,254
				1,575	1,905								1,549	1,676

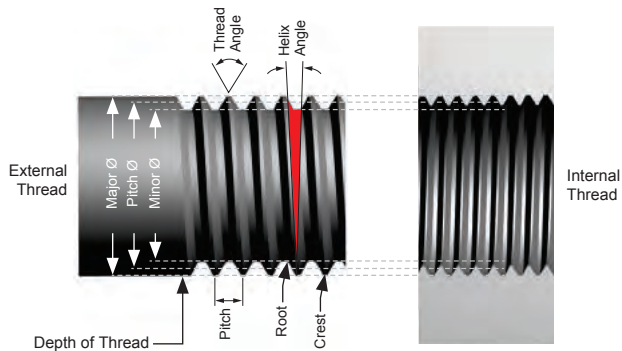
Internal	Metric 60° (I.S.O) Pitch (mm)					Unified 60° (UN) T.P.I					Whitworth (W) T.P.I			NPT T.P.I
	1,0	1,5	2,0	2,5	3,0	20	18	16	14	12	19	14	11	11,5
Number of Passes	Radial in-feed per pass (mm)					Radial in-feed per pass (mm)					Radial in-feed per pass (mm)			
1	0,330	0,330	0,457			0,356	0,483				0,356	0,483	0,457	0,508
2	0,305	0,305	0,432			0,330	0,432				0,305	0,432	0,432	0,483
3	0,635	0,254	0,330			0,254	0,330				0,254	0,330	0,381	0,432
4		0,889	1,219			0,940	1,245				0,914	1,245	0,279	0,254
													1,549	1,676

Last pass equals total depth of thread.



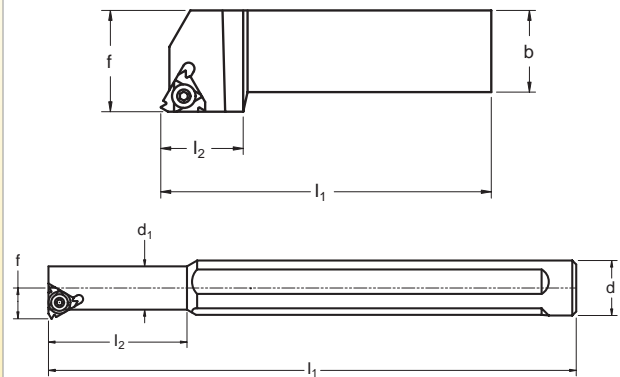
1 What's the Application

- A) Internal or External
- B) Type of thread form
- C) Material being machined



3 Select Tooling

- F) External
- G) Internal

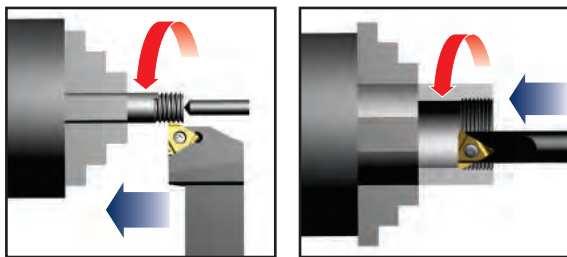


See pages C238 – C242

2 Machine Set-Up

- D) LH or RH thread form
- E) Machine Set-Up

Right Hand Thread / Right Hand Tooling



See page C248

4 Check Helix Angle

Note: The 1.5°
Calculation of thread helix angle for a given thread

$$\text{Helix angle} - \tan^{-1} \theta = \frac{\text{Lead of the Thread}}{\text{Pitch/Effective Diameter} \times \pi}$$

Helix Angle Calculation (mm)

Outside Diameter mm	Helix A°			
	1	1,25	1,5	1,75
5	3° - 38'	4° - 33'	5° - 27'	-
6	3° - 2'	3° - 48'	4° - 33'	5° - 18'
8	2° - 17'	2° - 51'	3° - 25'	3° - 59'
10	1° - 49'	2° - 16'	2° - 44'	3° - 11'
12	1° - 31'	1° - 54'	2° - 17'	2° - 39'
14	1° - 18'	1° - 38'	1° - 57'	2° - 17'
16	1° - 8'	1° - 42'	1° - 42'	2° - 0'

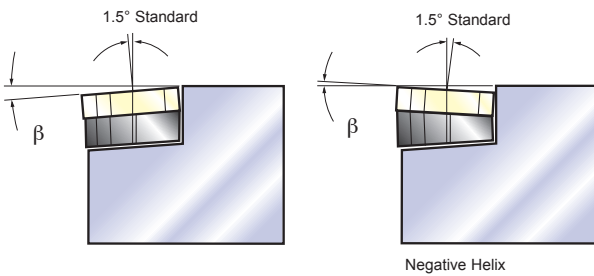
See page C250



Threading

5 Select Anvil

Note: The 1.5° angle is Standard with all toolholders



Insert size		Toolholder	β Helix / Anvil Part N			
mm	Inch		4.5°	3.5°	2.5°	1.5°
16	3/8"	EX RH / IN LH	YE33P	YE32P	YE31P	YE3
		EX LH / IN RH	YI33P	YI32P	YI31P	YI3
22	1/2"	EX RH / IN LH	YE43P	YE42P	YE41P	YE4
		EX LH / IN RH	YI43P	YI42P	YI41P	YI4
22U	1/2"	EX RH / IN LH	YE4U3P	YE4U2P	YE4U1P	YE4U
		EX LH / IN RH	YI4U3P	YI4U2P	YI4U1P	YI4U
27	5/8"	EX RH / IN LH	YE53P	YE52P	YE51P	YE5
		EX LH / IN RH	YI53P	YI52P	YI51P	YI5
27U	5/8"	EX RH / IN LH	YE5U3P	YE5U2P	YE5U1P	YE5U
		EX LH / IN RH	YI5U3P	YI5U2P	YI5U1P	YI5U

See page C243

6 Select Cutting Speed

Cutting Speed v_c			
ISO	Materials	Rm and Hardness	PVD
			SP4066
			m/min
			min. - max
P	Unalloyed Steel	<600 N/mm ² <180 HBN	230 - 485
		<950 N/mm ² <280 HBN	150 - 315
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	135 - 290
		950-1200 N/mm ² 280-355 HBN	115 - 240
		1200-1400 N/mm ² 355-415 HBN	75 - 165
M	Stainless Steel	Austenitic + Ferritic 300 series	155 - 330
		Martensitic 400 series	160 - 340
	PH Stainless	Refractory P.H.	80 - 175

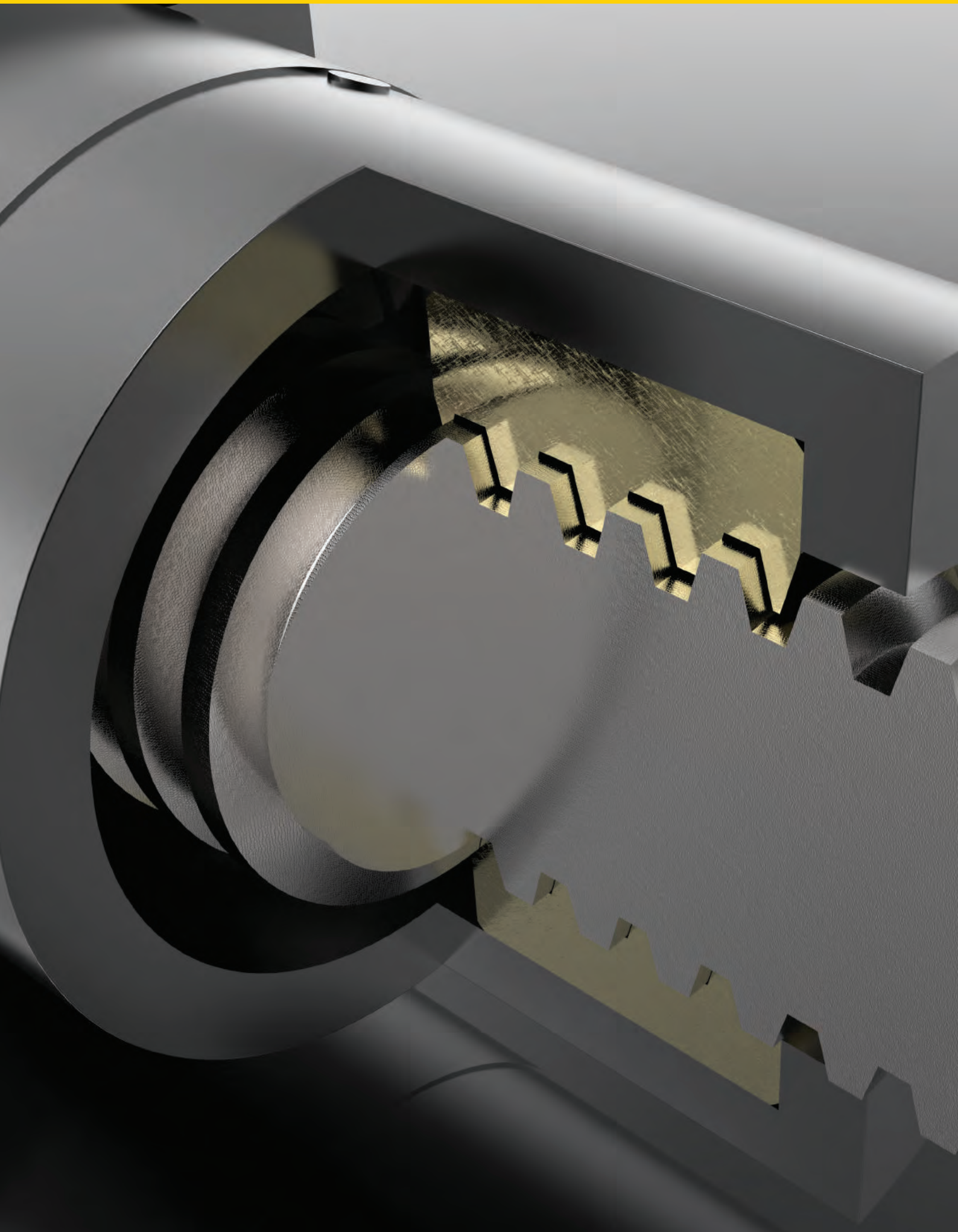
See page C205

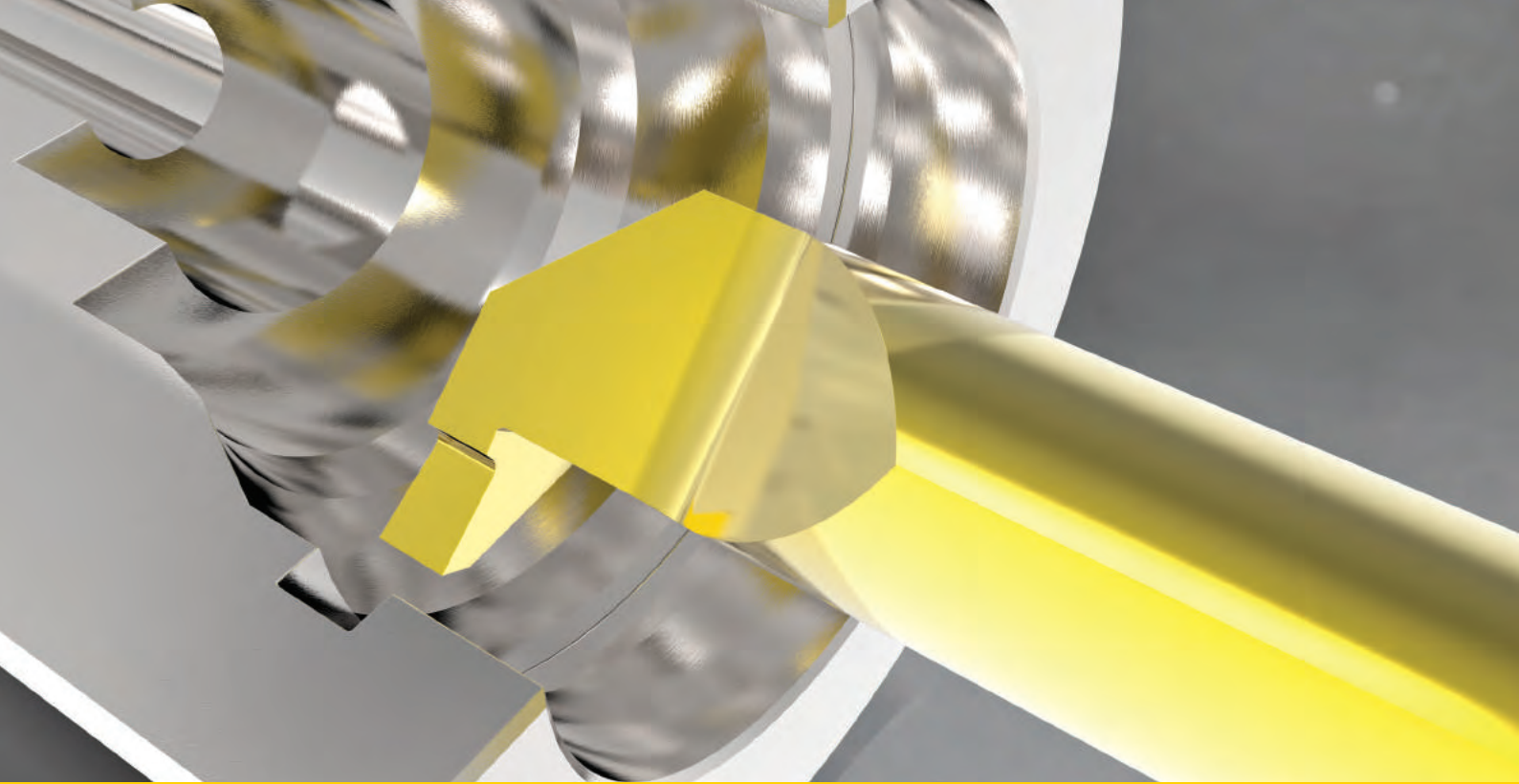
7 Select number and depth of passes

I.S.O Metric (ISO) 60°, External (mm)

Number of Passes	0,5	0,75	0,8	1,0	1,25	1,5	1,75
	1	0,102	0,178	0,178	0,178	0,178	0,229
2	0,102	0,152	0,152	0,178	0,178	0,203	0,203
3	0,076	0,102	0,127	0,127	0,152	0,178	0,152
4	0,076	0,076	0,076	0,102	0,127	0,152	0,152
5	0,356	0,508	0,533	0,076	0,102	0,127	0,127
6				0,660	0,076	0,076	0,102
7					0,813	0,965	0,102
8							0,076
9							1,143
10							
11							
12							
13							

See pages C251 – C259





GROOVING

Grooving





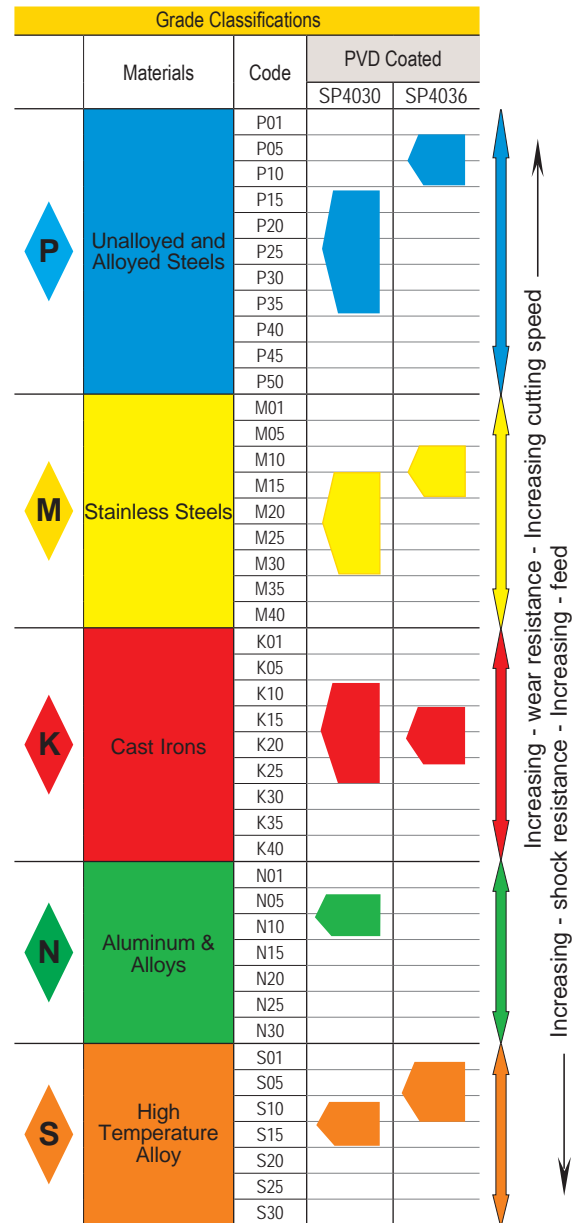
Grooving Grades

SP4030 and SP0436 are PVD coated grades with a micrograin substrate for machining at higher speeds with lower feed. Ideal for Stainless Steels and Ductile materials.

Grooving

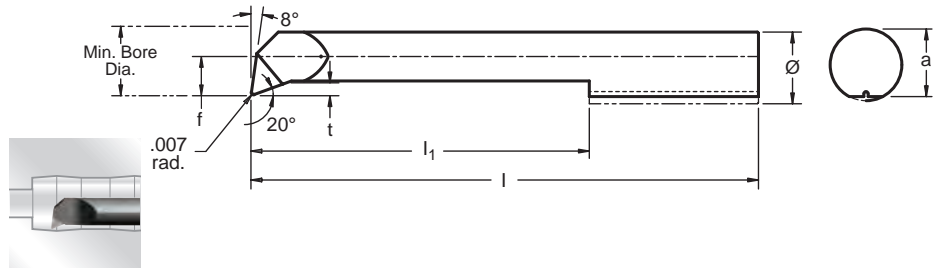
Cutting Speed v_c				
ISO	Materials	Rm and Hardness	PVD	
			SP4030	SP4036
			m/min	m/min
			min. - max.	min. - max.
P	Unalloyed Steel	<600 N/mm ² <180 HBN	135 - 271	162 - 325
		<950 N/mm ² <280 HBN	88 - 176	105 - 211
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	80 - 161	97 - 193
		950-1200 N/mm ² 280-355 HBN	73 - 146	88 - 176
M	Stainless Steel	1200-1400 N/mm ² 355-415 HBN	50 - 100	60 - 120
		Austenitic + Ferritic 300 series	107 - 229	128 - 274
		Martensitic 400 series	102 - 220	123 - 263
	PH Stainless	Refractory P.H.	57 - 122	68 - 146
K	Cast Iron	Grey GG-Ft	134 - 268	161 - 322
		Spheroidal-Ductile GGG-FGS	116 - 232	139 - 278
		Malleable GTS - MN/MP	78 - 156	94 - 187
N	Aluminium & Alloys	Aluminium & Alloys < 16% 116 HB	366 - 915	439 - 1098
		Aluminium + Silicon > 16% 92 HB	244 - 610	293 - 732
S	High Temperature Alloys	Iron Based	20 - 39	23 - 47
		Cobalt Based	16 - 32	19 - 38
		Nickel Based	17 - 34	20 - 41
		Titanium Based	27 - 54	32 - 64

Optimum Grade Performance





050...

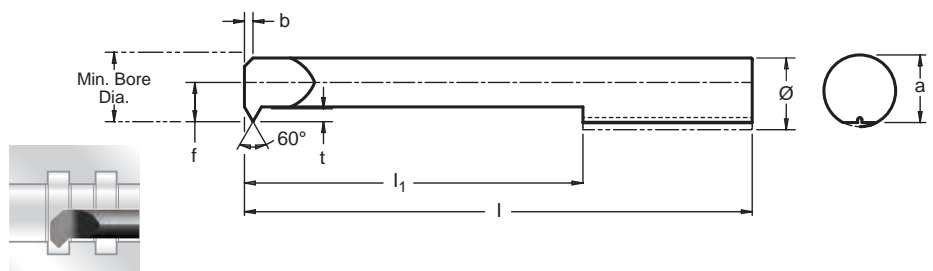


Type 050... Boring and Profiling Operation

EDP	Description	Grade	Dimensions (mm)								Toolholder
			b	f	a	l	l ₁	t	D min	Ø	
026360	R050205	SP4030	-	-	3,5	19	5	0,1	2	4	645...
026364	R050210		-	-	3,5	24	10	0,1	2	4	
026368	R050215		-	-	3,5	29	15	0,1	2	4	
026372	R050310		0,6	3,5	24	10	0,2	2,8	4	4	
026376	R050316		0,6	3,5	30	16	0,2	2,8	4	4	
026380	R050320		0,6	3,5	34	20	0,2	2,8	4	4	
026384	R050410		1,5	3,5	24	10	0,3	4	4	4	
026388	R050416		1,5	3,5	30	16	0,3	4	4	4	
026392	R050420		1,5	3,5	34	20	0,3	4	4	4	
026396	R050510		1,9	4,4	25	10	0,5	5	5	5	
026400	R050515		1,9	4,4	30	15	0,5	5	5	5	
026404	R050520		1,9	4,4	35	20	0,5	5	5	5	
026407	R050525		1,9	4,4	40	25	0,5	5	5	5	
026411	R050530		1,9	4,4	45	30	0,5	5	5	5	
026414	R050615		2,3	5,3	30	15	0,5	6	6	676...	
026418	R050622		2,3	5,3	37	22	0,5	6	6		
026422	R050625		2,3	5,3	40	25	0,5	6	6		
026426	R050630		2,3	5,3	45	30	0,5	6	6		
026430	R050720		2,7	6,3	35	20	0,6	6,8	7		
026434	R050725		2,7	6,3	40	25	0,6	6,8	7		
026438	R050730	2,7	6,3	45	30	0,6	6,8	7			

For Toolholders See page C269

060...



Type 060... Boring, Profiling and Chamfering Operation

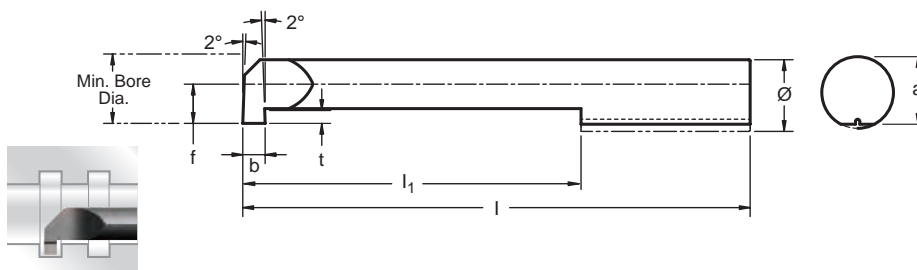
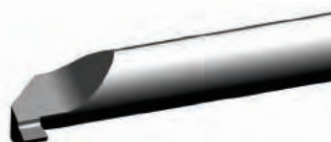
EDP	Description	Grade	Dimensions (mm)								Toolholder
			b	f	a	l	l ₁	t	D min	Ø	
026446	R060520	SP4030	0,2	1,9	4,4	35	20	0,7	5	5	645...
026450	R060720			2,8	6,3				6,8	7	676...

For Toolholders See page C269



004...

Grooving

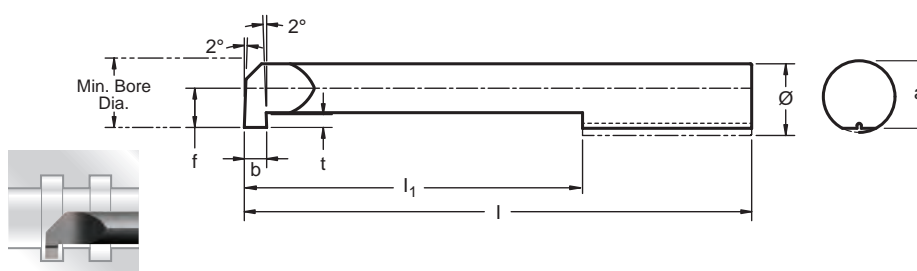


Type 004... Grooving Internal Boring Operation

EDP	Description	Grade	Dimensions (mm)								Toolholder
			b	f	a	l	l ₁	t	D min	Ø	
026168	R004010010	SP4030	1	1,5	3,5	24	10	0,8	4	4	645...
026172	R004010016					30	16				
026176	R004010020					34	20				

For Toolholders See page C269

005...



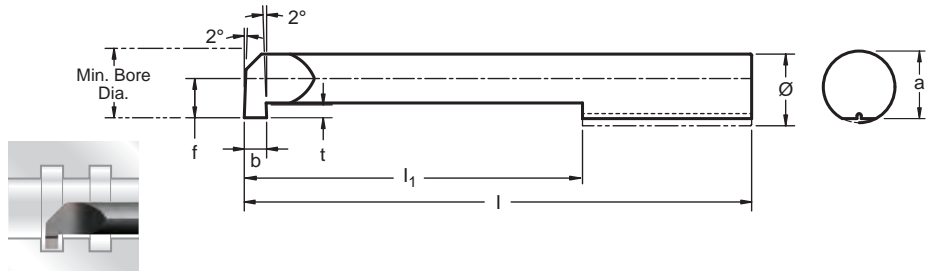
Type 005... Grooving Internal Boring Operation

EDP	Description	Grade	Dimensions (mm)								Toolholder
			b	f	a	l	l ₁	t	D min	Ø	
026180	R005010010	SP4030	1	1,9	4,4	25	10	1	5	5	645...
026184	R005010015		1			30	15				
026188	R005010020		1			35	20				
026192	R005010025		1			40	25				
026204	R005015015		1,5			30	15				
026208	R005015020		1,5			35	20				
026220	R005020010		2			25	10				
026224	R005020015		2			30	15				
026228	R005020020		2			35	20				
026232	R005020025		2			40	25				
023301	R005051015		2			45	30				

For Toolholders See page C269



006...

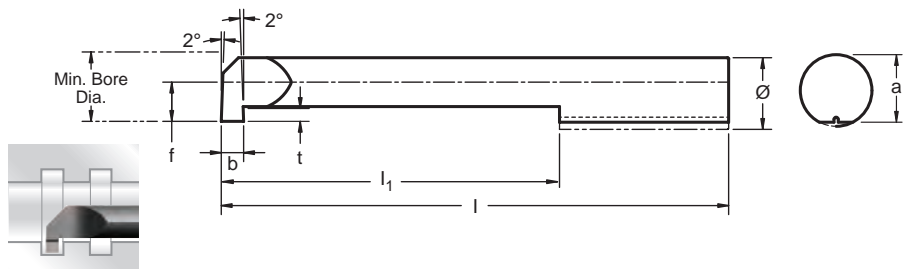


Type 006... Grooving Internal Boring Operation

EDP	Description	Grade	Dimensions (mm)								Toolholder
			b	f	a	l	l ₁	t	D min	Ø	
026240	R006010010	SP4030	1	2,3	5,3	25	10	1,8	6	6	676...
026244	R006010015		1			30	15				
026248	R006010022		1			37	22				
026252	R006010025		1			40	25				
026260	R006015010		1,5			25	10				
026264	R006015015		1,5			30	15				
026268	R006015022		1,5			37	22				
026272	R006015025		1,5			40	25				
026280	R006020010		2			25	10				
026284	R006020015		2			30	15				
026292	R006020025		2			40	25				

For Toolholders See page C269

007...



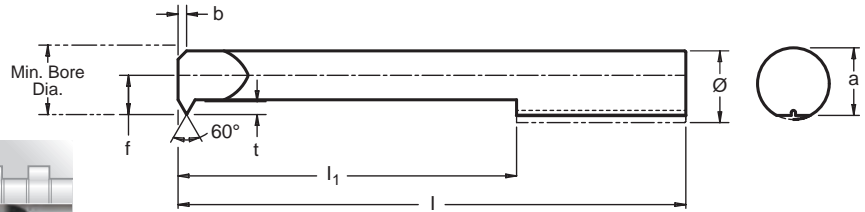
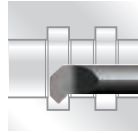
Type 007... Grooving Internal Boring Operation

EDP	Description	Grade	Dimensions (mm)								Toolholder
			b	f	a	l	l ₁	t	D min	Ø	
026300	R007010010	SP4030	1	2,7	6,3	25	10	2,5	6,8	7	676...
026304	R007010015		1			30	15				
026312	R007010025		1			40	25				
026320	R007015010		1,5			25	10				
026324	R007015015		1,5			30	15				
026332	R007015025		1,5			40	25				
026336	R007015030		1,5			45	30				
026340	R007020010		2			25	10				
026344	R007020015		2			30	15				
026352	R007020025		2			40	25				
026356	R007020030		2			45	30				

For Toolholders See page C269



004 / 5 / 6 / 7...



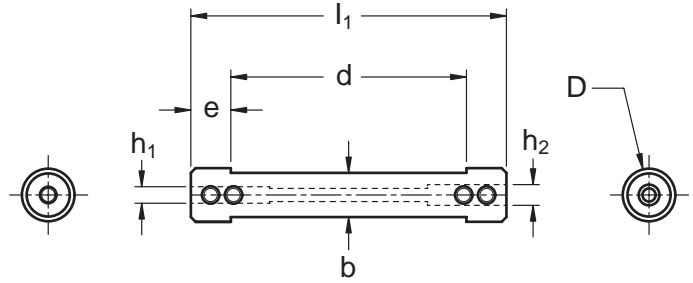
Type 004/5/6/7... Metric ISO Thread Partial Profile 60°

EDP	Description	Grade	Dimensions (mm)									
			Pitch	e	f	a	l	l ₁	t	D min	Ø	Toolholder
Standard pitch												
026467	R006051015	SP4030	1	0.55	1.9	4.4	30	15	0.55	4.8	5	645...
026469	R006061215		1.25	0.65	2.3	5.3			0.68	6	6	
026471	R006081515		1.5	0.75	2.3	5.3			0.81	6	6	
026473	R007081515		1.5	0.75	2.7	6.3			0.81	7	7	
Fine pitch												
026460	R004020515	SP4030	0.5	0.35	1.5	3.5	30	15	0.27	4	4	645...
026462	R005020515		0.5	0.35	1.9	4.4			0.27	5	5	
026464	R005040715		0.75	0.45	1.9	4.4			0.4	5	5	

For Toolholders See page C269



645 - 676



Toolholder for Ultra Mini

EDP	Description	Dimensions (mm)						
		D	b	d	e	l ₁	h ₁	h ₂
026475	6450012D	12	10,3	55	10	75	4	5
026476	6450016D	16	14	55		75	4	5
026477	6450020D	20	18	70		90	4	5
026478	6760016D	16	14	55		75	6	7
026479	6760020D	20	18	70		90	6	7

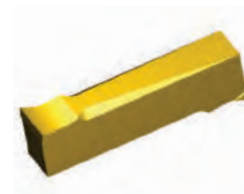
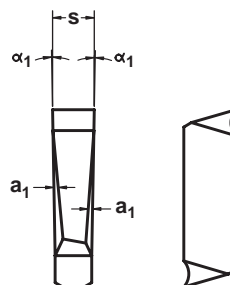
For Inserts See pages C265 - C268

Spare Parts

Description	EDP	Screw
6450012D to 6760020D	024516	110645



G217

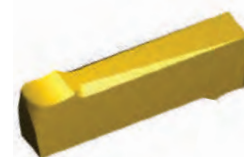
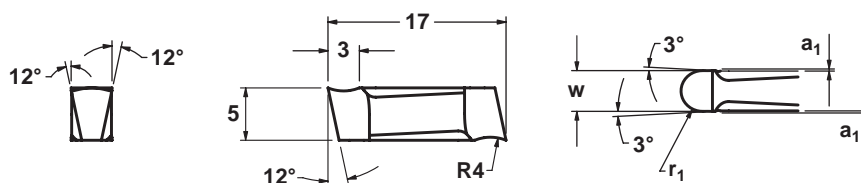


G217 Standard Groove Widths

EDP	Description	Grade	Dimensions (mm)			Grooving Width
			s	α_1	a_1	
026530	G217005000	SP4036	0,57	1°	0,06	1
026532	G217006000		0,67			
026534	G217007000		0,77			
026536	G217008000		0,87			
026538	G217009000		0,97			
026540	G217010000		1,07			
026542	G217011000		1,24	3°	1	2
026544	G217013000		1,44			
026546	G217016000		1,74			
026548	G217018500		1,99			
026550	G217021500		2,29			
026552	G217026500		2,79			
026554	G217031500		3,29			
026556	G217041500		4,29			
026558	G217051500		5,29			
					4	

For Toolholders See pages C271 - C272

G217 Full Radius



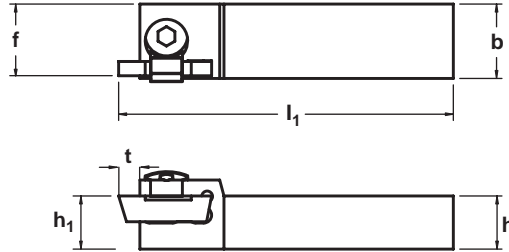
G217 Full Radius Inserts

EDP	Description	Grade	Dimensions (mm)				Toolholder Width
			w	r_1	a_1	t max	
034397	G217001020	SP4036	2	1,00	0,2	3 or 4*	2
034398	G217001530		3	1,50			3
034399	G217002040		4	2,00			4

* In combination with toolholder, 3mm for internal operation and 4mm for external operation



GR240



External Toolholder GR240 for Insert Type G217

EDP	Version	Description	Dimensions (mm)						Grooving Width
			b	h	h ₁	l ₁	f	t	
025124	Left hand	GL2401212M01	12	12	12	150	11,50	4	0,50 - 1,74
025123	Right hand	GR2401212M01							
025126	Left hand	GL2401212M02	12	12	12	150	11,50	4	1,74 - 2,74
025125	Right hand	GR2401212M02							
025132	Left hand	GL2401616M01	16	16	16	150	14,50	4	0,50 - 1,74
025131	Right hand	GR2401616M01							
025134	Left hand	GL2401616M02	16	16	16	150	14,50	4	1,74 - 2,74
025133	Right hand	GR2401616M02							
025136	Left hand	GL2401616M03	16	16	16	150	14,50	4	2,74 - 3,74
025135	Right hand	GR2401616M03							
025140	Left hand	GL2402020K01	20	20	20	125	18,50	4	0,50 - 1,74
025139	Right hand	GR2402020K01							
025142	Left hand	GL2402020K02	20	20	20	125	18,50	4	1,74 - 2,74
025141	Right hand	GR2402020K02							
025144	Left hand	GL2402020K03	20	20	20	125	18,50	4	2,74 - 3,74
025143	Right hand	GR2402020K03							
025146	Left hand	GL2402020K04	20	20	20	125	18,50	4	3,74 - 5,29
025145	Right hand	GR2402020K04							

For Inserts See page C270

Spare Parts for External GR240 Toolholder

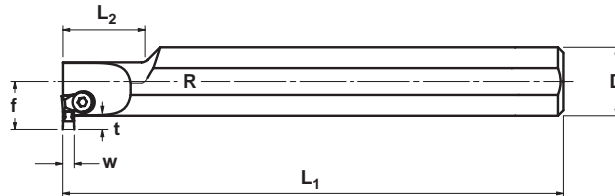
Description	EDP	Screw	EDP	Clamp	Insert Type
G_2401212M0.. To G_2401616M0	025385	SN135	025387	SG24083	G217
G_2402020M0...			025388	SG24084	



GR233 / GR253



Grooving



Internal Toolholder GR233/GR253 for Insert Type G217

EDP	Description	Dimensions (mm)					Grooving Width W
		D	L ₂	L ₁	f	t max	
024170	GR233002001	20	25	130	13,30	3,00	0,50 - 1,74
024171	GR233002002	20	25	130	13,30	3,00	1,74 - 2,74
034424	GR233002003	20	25	130	13,30	3,00	2,74 - 3,74
024172	GR253002501	25	30	150	17,50	4,70	0,50 - 1,74
034425	GR253002502	25	30	150	17,50	4,70	1,74 - 2,74
024173	GR253002503	25	30	150	17,50	4,70	2,74 - 3,74
034426	GR253002504	25	30	150	17,50	4,70	3,74 - 5,29
034427	GR253003202	32	30	150	21,00	4,70	1,74 - 2,74
024686	GR253003203	32	30	150	21,00	4,70	2,74 - 3,74
034428	GR253003204	32	30	150	21,00	4,70	3,74 - 5,29

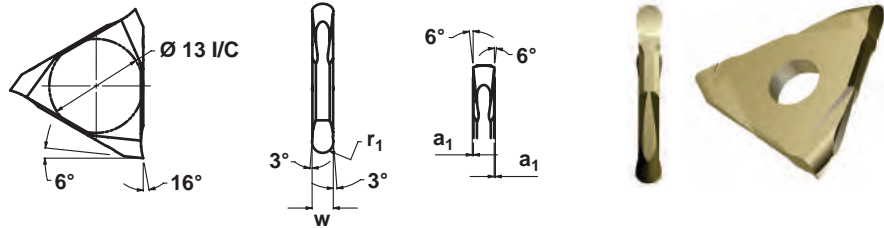
For Inserts See page C270

Spare parts for Internal GR233/GR253 Toolholder

Description	EDP	Screw	EDP	Clamp	Insert Type
GR233.. 01-03	025387	SG24083	025385	SN135	G217
GR253.. 01-03					
GR253.. 04					



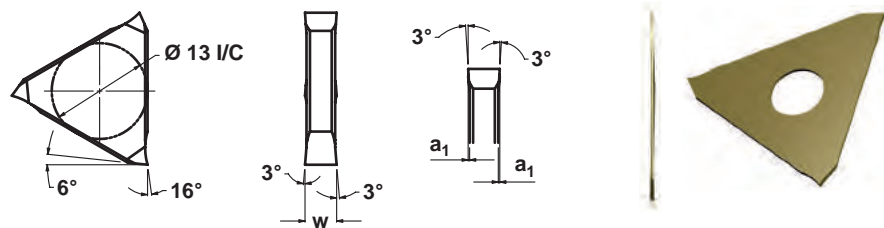
G312



G312 Inserts Full Radius

EDP	Description	Grade	Dimensions (mm)				Toolholder Type
			w	r ₁	a ₁	t max*	
034401	G312001020	SP4030	2	1,00	0,3	6*	G360...02
024174	G312001530		3	1,50	0,3	6*	G360...03
024175	G312002040		4	2,00	0,3	6*	G360...04

* In combination with toolholder See page C274



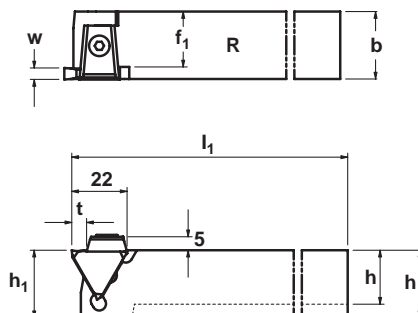
G312 Inserts for Grooving to DIN 471/472 and DIN 983/894

EDP	Description	Grade	Nominal Width of Groove	Dimensions (mm)			Toolholder Type
				w	a ₁	t max*	
034402	G312005000	SP4030	0,50	0,57	0,06	4*	G360...01
024176	G312006000		0,60	0,67	0,06	4*	
024177	G312007000		0,70	0,77	0,08	4*	
034392	G312008000		0,80	0,87	0,08	4*	
034393	G312009000		0,90	0,97	0,08	4*	
024178	G312010000		1,00	1,07	0,09	4*	
024179	G312011000		1,10	1,24	0,20	4*	
024180	G312013000		1,30	1,44	0,22	4*	
024181	G312016000		1,60	1,74	0,22	4*	
034394	G312018500		1,85	1,99	0,22	6*	
034395	G312021500		2,15	2,30	0,22	6*	
024182	G312026500		2,65	2,80	0,22	6*	
024183	G312031500		3,15	3,29	0,22	6*	
034396	G312041500			4,15	4,30	0,22	6*

* In combination with toolholder See page C274



GR / L360



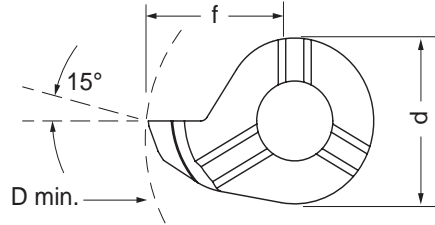
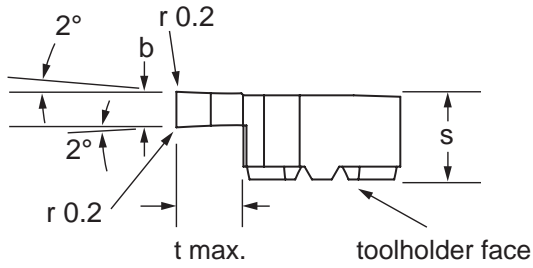
External Toolholder GR360 for Insert Type G312

EDP	Description	Dimensions (mm)						Grooving Width W
		b	h	h ₁	l ₁	f ₁	t	
034403	GL360121201	12	12	12	100	10,50	4	0,5 - 1,74
024184	GR360121201							
034404	GL360121202	12	12	12	100	9,50	6	1,74 - 2,74
034405	GR360121202							
034406	GL360121203	12	12	12	100	8,50	6	2,74 - 3,74
024186	GR360121203							
034407	GL360161601	16	16	16	125	14,50	4	0,5 - 1,74
034408	GR360161601							
034409	GL360161602	16	16	16	125	13,50	6	1,74 - 2,74
034410	GR360161602							
034411	GL360161603	16	16	16	125	12,50	6	2,74 - 3,74
034412	GR360161603							
034413	GL360161604	16	16	16	125	11,50	6	3,74 - 5,29
034414	GR360161604							
034415	GL360202001	20	20	20	125	18,50	4	0,5 - 1,74
024187	GR360202001							
034416	GL360202002	20	20	20	125	17,50	6	1,74 - 2,74
024188	GR360202002							
034417	GL360202003	20	20	20	125	16,50	6	2,74 - 3,74
024189	GR360202003							
034418	GL360202004	20	20	20	125	15,50	6	3,74 - 5,29
024190	GR360202004							
024191	GL360252501	25	25	25	150	23,50	4	0,5 - 1,74
024192	GR360252501							
034419	GL360252502	25	25	25	150	22,50	6	1,74 - 2,74
024193	GR360252502							
034420	GL360252503	25	25	25	150	21,50	6	2,74 - 3,74
034421	GR360252503							
034422	GL360252504	25	25	25	150	19,80	6	3,74 - 5,29
034423	GR360252504							

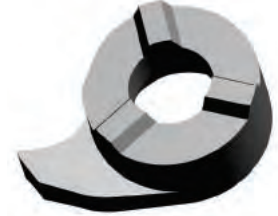
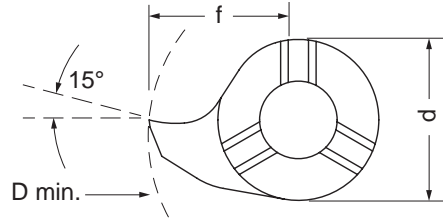
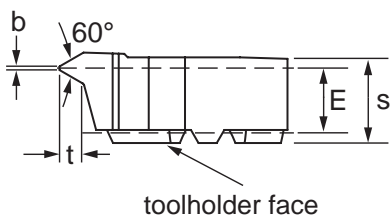
For Inserts See page C273

Spare parts for External GR360 Toolholder

Description	EDP	Clamp	EDP	Screw	Insert Type
G_360121201/02/03	025385	G113	034391	6-25	G312
G_360161601/02/03					
G_360161604	034390	G134	034391	6-25	G312
G_360202001/02/03/04	024522	G164			
G_360252501/02/03/04					


Mini-Cut Groove & Profile

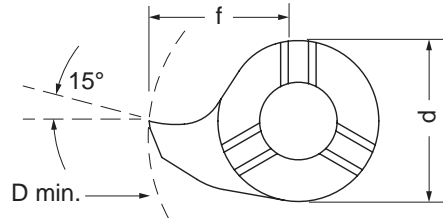
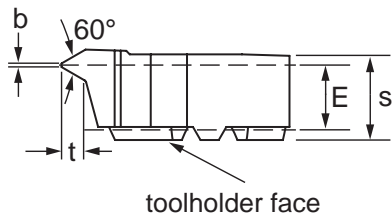
EDP	Description	Grade	Dimensions						Type of Holder
			b	f	s	d	t max	D min.	
034433	LS0815002	SP4036	1,50	4,80	3,30	6,00	1,00	8,00	608
034434	LS1115002		1,50	6,70	4,20	8,00	2,30	11,00	611
034435	LS1420002		2,00	9,00	5,30	9,00	4,00	14,00	614
034430	RS0815002	SP4036	1,50	4,80	3,30	6,00	1,00	8,00	608
034431	RS1115002		1,50	6,70	4,20	8,00	2,30	11,00	611
034432	RS1420002		2,00	9,00	5,30	9,00	4,00	14,00	614



Mini Cut

Mini-Cut 60° Threading Partial Profile

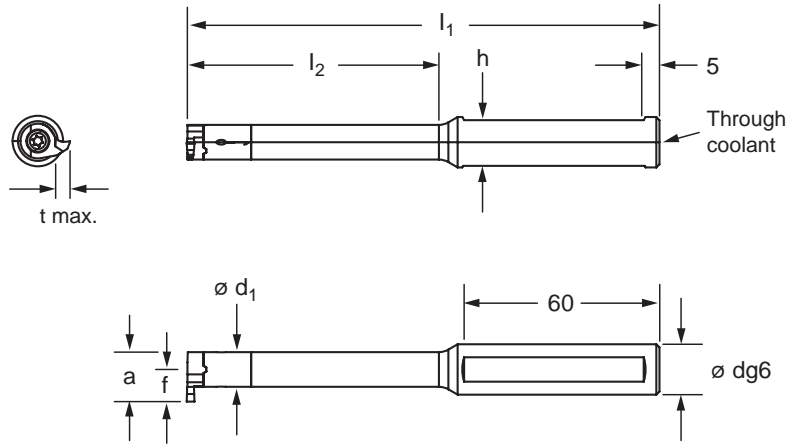
EDP	Description	Grade	Dimensions								Type of Holder
			Pitch	t	b	f	s	d	E	D min.	
034446	LS08081501	SP4036	1,5 - 1,75	0,95	0,18	4,80	3,50	6,00	2,50	8,00	608
034447	LS11102001		2	1,08	2,25	6,70	4,30	8,00	3,00	11,00	611
034448	LS14102001		2	1,08	0,25	9,00	5,40	9,00	4,20	14,00	614
034449	LS14132501		2,5	1,35	0,31	9,00	5,40	9,00	4,70	14,00	614
034450	LS08020501		0,5 - 0,75	0,43	0,06	4,80	3,50	6,00	2,70	8,00	608
034451	LS08051001		1,0 - 1,25	0,55	0,12	4,80	3,50	6,00	2,70	8,00	608
034452	LS11051001		1,0 - 1,25	0,55	0,12	6,70	4,30	8,00	3,50	11,00	611
034453	LS11081501		1,5 - 1,75	0,81	0,18	6,70	4,30	8,00	3,50	11,00	611
034454	LS14051001		1,0 - 1,25	0,55	0,12	9,00	5,40	9,00	4,70	14,00	614
034455	LS14081501		1,5 - 1,75	0,81	0,18	9,00	5,40	9,00	4,50	14,00	614


Mini-Cut 60° Threading Partial Profile

EDP	Description	Grade	Dimensions								Type of Holder
			Pitch	t	b	f	s	d	E	D min.	
034436	RS08081501	SP4036	1,5 - 1,75	0,95	0,18	4,80	3,50	6,00	2,50	8,00	608
034437	RS11102001		2	1,08	2,25	6,70	4,30	8,00	3,00	11,00	611
034438	RS14102001		2	1,08	0,25	9,00	5,40	9,00	4,20	14,00	614
034439	RS14132501		2,5	1,35	0,31	9,00	5,40	9,00	4,70	14,00	614
034440	RS08020501		0,5 - 0,75	0,43	0,06	4,80	3,50	6,00	2,70	8,00	608
034441	RS08051001		1,0 - 1,25	0,55	0,12	4,80	3,50	6,00	2,70	8,00	608
034442	RS11051001		1,0 - 1,25	0,55	0,12	6,70	4,30	8,00	3,50	11,00	611
034443	RS11081501		1,5 - 1,75	0,81	0,18	6,70	4,30	8,00	3,50	11,00	611
034444	RS14051001		1,0 - 1,25	0,55	0,12	9,00	5,40	9,00	4,70	14,00	614
034445	RS14081501		1,5 - 1,75	0,81	0,18	9,00	5,40	9,00	4,50	14,00	614



Mini Cut

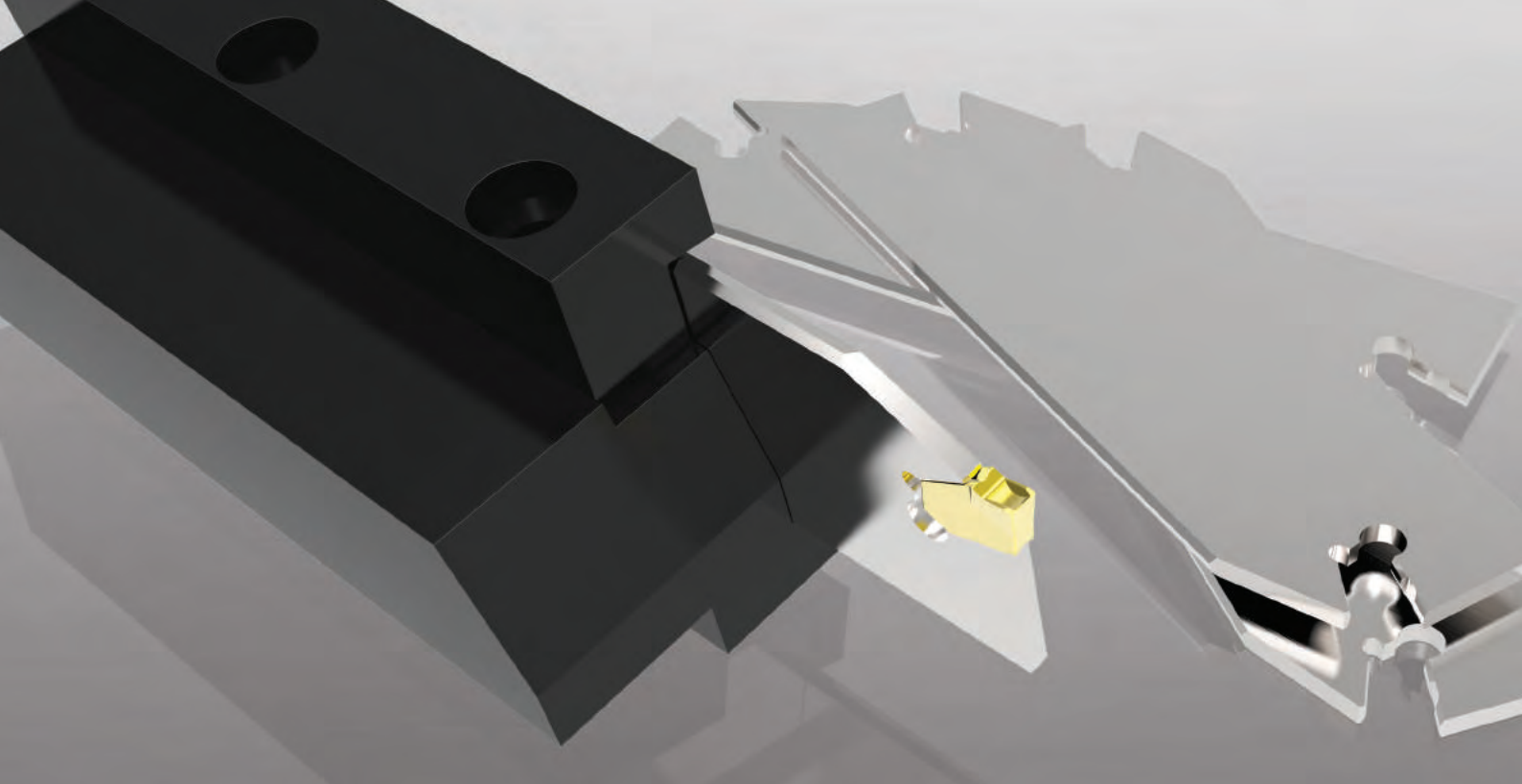


Mini-Cut Carbide Toolholders

EDP	Description	Dimensions									
		$\varnothing dg6$	$d1$	$l1$	$l2$	f	a	h	Insert Type	t_{max}	Min Bore
034466	GHM60800122	12,00	6,00	90,00	30,00	4,80	7,80	11,00	R/L S08	1,00	8,00
034467	GHM60800124		6,00	115,00	50,00	4,80	7,80	11,00	R/L S08	1,00	8,00
034468	GHM61100123		8,00	120,00	56,00	6,70	10,70	10,50	R/L S11	2,30	11,00
034469	GHM61400162	16,00	9,50	110,00	45,00	8,75	13,50	14,50	R/L S14	4,0	14
034470	GHM61400164		9,50	145,00	75,00	8,75	13,50	15,00	R/L S14	4,0	14

For Inserts See pages C275 - C277

* dimension as per insert



PART-OFF

Part-Off



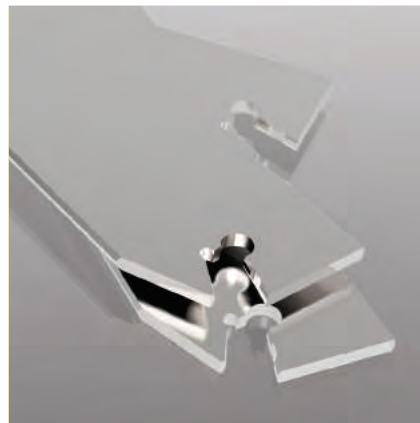


Part-Off Grade Description

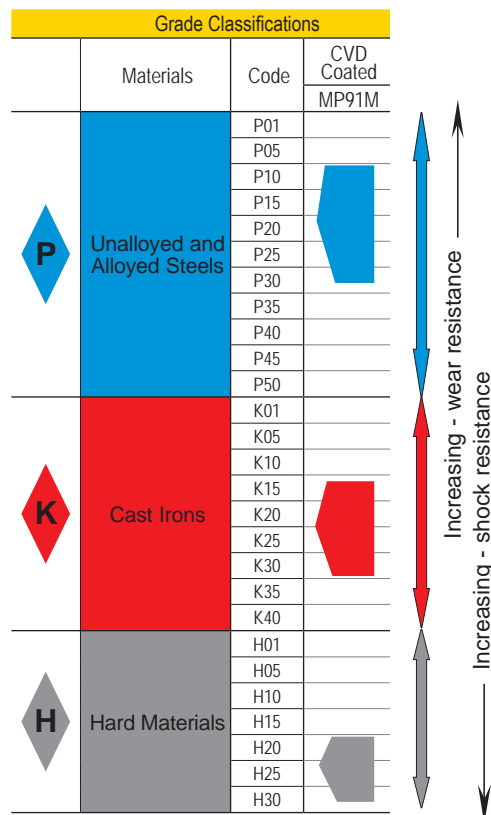
MP91M CVD Coated grade offering good wear, and shock resistance. Ideal for Steels and Cast Irons

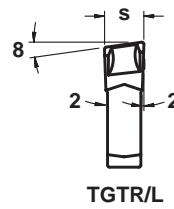
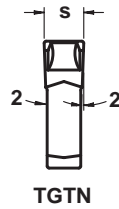
Cutting Speed v_c

ISO	Materials	Rm and Hardness	CVD
			MP91M
			m/min
			min. - max.
P	Unalloyed Steel	<600 N/mm ² <180 HBN	140 - 345
		<950 N/mm ² <280 HBN	125 - 300
	Alloyed Steel	700-950 N/mm ² 200-280 HBN	105 - 270
		950-1200 N/mm ² 280-355 HBN	80 - 205
		1200-1400 N/mm ² 355-415 HBN	50 - 130
K	Cast Iron	Grey GG-Ft	145 - 365
		Spheroidal-Ductile GGG-FGS	115 - 285
		Malleable GTS - MN/MP	105 - 260
H	Hard Materials	Hard Steel >1400 N/mm ² >415 HBN	50 - 80
		Chilled Cast Iron ² 1400 N/mm ² 400 HBN	40 - 65



Optimum Grade Performance

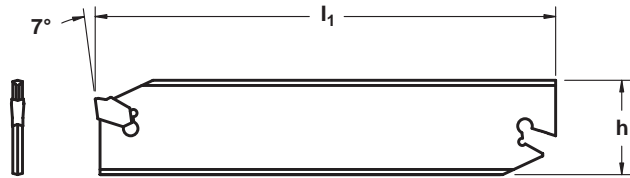



TGT Inserts


TGT Inserts			
EDP	Description	Grade	Dimensions
			s (mm)
012958	TGTN2	MP91M	2,21
012959	TGTN2,4	MP91M	2,39
012960	TGTN3	MP91M	3,1
012961	TGTN4	MP91M	4,09
012962	TGTN4,8	MP91M	4,78
012963	TGTN5	MP91M	5,08
012964	TGTN6	MP91M	6,35
014091	TGTR38	MP91M	3,1
014092	TGTL38	MP91M	3,1



Hardened Steel Blades



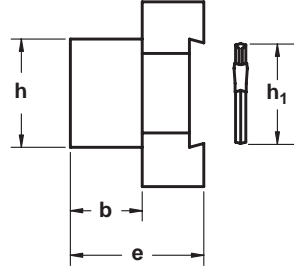
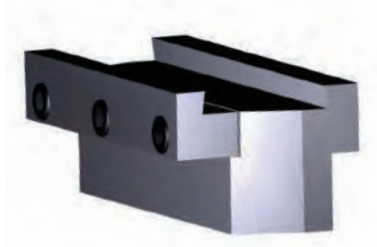
Part-Off

Blade					
EDP	Description	Dimensions (mm)			
		h	l_1	Ø Max	Inserts
015199	SGIH26.2PSHD	26	110	75	TGT 2/2,4
015200	SGIH26.3PSHD	26	110	75	TGT 3
015201	SGIH26.4PSHD	26	110	75	TGT 4
017232	SGIH26.5PSHD	26	110	75	TGT 4,8/5
015202	SGIH32.3PSHD	32	150	100	TGT 3
015203	SGIH32.4PSHD	32	150	100	TGT 4
017234	SGIH32.5PSHD	32	150	125	TGT 4,8/5
017235	SGIH32.6PSHD	32	150	125	TGT 6

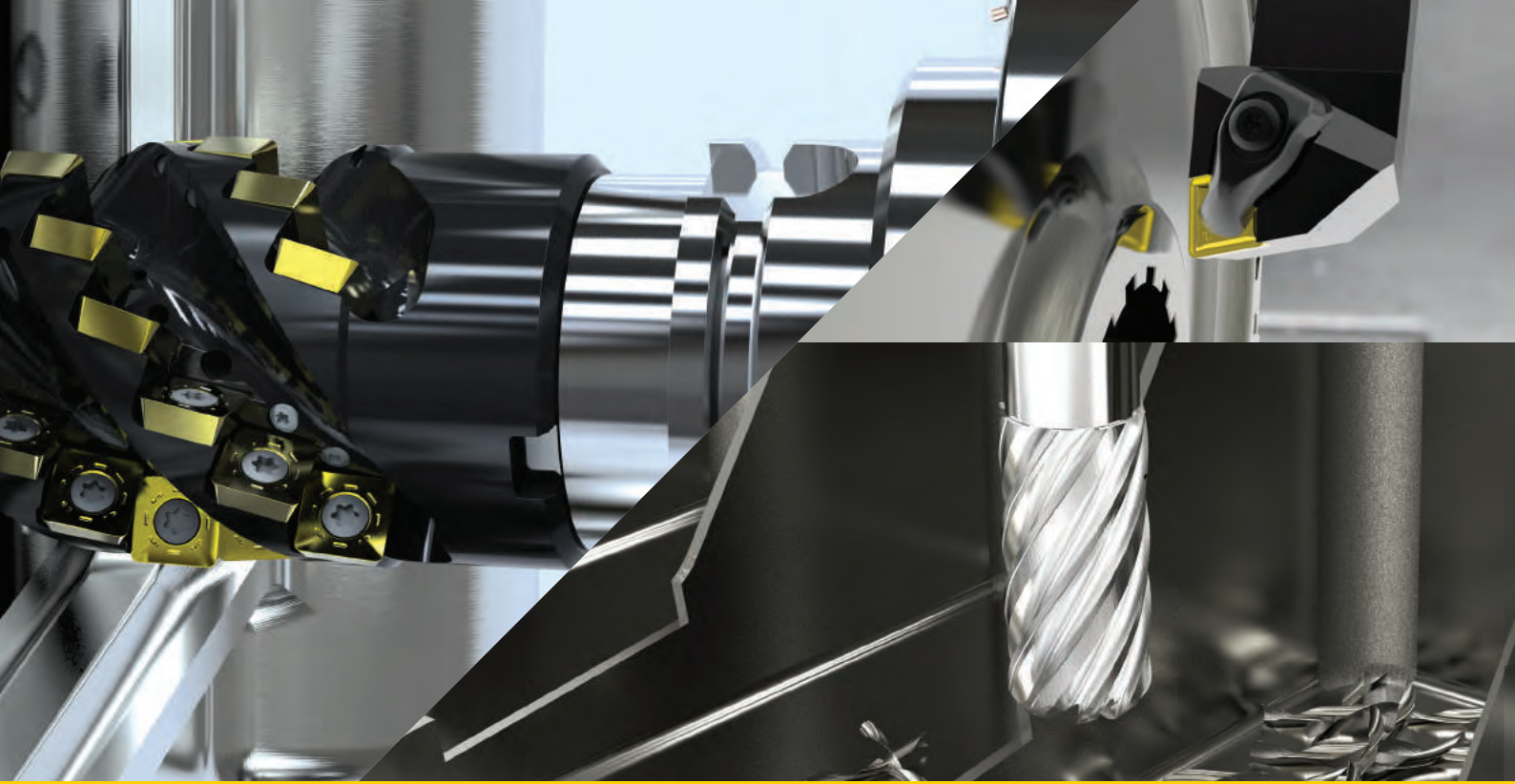
Spare Part		
Extracting Key	Description	EDP
SGIH26.2PSHD - SGIH32.6PSHD	E219EXTKEY	017031



Tool Blocks



Block								
EDP	Description	Dimensions (mm)			Spare Parts			
		h1	b	h	EDP	Screw	EDP	Key
030659	SGTB2620	26	20	20	034612	1076	018288	K5005
030660	SGTB2625	26	25	25				
030661	SGTB3220	32	20	20				
030662	SGTB3225	32	25	25				
030663	SGTB3232	32	32	32				



CUTTING TOOLS

Materials Cross Reference



Materials Cross Reference

	UNALLOYED STEELS	D2 - D7
	ALLOYED STEELS	D8 - D11
	STAINLESS STEELS	D12 - D15
	PH STAINLESS	D16 - D17
	CAST IRONS	D18 - D19
	ALUMINUM & ALLOYS	D20 - D23
	HIGH TEMPERATURE ALLOYS	D22 - D33
	HARD MATERIALS (42-45 HRC)	D34 - D35

Materials Cross Reference



Materials Cross Reference

Commercial Name	UNS Number	UK: BS,EN	Sweden: SS	USA: AISI/SAE	Germany: Wnr	Germany: DIN	France: AFNOR	Italy: UNI	Spain: UNF	Japan: JIS
Unalloyed Steels										
1006 / Fd5			1160	1006	1.0201	St36	Fd5			
1010 / XC10		045M10	1265	1010	1.1121	Ck10	XC10	C10	F.1510	
1015 / CC12		080M15	1350	1015	1.0401	C15	CC12	C15C16	F.111	
1020 / CC20		050A20	1450	1020	1.0402	C22	CC20	C20C21	F.112	
1022 / 20M5		120M19	1410	1022	1.1133	GS.20Mn5	20M5	G22Mn3	F.1515	
1025 /				1025	1.1158	Ck25				S25C
1035 / CC35		060A35	1550	1035	1.0501	C35	CC35	C35	F.113	
1035 / XC38TS		060A35	1572	1035	1.1183	Ck35	XC38TS	C36		S35C
1039 / 35M5		150M36		1039	1.1157	40Mn4	35M5			
1040 / 1C40		080M40		1040	1.0511	C40	1C40/AF60C40	C40/1C40	F.114.A	
1043 / CC45							CC45			
1045 / CC45		080M46	1650	1045	1.0503	C45	CC45	C45	F.114	
1045 / XC42		080M46	1672	1045	1.1191	Ck45	XC42	C45	C45K	S45C
1049 / XC42H1		080M46	1660	1049	1.1201	Cm45	3C45/XC42H1/XC48H1		F.1145, C45k-1/F.1147-C48k-1	S50C
1049 / XC48H1		080M50		1049/1050	1.1206	Ck50	2C50/XC48H1			
1050 / XC48TS		060A52	1674	1050	1.1213	Cf53	XC48TS	C53		S50C
1055 / XC55		070M55		1055	1.1203	Ck55	XC55	C50	C55K	S55C
105WC13		BO1	2140	O1	1.2510	105WCr6	105WC13	10WCr6-107WCr5KU	105WCr5	SKS31-SKS2-SKS3
1060 / CC55		080A62		1060	1.0601	C60	CC55	C60		
1070 / XC68		070A72	1770	1070	1.1231	Ck67	XC68	C70	F.5103	
1080 / XC75		060A78	1774	1080	1.1248	Ck75	XC75		F.5107	
1086 / XC90				1086	1.1269	Ck85	XC90	C90		
1095 / XC100		060A96	1870	1095	1.1274	Ck101	XC100		F.5117	SUP4
10PbF2					1.0722	10SPb20	10PbF2	CF10SPb20	10SPb20	
1108 / 10F1		(210M15)		1108/1109	1.0721	10S20	10F1	CF10S20	F.2121-10S20	
1140 / 35MF4		212M36	1957	1140	1.0726	35S20	35MF4		F210G	
1151 / 45MF4		212M44	1973	1151	1.0727	45S20	45MF4			
120WV10		BF1			1.2516	120WV4	120WV10	110W4KU		
1213 / S250		230M07	1912	1213	1.0715	9SMn28	S250	CF9SMn28	11SMn28	SUM22
1215 / S300		240M07		1215	1.0736	9SMn36	S300	CF9SMn36	12SMn35	
12L13 / S250Pb			1914	12L13	1.0718	9SMnPb28	S250Pb	CF9SMnPb28	11SMnPb28	SUM22L
12L14 / S300Pb			1926	12L14	1.0737	9SMnPb36	S300Pb	CF9SMnPb36	12SMnP35	
18NCD6		820A16			1.6587	17CrNiMo6	18NCD6		14NiCrMo13	
20MC5					1.7139	16MnSCr5	20MC5	20MnCr5	F.150.D	SMnC420H
2515 / Z18N5				2515	1.5680	12Ni19	Z18N5			
30CD12		722M24	2240		1.8515	32CrMo12	30CD12	32CrMo12	F.124.A	
3115 / 16NC6				3115	1.5919	15CrNi6	16NC6			
3415 / 12NC15		655M13-655A12		3415-3310	1.5752	14NiCr14	12NC15			SNC815(H)
38C2					1.7003	38Cr2	38C2/38Cr2	38Cr2/41Cr2KB	F.1200-38Cr3	
40CrMnNiMo8					1.2738	40CrMnNiMo8				
4130 / 25CD4		1717CDS110	2225	4130	1.7218	25CrMo4	25CD4	25CrMo4(KB)	55Cr3AM26CrMo4	SCM420-SCM430

Material Guide – Key to Recommended Inserts

Material Designation

- ◆ Unalloyed Steels
- ◆ Alloyed Steels
- ◆ Stainless Steels
- ◆ PH Stainless
- ◆ Cast Irons
- ◆ Aluminum & Alloys
- ◆ High Temp. Alloys
- ◆ Hard Materials



Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
Unalloyed Steels																			
390																			
390																			
590-780																			
500-650																			
500-650																			
550-750																			
540-730																			
690-930																			
580-800																			
630-800																			
630-800																			
630-800																			
620-850																			
650-900																			
640-830																			
640-830																			
750-850																			
750-900																			
810																			
630																			
670																			
1000-1100																			
390-710																			
350-780																			
510-740																			
650																			
775																			
410-710																			
430-740																			
410-710																			
430-740																			
980-1320																			
480-640																			
510-710																			
980-1420																			
500-850																			
880-1230																			
800-950																			
785																			
650-950																			

Materials Cross Reference

Material Guide – Key to Recommended Inserts

Material Designation										
Unalloyed Steels	Alloyed Steels	Stainless Steels	PH Stainless	Cast Irons	Aluminum & Alloys	High Temp. Alloys	Hard Materials			



Materials Cross Reference

Commercial Name	UNS Number	UK: BS,EN	Sweden: SS	USA: AISI/SAE	Germany: Wnr	Germany: DIN	France: AFNOR	Italy: UNI	Spain: UNF	Japan: JIS
Unalloyed Steels										
4137-4135 / 35CD4		708A37	2234	4137-4135	1.7220	34CrMo4	35CD4	35CrMo4	34CrMo4	SCM432.SCCRM3
4140 / 42CD4		708M40	2244	4140	1.7225	42CrMo4	42CD4	42CrMo4	42CrMo4	SCM440(H)
4140 / 42CD4(HT)		708M40	2244	4140	1.7225	42CrMo4	42CD4	42CrMo4	42CrMo4	SCM440(H)
4140-4142 / 42CD4TS		708M40	2244	4140-4142	1.7223	41CrMo4	42CD4TS	41CrMo4	42CrMo4	SCM440
4150 / 50CrMo4		708A47		4150	1.7228	50CrMo4	50CrMo4	50CrMo4		SCM445(H)
4340 / 35NCD6		817M40	2541	4340	1.6582	35CrNiMo6	35NCD6	35NiCrMo6(KB)	F.1280	
4419 /		1503-243-430	2512	4419	1.5419	22Mo4		G20Mo5/G22Mo5		SCPH11
5015 / 12C3		523M15		5015	1.7015	15Cr3	12C3			Scr415(H)
5045 / 45Cr2				5045-5046	1.7006	46Cr2	42C2/46Cr2	45Cr2		
5130 /		530A30		5130	1.7030	28Cr4				
5132 / 32C4		530A32		5132	1.7033	34Cr4	32C4	34Cr4(KB)	35Cr4	Scr430(H)
5135 / 37Cr4		530A36/530H36		5135	1.7034	37Cr4	37Cr4/38C4	36CrMn4/36CrMn5/38Cr4KB/38CrMn4KB	F.1210-38Cr4DF/ F.1201-38Cr4	Scr435H
5140 / 42C4		530M40		5140	1.7035	41Cr4	42C4	41Cr4	42Cr4	Scr440(H)
5155 / 55C3		524A60	2253	5155	1.7176	55Cr3	55C3			SUP9(A)
55NCDV6					1.2711	54NiCrMoV6	55NCDV6			
57NiCrMoV77					1.2744	57NiCrMoV77				
6150 / 50CV4		735A50	2230	6150	1.8159	50CrV4	50CV4	50CrV4	51CrV4	SUP10
6F3 / 55NCDV7				6F3	1.2714	56NiCrMoV7	55NCDV7			
6F5 / 55NC10				6F5	1.2718	55NiCr10	55NC10			
75CrMoNiW67					1.2762	75CrMoNiW67				
8620 / 20NCD2		805M20	2506	8620	1.6523	21NiCrMo2	20NCD2	20NiCrMo2	20NiCrMo2	SNM220(H)
90MnCrV8		BO2		2	1.2842	90MnCrV8	90MnCrV8	90MnCr8KU		
9310 / 16NCD13		832H13/832M13/S157		9310	1.6657	14NiCrMo134	16NCD13	15NiCrMo13	F.1560-14NiCrMo13/F. 1569-14NiCrMo131	
A105 / A48CP	K03501			A105		C22-8	A48CP			
A106GB / TUE250B						P235GH	TUE250B			
A182 / 12CD9		1501-622	2218	ASTMA182F22	1.7380	10CrMo910	12CD9.10	12CrMo910	TU.H	
A182 / 15CD3.5		1501-620Gr27		ASTMA182F11-F12	1.7335	13CrMo44	15CD3.5-15CD4.5	14CrMo45	14CrMo45	
A204Gr A / 15D3		1501-240	2912	ASTMA204Gr.A	1.5415	15Mo3	15D3	16Mo3KW	16Mo3	
A234WPB / AE250B							AE250B			
A234WPL6 / 42BT	K03006						42BT			
A27 65.35 / E23.45M		A1	1305	A27 65.35	1.0443	GS.45	E23.45M		F.221	
A33		Fe310-0/144915HR,HS	1300		1.0035	Fe310.0 (Si33)	A33	Fe320	A310-0/FE310-0	
A333G6 / TU42BT						P265GH	TU42BT			
A34-2					1.0028	Ust34-2	A34-2	Fe330Fe/330BFU		SS330
A34-2NE		144934/20HR,HS,CR,CS			1.0034	RSI34-2	A34-2NE	Fe330BFN		
A350LF2 / A48FP	K03504						A48FP			
A36 / E28				A36			E28			
A515.65 / A37CP		1501 161	1330	A515 65	1.0345	H I	A37CP		F.1110	
A516 / A48CP				A516Gr.70	1.0481	17MnA/ A515Gr.70/ A414Gr.F	A48CP	Fe510-1KG:KT:KW/ Fe510-2KG:KT:KW	A47RCI/RAII	SG365/SGV410/ SGV450/SGV480
A516G60 / E24-2						P265GH	E24-2			
A516G70 / E36-4						P295GH	E36-4			

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others	
Unalloyed Steels																				
	750-1100																			
	740-1080																			
	800-1200																			
	750-1100																			
	1100-1300																			
241-277HB	890																			
	440-590																			
	690-880																			
	900-1100																			
	530-860																			
	700-950																			
	950-1150																			
	700-750																			
	1050-1100																			
	800																			
	850																			
	780-1180																			
	850																			
	800																			
	705																			
	510-710																			
	740																			
	560-1200																			
187HB	600		0.4	0.3		0.12		0.15-0.35	0.6-1.05	0.35				0.035	0.04			0.4	Nb 0.4	
			0.4	0.4		0.15		0.10 min	0.29-1.06	0.3				0.048	0.058			0.4	Nb 0.4	
	440-590																			
	440-590																			
	440-570																			
197HB	660		0.4	0.4		0.15		0.10 min	0.29-1.06	0.3				0.05	0.058			0.4	Nb 0.4	
			0.4	0.3				0.10 min	0.6-1.35	0.3				0.035	0.04			0.4		
	750																			
	290-540																			
				0.4				0.10 min	0.29-1.06	0.3				0.025	0.025					
	300-500																			
	460-500																			
197HB	660		0.4	0.3		0.12		0.15-0.30	0.6-1.35	0.3				0.035	0.04			0.4	Nb 0.4	
	750																			
	750																			
	460-580																			
								0.1-0.35	1.4	0.2				0.05	0.05					
								0.1-0.35	1.6	0.22				0.04	0.04					

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Materials Cross Reference

Commercial Name	UNS Number	UK: BS,EN	Sweden: SS	USA: AISI/SAE	Germany: Wnr	Germany: DIN	France: AFNOR	Italy: UNI	Spain: UNF	Japan: JIS
Unalloyed Steels										
A537 / A52CP			2101/2102	A537Cl.1/ A414Gr.G/A612	1.0473	19Mn6	A52CP		A52RCI/RAII	SGV410/SGV450/ SGV480
A570 / A50-2		Fe490-2FN/4360-50B	1550/2172	A570Gr.50/ A572Gr.50	1.0050	Fe490-2 (St50-2)	A50-2	Fe490	A490-2/Fe490-2FN	SS490
A570 / E24-2		Fe360B/4360-40B	1311/1312	A570Gr.33,36	1.0036	Fe360B (Ust37-2)	E24-2	Fe360BFU	AE235B/Fe360B	
A570 / E28-2		Fe430BFN/144943/25HR, HS/4360-43B	1411/1412	A570Gr.40	1.0044	Fe430B (St44-2)	E28-2	FE430B/Fe430BFN	AE275B/Fe430BFN	SM400A:B:C
A570.36 / E24.2Ne		4360 40 C	1311	A570 36	1.0038	RS137.2	E24.2Ne			
A572 / A60-2		Fe590-2FN/4360-55E:55C	1650	A572Gr.65	1.0060	Fe590-2 (St60-2)	A60-2	Fe60-2/Fe590	A590-2/Fe590-2FN	SM570
A572.60 / E36							E36			
A573 / E38-3		Fe430D1FF/4360-43C:43D	1411/1412/1414	A573Gr.70/ A611Gr.D	1.0144	Fe430D1 (St44-3)	E28-3/E28-4	Fe430B/Fe430C(FN)/ Fe430D(FF)	AE275D/Fe430D1FF	SM400A:B:C
A573.81.65 / E24.U			1312	A573.81.65	1.0116	Sl37.3	E24.U	Fe37.3		
A619		14493CR		A619(1008)	1.0347	RRS13	E	FeP02		
A633 / FeE355KGN		A588		A633Gr.C	1.0562	SlE355	FeE355KGN/ E335R/FP	FeE355KG:KW	AE355KG:DD	SM490A:B:C:YA:YB
A70-2		Fe690-2FN	1655		1.0070	Fe690-2 (St70-2)	A70-2	Fe70-2/Fe690	A690-2/Fe690-2FN	
A738 / A52FP		Fe510D2F- F/1501Gr.224-460/1501Gr.224-490		A738	1.0577	Fe510D2 (Ast52)	A52FP		A52RBII	
C25		070M26		(M)1025	1.0406	C25	C25/1C25	C25/1C25		
E24-2		Fe360B/144937/23HR	1311		1.0037	Fe360B (St37-2)	E24-2	Fe360B:C:D	AE235B/Fe360B	STKM12A:C
E36-3		Fe510D1FF/144950/35HR, HS/4360-50D	2132/2133/2134		1.0570	Fe510D1 (St52-3)	E36-3/E36-4	Fe510CFN/ Fe510510B:C:D/ Fe510BFN	AE355D/Fe510D1FF	SM490A:B:C:YA:YB
L6 / 55NCDV07			2550	L6	1.2713	55NiCrMoV6	55NCDV7		F.520.S	SKT4
P2 / 20MC5				P2	1.2162	21MnCr5	20MC5			SCR420H
P20 / 40CMD8		P20		P20	1.2311	40CrMnMo7	40CMD8			
P20+S / 40CMD8+S		P20+S		P20+S	1.2312	40CrMnMoS86	40CMD8+S			
S1 / 55WC20		BS1	2710	S1	1.2542	45WCrV7	55WC20	45WCrV8KU	45WCrSi8	
S4				S4	1.2826	60MnSiCr4				
W110 / Y1105							Y1105			
W112 / Y2120				W112	1.1663	C125W	Y2120	C120KU	C120	SK2
W210 / Y1105V		BW2		W210	1.2833	100V1	Y1105V	102V2KUSKS43		
Alloyed Steels										
12CD4		1501620	2216	A38712-2	1.7262	15CrMo5	12CD4	12CrMo910	12CrMo4	SCM415(H)
1330 / 20M5		150M28		1330	1.1170	28Mn6	20M5	C28Mn		SCMn1
1335 / 40M5			2120	1335	1.1167	36Mn5	40M5		36Mn5	SMn438(H)
20AP										
22CMSD4							22CMS4			
3135 / 35NC6		640A35		3135	1.5710	36NiCr6	35NC6			SNC236
3415 / 14NC11				3415	1.5732	14NiCr10	14NC11	16NiCr11	15NiCr11	SNC415(H)
35NCD14							35NCD14			
40CMD8							40CMD8			
420 / Z40C14			2314	420	1.2083	X42Cr13	Z40C14			SUS420J2
429				429						
4340 / 35NCD6				4340			35NCD6			
440C / Z100CD17				440C	1.4125	X105CrMo17	Z100CD17			
4520				4520						

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
Unalloyed Steels																			
	480-650																		
	470-800																		
	340-690																		
	410-790																		
	750																		
	570-920																		
	750																		
	790																		
	750																		
	210-690																		
	490-800																		
	670-1000																		
	450-680																		
	470-650																		
	340-690																		
	490-800																		
	800-850																		
	705																		
	790																		
	790																		
	750-800																		
	740																		
	640-830																		
	650-750																		
	675																		
Alloyed Steels																			
	640-1080																		
	640-840																		
	600																		
	720-950							0.3	0.25-0.50	1				0.035	0.045				Pb0.2
255-300HB	970																		
	690-930																		
	830-1180																		
	1100-1350																		
	1100-1300																		
	770																		
	600																		
	900-1200																		
	870																		
	450-590																		

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Alloyed Steels										
45NCD17 / 6F7		EN30B		6F7	1.2767	X45NiCrMo4	45NCD17	KV		
5115 / 16MC5		527M20	2511	5115	1.7131	16MnCr5	16MC5	16MnCr5	16MnCr5	
5120 / 20MC5		150M19	2172	5120	1.0841	Si52-3	20MC5	Fe52BFN/Fe52CFN	F.431	
5140 / 42C4 (HT)		530M40		5140	1.7035	41Cr4	42C4	41Cr4	42Cr4	SCr440(H)
52100 / 100C6		534A99	2258	52100	1.3505	100Cr6	100C6	100Cr6	F.131	SUJ2
55MnSi4-4							55MS4-4			
55W1							XC55			
8630				8630						
8740 / 40NiCrMo22		311Type7		8740	1.6546	40NiCrMo22		40NiCrMo2(KB)	40NiCrMo2	SNCM240
9255 / 55S7		250A53	2090	9254	1.0904	55Si7	55S7	55Si8	F.144	
9262 / 60SC7				9262	1.0961	60SiCr7	60SC7	60SiCr8	60SiCr8	
9840 / 40NCD3		816M40		9840	1.6511	36CrNiMo4	40NCD3	38NiCrMo4(KB)	35NiCrMo4	
A128.75 / Z120M12		BW10	2183	A12875	1.3401	GX120Mn12	Z120M12	XG120Mn12	X120Mn12	
A2 / Z100CDV5		BA2	2260	A2	1.2363	X100CrMoV51	Z100CDV5	X100CrMoV51KU	X100CrMoV5F5227	SKD12
A350LF5 / 16N6				ASTMA350LF5	1.5622	14Ni6	16N6	14Ni6	15Ni6	
A355A / 40CAD06.12				A335A			40CAD0612			
A6				A6						
A7				A7						
Aermet 100	UNSK92580									
Aermet 310										
Aermet 340										
D2 / Z160CDV12		BD2	2310	D2	1.2601	X165CrMoV12	Z160CDV12	X165CrMoV12KU	X160CrMoV12	
D2 / Z210CW12		BD2		D2	1.2379	X155CrVMo12.1	Z210CW12			
D3 / Z200Cr12		BD3		D3	1.2080	X210Cr12	Z200Cr12	X210Cr13KU / X250Cr12KU	X210Cr12	SKD1
D4(D6) / Z200CD12		BD6	2312	D4(D6)	1.2436	X210CrW12	Z200CD12	X215CrW121KU	X210CrW12	SKD2
FV535										
H10 / 30CDV12-28		BH10		H10	1.2365	X32CrMoV33	30CDV12-28	30CrMoV1227KU	F.5313	
H10A / 30CKDV28		BH10A		H10A	1.2885	X32CrMoCoV33.3	30CKDV28			
H11 / Z38CDV5		BH11		H11	1.2343	X38CrMoV51	Z38CDV5	X37CrMoV51KU	F.5137	SKD6
H13 / Z40CDV5		BH13	2242	H13	1.2344	X40CrMoV51	Z40CDV5	X35CrMoV05KU / X40CrMoV511KU	X40CrMoV5	SKD61
H21 / Z30WCV9-3		BH21		H21	1.2581	X30WCrV93	Z30WCV9-3	X30WCrV93KU	F.5323	SKD5
Hardox400										
HardoxHiTuf										
HW3 / Z45CS9		401S45		HW3	1.4718	X45GrSi93	Z45CS9	X45GrSi8	F.322	SUH1
L1				L1						
L3 / Y100C6		BL3		L3	1.2067	100Cr6	Y100C6		100Cr6	
M2 / Z85WDCV06050402				M2			Z85WDCV06050402			
M3				M3						
M35 / Z85WDKCV			2723	M35	1.3243	S6/5/2/5	Z85WDKCV	HS6.5.2.5	F.5613	SKH55
M7 / Z100WCV09040202							Z100WCV09040202			
O1				O1						
P21				P21	1.2764	X19NiCrMo4				
P4				P4	1.2341	X6CrMo4				
S7				S7						
T1 / Z80WCV180401		BT1		T1	1.3355	S18.0.1	Z80WCV180401	X75W18KU	HS18.0.1	SKH2

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
Alloyed Steels																			
	880																		
	640-1080																		
	650																		
	800-1100																		
	650-750																		
269-302HB	970																		
248-285HB	900																		
	690-930																		
	690-930																		
	950-1050																		
	1050-1100																		
	800-1100																		
	780-1080																		
	750-850																		
	490-640																		
	700																		
	720-775																		
	795-910																		
40HRC	1250	71	11.1	3	13.4	1.2				0.23									
40HRC	1250	70	11	2.4	15	1.4				0.25									
37-42HRC	1330	68	12	2.25	15.6	1.85				0.33									
	850-900																		
	850																		
	850-900																		
	850-900																		
34HRC	1070		0.2-0.8	9.8-11.2		0.5-1.0	0.7	0.1-0.7	0.6-1.15	0.06-0.11									
	770																		
	770																		
	770																		
	1180-1620																		
	850																		
400HBW	1300																		
350HBW	1130																		
	970																		
	630																		
	750-850																		
	775-990																		
	795-870																		
	775-990																		
	775-990																		
	640-670																		
	850																		
	400																		
	640-720																		
	800-1050																		

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Alloyed Steels										
T4 / Z80WKC18050401		BT4		T4	1.3255	S18.1.2.5	Z80WKC18050401	X78WCo1805KU	HS18.1.1.5	SKH3
Z2NKDT18-10-5					1.2709	X3NiCoMoTi18.9.5	Z2NKDT18-10-5			
Z38CDV5-3					1.2367	X40CrMoV53	Z38CDV5-3	Z155CVD12-1		
Stainless Steels										
50	UNS S20910									
202		284S16		202	1.4371	X3CrMnNi18-8-7	Z8CMN18.08.05			
215										
284										
301			2331	301	1.4310	X12CrNi17-7	Z12CN17.07	X12CrNi17.07	F.3517	SUS301
302		302S31	2330	302	1.4319	X12CrNi18-9	Z10CN18.09	X10CrNi18.09	F.314	
303		303S21, 58M	2346	303	1.4305	X8CrNiS18-9	Z10CNF18.09	X10CrNiS 18.09	F.3508	SUS303
304		304S31, 58E	2332/2333	304	1.4350	X5CrNi18-9	Z6CN18.09	X5CrNi18.10	F.3551;F.3541;F.3504	SUS304
305		305S19		305	1.4312	X8CrNi18-12		X8CrNi1910	F.3503	
311										
315										
316		316S33, 58J	2343	316	1.4401	X5CrNiMo17-13-3	Z6CND19.12.03	X5CrNiMo1713	F.3543	SUS316
317		317S16		317	1.4449	X5CrNiMo17-13				
318				318	1.4583	X10CrNiMoNb18-12	Z6CNDNb17.13B	X6CrNiMoNb17.13		
320										
321	UNS S32100	321S12, 58B	2337	321	1.4541	X10CrNiTi18-9	Z6CNT18.10	X6CrNiTi18.11	F.3553;F.3523	SUS321
325										
326										
329			2324	329	1.4460	X8CrNiMo27-5	Z5CND27.05AZ			SUS329L
331										
332										
334				70334		X8CrNiAlTi20-20				
347	UNS S34700	347S17, 58F	2338	347	1.4550	X10CrNiNb18-9	Z6CNNb18.10	X6CrNiNb18.11	F.3552;F.3524	SUS347
348	UNS S34800				1.4546	X5CrNiNb18-10	Z10CrNiNb18.10			
394										
403		403S17	2301	403	1.4000	X7Cr13	Z6C13	X6Cr13	F.3110	SUS403
409		409S19		409	1.4510	X6CrTi12	Z6CT12	X6CrTi12		
410		410S21, 56A	2302	410	1.4006	X10Cr13	Z10C14	X12Cr13	F.3401	SUS410
416		416S21	2380	41600	1.4005	X12CrS13	Z11CF13	X12CrS13	F.3411	SUS416
420		420S37	2303	420	1.4021	X20Cr13	Z20C13	X20Cr13	F.5261	
425										
430		430S15, 60	2320	430	1.4016	X8Cr17	Z8C17	X8Cr17	F.3113	SUS430
431		431S29, 57	2321	431	1.4057	X22CrNi17	Z15CN16.02	X16CrNi16	F.3427	SUS431
433										
434		434S17	2325	434	1.4113	X6CrMo17	Z8CD17.01	X8CrMo17		SUS434
441										
444	UNS S44400		2326	444	1.4521		Z3CDT18.02			
452										
455	UNS S45500									

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
Alloyed Steels																			
	820-1050																		
	1125																		
	785																		
Stainless Steels																			
		63.7	6	21					9										
			4.0/6.0	17.0/19.0		-		1	7.5/10.0	0.15					0.06	0.03			
			9.0/11.00	14.0/16.0		0.08/1.20		0.20/1.00	5.50/7.00	0.06/0.15					0.04	0.03			
			4.00/6.50	16.5/18.5		-		1	7.00/10.0	0.07					0.06	0.03			
	700-950		7.00	17.00				1.00	2.00	0.14					0.05	0.03			
			6.0/10.0	17.0/22.0		1.5		2	2	0.20/0.4					0.05	0.05			
	500-700		10.50	19.50		0.60		2.00	1.50	0.16					0.04	0.30			
	500-700		9.00	19.50				2.00	1.50	0.08					0.04	0.04			
	490-690		11.50	18.00				1.00	2.00	0.12					0.04	0.03			
			23.0/28.0	17.0/23.0		1.5		3	2	0.5					0.05	0.05			
			9.0/11.0	16.5/18.5		1.25/1.75		1	2	0.07					0.045	0.03			
	510-710		13.00	17.00		1.50		0.75	2.00	0.08					0.04	0.03			Cu 0.5
	490-690		13.00	19.00		3.50		1.00	1.00	0.02					0.02	0.02			
	490-740		9.0 min	17.0/21.0		2.0/3.0		1.5	2	0.08					0.04	0.04			
			10.5/13.5	16.5/18.5		2.00/2.50		1	2	0.08		5C/0.80			0.045	0.03			
	500-730		9.50	18.00				1.00	2.00	0.08		0.40			0.04	0.03			
			8.0/11.0	17.0/19.0		0.7		1	2	0.12		5C/0.90			0.06	0.15/0.35			
			10.0/13.0	16.5/18.5		2.25/3.00		1	2	0.12					0.06	0.06			
	640-900		3.50	25.50		1.00				0.10					0.04	0.03			
			36.0/46.0	15.0/25.0		1.5		3	2	0.75					0.05	0.05			
			4.0/7.00	21.0/27.0		1.75/3.00		1.5	1.5	0.08					0.04	0.04			
			55.0/65.0	10.0/20.0		1.5		3	2	0.75					0.05	0.05			
	510-740		9.0/13.0	17.0/19.0				0.75	2.00	0.08					0.05	0.03			
	510-740		9.0/13.0	17.0/19.0	0.2			0.75	2.00	0.08					0.05	0.03			Ta 0.10
			8.0/10.5	17.0/19.0		-		1	2	0.07					0.045	0.03			Cu 3.00/4.00
	400-600		0.50	12.00				0.50	0.50	0.15					0.02	0.01			
			1	10.5/12.5		-		1	1	0.08		6C/1.0			0.04	0.03			
	450-650		1.00	12.00		0.50		0.50	0.50	0.15					0.02	0.01			Cu 0.5
	590-780		1.00	13.00		0.60		1.00	1.25	0.15					0.07	0.07			
	750-950		1.00	12.50				1.00	1.00	0.20					0.04	0.04			
			3.5/4.5	11.5/14.0		0.40/1.0		1	1	0.06					0.04	0.03			
	450-650		1.00	16.00				1.00	1.00	0.08					0.04	0.03			
	950		2.00	16.00				1.00	1.00	0.20					0.04	0.03			
79HRB	510	78	0.25	20.00				0.39	0.30	0.01					0.02	0.00		0.50	Nb 0.8
	450-650		1.00	17.00		0.75				0.08									
			2.0/3.0	15.0/18.0		0.6		1	1.5	0.12/0.20					0.04	0.03			
80HRB	500		0.5	18.2		1.9		0.45	0.3	0.013		0.13			0.03	0.002			
			4	25.0/30.0		1.5		2	1	1.0/2.0					0.05	0.05			
40-49HRC	1270-1650		7.5/9.5	11.0/12.5		0.5		0.5	0.5	0.05		0.8/1.4			0.04	0.03		1.5/2.5	

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Materials Cross Reference

Commercial Name	UNS Number	UK: BS,EN	Sweden: SS	USA: AISI/SAE	Germany: Wnr	Germany: DIN	France: AFNOR	Italy: UNI	Spain: UNF	Japan: JIS
Stainless Steels										
610	UNS S30600									
611	UNS S30601									
0Cr19Ni9										
1Cr12Ni3Mo2VN-5										
201LN	UNS S20153									
304 L		304S11	2352	304L	1.4306		Z2CN1810	X2CrNi18 11		
304 LN		304S62	2371	304LN	1.4311	X2CrNiN18-10	Z2CN18.10	X2CrNiN1811		SUS304LN
316 L	UNS S31603 & S31673	316S13	2348	316L	1.4404	X2CrNiMo18-12	Z2CND17.12	X2CrNiMo17 12		SCS16:SUS316L
316 LN		316S63	2375	316LN	1.4429	X2CrNiMoN18-13	Z2CND17.13			SUS316LN
316 LXN					1.4429	X2CrNiMoN17-13-3	Z2CND17 13	X2CrNiMoN17-13-3		
316 Ti		320S31		316Ti	1.4571	X8CrNiMoTi17-12-2		X6CrNiTi18 11	F.3535	
316L (S+Cu)						X2CrNiMo17-12-2+S+Cu				
316L Decolletage						X2CrNiMo17-12-2 improved				
317 L	UNS S31703	317S12	2367	317L	1.4438	X2CrNiMo18-16	Z2CND19.15	X2CrNiMo18 16		SUS317L
321 H						X8CrNiTi18-10				
403Cb				403Cb						
403Cb+					1.4914	X19CrMoVNb11-1	Z20CDNbV11			SUH600
409 Cb										
409 HP	UNS S40930									
410 S	UNS S41008									
420 F	UNS S42020	420S45	2304	420F	1.4028	X30Cr13	Z29CF13 / Z40C14	X40Cr14	F.3404 / X40Cr13	SUS420J2
430 F			2383	430F	1.4104	X12CrMoS17	Z10CF17	X10CrS17	F.3117	SUS430F
431 (HT)				431	1.4057	X17CrNi16-2				
436 S										
439 HP	UNS S43035									
440 A					1.4109	X70CrMo15				
440 C				440C		X105CrMo17	Z100CD17	X102CrMo17KU		SUS 440C
441 HP										
904 L	UNS N08904		2562		1.4539	X1CrNiMoCu25-20-5				
A286	UNS S66286	HR5152		ASTM 638		X5NiCrTi26-15	Z06NCT25			
AL 29-4C	UNS S44735									
AL-6XN	UNS N08367									
AL-6XN Plus	UNS N08367									
AM 350										
Bioline 4C27A				420F						
CF-8		304C15	2333	CF-8	1.4308	X6CrNi18-9	Z6CN18.10M			SCS13
CF-8M		316C6 ANC4B	2343	CF-8M	1.4408	X6CrNiMo18-10		X2CrNiMoN17-12	F.8414-AM-X7CrNiMo20-10	SCS14
Custom 465										
Datalloy 2										
Duplex 2003	UNS S32003									
Duplex 2102	UNS S80211									

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
Stainless Steels																			
HRB86	560	58.9/65.3	14/15.5	17/18.5		2		3.7/4.3	2	0.018				0.02	0.02			0.5	
HRB91	620	58/60	17/18	17/18.5		0.2		5.0/5.6	0.5/0.8	0.015				0.03	0.013			0.35	
			9.00	19.00															
			3.00	12.00		2.00													
217-241HB	840	67.7	5.5	18				1	7.5	0.15				0.06	0.03				
	460-680		10.00	19.00				0.50	1.00	0.02				0.02	0.02				
	550-760		10.00	18.00				1.00	2.00	0.03				0.05	0.03				
	490-690		12.00	17.00		2.50		0.50	1.00	0.02				0.02	0.02				
	490-600		12.00	17.00		2.50		0.50	1.00	0.02				0.02	0.02				Nitrogene 0.14
	580-800		13.00	17.50		2.75		1.00	2.00	0.03				0.05	0.03				
	500-730		12.00	17.50		2.25		1.00	2.00	0.08		5.00		0.05	0.03				
	600-980																		
	600-980																		
HB217	900	63	11.0/15.0	18.0/20.0		3.0/4.0		0.75	2.00	0.03				0.04	0.03				
			9.0/12.0	17.0/19.0		-		1	2	0.04/0.10		5C/0.80		0.04	0.03				
	800-950		0.50	12.00				0.35	0.50	0.14									Nb 0.18
	930-1080		0.55	11.10		0.60		0.35	0.70	0.17									V 0.3 Nb 0.28
84-97HRB	700	86	0.25	12.3		0.04		0.35	0.35	0.15	0.1	0.005		0.025	0.005				Nb 0.45
71HRB	430																		
75HRB	450	87	0.60	12.00				1.00	1.00	0.08				0.04	0.03				
300-500HB	1050-1300			12/14		0.60		1.00	1.25	0.15				0.06	0.15				
	640-840		1.00	17.00		0.50		1.00	1.25	0.12				0.06	0.15				
45/56HRc	1270-1650		-	16.0/18.0		0.75/1.25		1	1	0.12				0.04	0.03				
	568-818	81	0.23	17.0/19.0				0.55	0.45	0.012		0.4		0.02	0.001				
31-54HRC	1000-1800	81	0.5	16.0/18.0		0.75		1	1	0.07				0.04	0.03				
		82		16.5						1									
HRB82	520	79	0.3	18				0.34	0.35	0.009	0.05	0.29		0.023	0.002				Nb 0.71
	620		24.50	20.50		4.50		0.50	1.60	0.02				0.04					Cu 1.5
	620		25.00	14.50		1.25		0.20	0.20	0.04		2.10		0.02	0.00				
90HRB	610	65	0.3	29		4		0.35	0.5	0.02				0.03	0.01				Nb 0.6
183HB	600	48	24	20.5		6.3		0.4	0.4	0.02								0.2	N 0.22
183HB	600	45	25.3	21.8		6.7		0.3	0.3	0.02				0.02				0.2	N 0.24
	1175		4.30	16.50		2.80		0.30	0.80	0.09				0.02					
350-575HV	1130-1860	82.4	< 0.8	13		1.2		0.6	1.6	0.22				0.03	0.18				
	440-640																		
	440-640																		
	1300-1700		10.8/11.3	11/12		0.8/1.2						1.5/1.8							
300-350HB	1100		2.30	15.30		2.10		0.30	15.10	0.03									N 0.4
31HRC	1000	73.8	3.5	21		1.7													
246HB	800		1.5	22		0.55		0.75	2.5	0.03				0.04	0.02			0.4	

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Stainless Steels										
Duplex 2205	UNS S31803 & S32205			ASTM A240						
Duplex 2304	UNS S32304									
Duplex 255	UNS S32550									
Duplex F51		318S13	2377	F51	1.4462	X2CrNiMoN22-5-3	Z2CND22.05.03			
Duplex F55										
Duplex LDX2101										
E-Brite Alloy				ASTM B625						
FV607										
H46										
Jethete M152	UNS S64152			5718.9	1.4939	X12CrNiMoV12-3	Z12CND12			
Jethete M448										
Jethete X19						X19CrMoNbVN11-1				
Jethete X20					1.4923	X21CrMoV12-1	Z21CDV12			
Nitronic 50										
Nitronic 60										
REX 734	UNS S31675			ASTM F1586						
S240										
Staballoy AG17										
Staybrite® 4435NCu						X2CrNi18-13-3				
Super duplex 2507						X2CrNiMoCuN25-6-3				
Super Duplex 4565	UNS S34565									
Super Duplex Zeron 100				ASTM 32760						
Uranus 35N	UNS S32304					X2CrNiN23-4				
Uranus 45N+	UNS S31803		2377		1.4462	X2CrNiMoN22-5-3	Z3CND2205Az			
Uranus 45N22CrMo						X2CrNiMoN22-5-3				
Uranus 47N+						X2CrNiMoN25-6-3				
Uranus 52N+						X2CrNiMoCuN25-6-3				
Uranus 65						X1CrNi25-21				
Uranus B25 6Mo						X1NiCrMoCuN20-18-7				
Uranus B26 6Mo	UNS N08926					X1NiCrMoCuN25-20-7				
Uranus B28	UNS N08028					X1NiCrMoCu31-27-4				
Uranus B6	UNS N08904		2562		1.4539	X1NiCrMoCuN25-20-5				
Uranus B66						X1NiCrMoCu22-24-6				
Uranus S1 4%Si	UNS S30600					X1CrNiSi18-15-4				
X12CrNiMoS18-11					1.4427	X12CrNiMoS18-11	Z3CND17.13			
X12CrNiWTi16-3						X12CrNiWTi16-3				
X17CrNi16-02					1.4057	X17CrNi16-02				
X20CrNi17-2						X20CrNi17-2				
X20CrNiMo22-5-3						X20CrNiMo22-5-3				
X20CrNiMoS13-1						X20CrNiMoS13-1				
X22CrMoV12.1				ASTM A437-76 Grade B4B		X22CrMoV12-1 = ST12T				
X2CrNiMo18-15-3						X2CrNiMo18-15-3				
X30Cr13						X30Cr13				
X30CrMoN15-1		420S45	2304		1.4028	X30CrMoN15-1	Z33C13			
X3CrNiCuTiNb12-9						X3CrNiCuTiNb12-9				

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
Stainless Steels																			
	1000	68.9	5.8	22		3.3													
	950		4.50	22.50				1.00	2.00	0.03				0.04	0.02				
HRC32	1000	57.0/64.0	4.5/6.5	24.0/27.0		2.9/3.9		1	1.5	0.04				0.04	0.03			1.5/2.5	
225-290HB	900	72.6	4.5/6.5	21.0/23.0		2.50/3.5		1	2	0.03				0.035	0.015				
335HB	1100	58.7	4.5/6.5	24.0/26.0		3.0/4.0	0.08/0.2	1	2	0.03				0.03	0.02				N 2.5/3.5
248HB	850																		
	550			26.00		1.00				0.00									
290-349HV	930-1130		0.62	11.6		0.89		0.4	0.77	0.13									
304HB	1050	86	0.60	11.00		0.75		0.45	0.65	0.16				0.01	0.01			0.20	
	1100		2.60	16.80		1.80		0.18	0.70	0.12				0.03	0.02				
	> 930		1.00	10.50		0.60		0.40	1.00	0.13									Nb 0.4
	980		0.40	10.80		0.70		0.30	0.60	0.20									
			0.60	11.80		1.00		0.30	0.60	0.20									
260HB	860		13.50	23.50		3.00		1.00	6.00	0.06									
260HB	860		9.00	18.00		0.75		4.50	9.00	0.10									
22HRC	780	62	10.00	20.80		2.50		0.38	3.12	0.04				0.01	0.01			0.12	
32-34HRC	1070	69.2	10.75	12.5		1.75	1.5	0.25	0.25	0.03	1.5	0.7		0.01	0.01			1.5	
			0.50	17.00		0.05		0.30	20.00	0.03									N 0.5
	490-690		13	18		2.5		0.7	1.3	0.02								0.5	N 0.12
			7.50	25.00		4.00		0.70	2.00	0.03					0.02			2.50	
180HB	600		16.0/18.0	23.0/25.0		4.0/5.0			5.0/7.0	0.03									
284HB	1000		7	25		3.5		0.75	1	0.05				0.03	0.01			0.75	W 0.75
220HB	770	69.5	3.5/5.5	22.0/24.0		0.10/0.60		1	2	0.03				0.035	0.015				Cu 0.10/0.60
225HB	800	67.8	6	22.6		3.4				0.02					0.01				
225HB	800	72.6	4	23		2		1	2	0.03				0.035	0.015				
28HRC	1000	64.6	6.5	25		3.6				0.03									
28HRC	1000	63	6.5	25		3.5				0.03								1.5	
155HB	600	52.5	20.5	25		0.3			2	0.015									
230HV	810	55	18	20		6.1				0.01					0.001			0.7	
220HV	800	47	25	20.5		6.3				0.01					0.001			1	
300HB	1050	37.4	31	27		3.5		0.7	2	0.02				0.03	0.01			1	
200HB	620		24.50	20.50		4.50		0.50	1.60	0.02				0.04				1.5	
240HB	840	41.1	22	24		6	2		3									1.5	
		64.5	14.5	17				4		0.015									
	750-1000																		
			13.50	16.00				0.50	1.00	0.15		0.50		0.05	0.03				
296HB	950		1.5-2.5	16				1	1.5	0.12-0.22				0.04	0.03				
	750-950		2.00	17.00				0.80	0.80	0.20				0.04	0.03				
			5.00	22.00		3.00													
	1500																		
	980		0.60	11.80		1.00		0.30	0.60	0.21				0.04	0.04				
	900-1150																		
	1000		1	13				1	1	0.26-0.35				0.04	0.03				
53-57HRc																			
	1300-1700																		

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Material Guide – Key to Recommended Inserts

Material Designation

◆ Unalloyed Steels
 ◆ Alloyed Steels
 ◆ Stainless Steels
 ◆ PH Stainless
 ◆ Cast Irons
 ◆ Aluminum & Alloys
 ◆ High Temp. Alloys
 ◆ Hard Materials



Materials Cross Reference

Commercial Name	UNS Number	UK: BS,EN	Sweden: SS	USA: AISI/SAE	Germany: Wnr	Germany: DIN	France: AFNOR	Italy: UNI	Spain: UNF	Japan: JIS
Stainless Steels										
X40CrMoVN16-2		420S25		ASTM F899	1.4123	X40CrMoVN16-2	Z40CDV16.02			
X46CrS13						X46CrS13				
X4CrNiMo16-5-1					1.4418	X4CrNiMo16-5-1	Z8CND17.04			
X8CrCoNiMo10-6										
X8CrMnMoN23-21-1						X8CrMnMoN23-21-1				
X8CrNiSCu18-9						X8CrNiSCu18-9				
X90CrMoV18						X90CrMoV18				
XM19	UNS S20910			ASTM F1314						
Stainless Steel Refractory PH										
13-8PH	UNS S13800									
15-5PH	UNS S15500				1.454	X4CrNiCuNb16.4	Z6CNU15.05			
15-7PH					1.4532	X7CrNiMoAl15.7	Z8CND15.07			
17-4PH	UNS S17400				1.4542	X5CrNiCuNb17.4 = 0Cr17Ni4Cu4Nb	Z6CNU17.04			
17-7PH		316S111		177PH	1.4568/1.4504	X7CrNiAl17.7	Z8CNA17.07	X2CrNiMo17 12		
309		309S24		309	1.4828	X15CrNiSi20-12	Z15CNS20.12			SUH309
309 S		309S24		309 S	1.4833	X7CrNi23-14	Z20CN24-13	X6CrNi23-14		SUS309S
310 S		310S24	2361	310S	1.4845	X12CrNi25-20	Z12CN25.20	X6CrNi25 20	F.331	SUH310
314		314		30314	1.4841	X15CrNiSi25-20				
330		NA17		330	1.4864	X12NiCrSi36-16	Z12NCS35.16			SUH330
405		405S17		405	1.4724	X10CrAl13	Z10C13	X6CrAl112	F.311	SUS405
446			2322	446	1.4762	X10CrAl24	Z10CAS24	X16Cr26		SUH446
B163		NA15(H)		B163	1.4876	X10NiCrAlTi32-20	Z10NC32.21		F.3314-X10NiCrAlTi32-20	NCF800(TP)
EV8		349S54		EV8	1.4871	X53CrMnNiN21-9	Z52CMN21.09	X53CrMnNiN21-9	F.3217-X53CrMnNiN21-09	SUH35 / SUH36
HK		310C40 / 310C45		HK	1.4848	X40CrNiSi25-20		GX40CrNi26-20	F.8452-AM-X40CrNi2520	SCH21 / SCH22
HNV3		401S45		HNV3	1.4718	X45CrSi9-3	Z45CS9	X45CrSi8	F.3220-X45CrSi9-03	SUH1
X10CrAl18					1.4742	X10CrAl18	Z10CAS18	X8Cr17	F.3153-X10CrAl18	SUH21
X40CrSiMo10-2					1.4731	X40CrSiMo10-2	Z40CSD10		F.3221-X40CrSiMo10-02	SUH3
X40NiCrSi38-18		330C11 / 330C40 / 331C40			1.4865	X40NiCrSi38-18		GX50NiCr39-19		SCH15 / SCH16
X45CrNiW18-9					1.4873	X45CrNiW18-9	Z35CNWS14.14	X45CrNiW18-9	F.3211-X45CrNiSiW18-09	SUH31

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
Stainless Steels																			
58HRc																			
55HRc																			
	1200		6.00	15.50		1.50		1.00	1.50	0.05				0.04	0.02				
34HRC	1070		0.2-0.8	9.8-11.2		0.5-1.0	0.7	0.1-0.7	0.6-1.15	0.06-0.11									
	1300																		
	500-700																		
60HRC																			
90HRB	600	57	12.00	22.00		2.30		0.50	5.00	0.03				0.02	0.02				
Stainless Steel Refractory PH																			
	1300		8.00	13.00		2.20		0.10	0.20	0.05				0.01	0.01				
	<1400		4.50	14.80				0.50	0.50	0.03				0.02	0.02			3.50	
	<1620		7.00	15.00		2.50		0.50	0.50	0.05				0.02	0.02				
	<1380		4.00	16.30				0.50	0.50	0.04				0.02	0.02			4.00	
	<1560		7.00	17.00				0.50	0.50	0.05				0.02	0.02				
	500-750		14.00	23.50				2.00	1.50	0.20				0.04	0.04				
	500-700																		
	500-750		20.50	25.00				0.75	2.00	0.15				0.05	0.03				
			19.0/22.0	23.0/26.0		-		1.50/3.00	2.5	0.25				0.045	0.03				
	390-590		38.00	18.80				1.75	1.00	0.40				0.05	0.03				
	450-650		0.50	12.00				0.50	1.00	0.08				0.04	0.03				
	520-720			25.00				1.00	1.00	0.12				0.04	0.03				
	450-680																		
	950-1300																		
	440-640																		
	900-1100																		
	500-700																		
	130-1100																		
	400-600																		
	800-1300																		

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Commercial Name	UNS Number	UK: BS,EN	Sweden: SS	USA: AISI/SAE	Germany: Wnr	Germany: DIN	France: AFNOR	Italy: UNI	Spain: UNF	Japan: JIS
Gray Iron										
GG-30 / EN-GJL-300		Grade 300	130-00	A48-45B	0.6030	GG-30	F130D	G30	FG30	FC30
GG-35 / EN-GJL-350		Grade 350	135-00	A48-50B	0.6035	GG-35	F135D	G35	FG35	FC35
GG-40 / EN-GJL-400		Grade 400	140-00	A48-55B	0.6040	GG-40	F140D			
GG10 / EN-GJL-100		Grade 100	110-00	A48-20B	0.6010	GG10	F110D	G10	FG10	FC10
GG15 / EN-GJL-150		Grade 150	115-00	A48-25B	0.6015	GG15	F115D	G15	FG15	FC15
GG20 / EN-GJL-200		Grade 200	120-00	A48-30B	0.6020	GG20	F120D	G20	FG20	FC20
GG25 / EN-GJL-250		Grade 250	125-00	A48-35B	0.6025	GG25	F125D	G25	FG25	FC25
Spheroidal-Ductile Iron										
GGG-40Mn0.5		500/7	0727-02	65-45-12	0.7050	GGG-50	FGS 500-7	GS 500/7	FGE 50-7	FCD 50
GGG-SiMn3.08										
GGG-SiMn4.10										
GGG-SiMn5.10										
GGG-35.3 / EN-GJS350-22			0717-15		0.7033	GGG-35.3				
GGG-40 / EN-GJS400-1		420/12	0717-02	60-40-18	0.7040	GGG-40	FGS 400-12	GS 400-12	FGE 38-17	FCD 40
GGG-50 / EN-GJS500-7										
GGG-60 / EN-GJS600-3		600/3	0732-03	80-55-06	0.7060	GGG-60	FGS 600-3	GS 600/3		FCD 60
GGG-70 / EN-GJS700-2		700/2	0737-01	100-70-03	0.7070	GGG-70	FGS 700-2	GS 700-2	FGS 70-2	FCD 70
GGG-80 / EN-GJS800-2		800/2		120-90-02	0.7080	GGG-80	FGS 800-2	GS 800-2		
GGG-Ni22 / EN-GJSAXNi22		S-Ni 22		A 439 Type D-2C	0.7670	GGG-Ni22	S-N 22			
GGG-Ni35 / EN-GJSAXNi35		S-Ni 35		A 439 Type D-5	0.7683	GGG-Ni35	S-N 35			
GGG-NiCr20.3		S-NiCr 20 3		A 439 Type D-2B	0.7661	GGG-NiCr20.3	S-NC 20 3			
GGG-NiCr202 / EN-GJSAXNiCr20-2		S-NiCr 20 2		A 439 Type D-2	0.7660	GGG-NiCr20.2	S-NC 20 2			
GGG-NiCr30.1		S-NiCr 30 1		A 439 Type D-3A	0.7677	GGG-NiCr30.1	S-NC 30 1			
GGG-NiCr303 / EN-GJSAXNiCr30-3		S-NiCr 30 3		A 439 Type D-3	0.7676	GGG-NiCr30.3	S-NC 30 3			
GGG-NiCr353 / EN-GJSAXNiCr35-3		S-NiCr 35 3		A 439 Type D-5B	0.7685	GGG-NiCr35.3	S-NC 35 3			
GGG-NiCrNb20.2					0.7659	GGG-NiCrNb20.2				
GGG-NiMn13.7		S-NiMn 13 7			0.7652	GGG-NiMn13.7	S-NM 13 7			
GGG-NiMn234 / EN-GJSAXNiMn23-4		S-NiMn 23 4		A 571 Type D-2M	0.7673	GGG-NiMn23.4	S-NM 23 4			
GGG-NiSi3055 / EN-GJSAXNiSiCr30-5-5		S-NiSiCr 30 5 5		A 439 Type D-4	0.7680	GGG-NiSiCr30.5.5	S-NSC 30 5 5			
GGG-NiSiCr20.5.2		S-NiSiCr 20 5 2			0.7665	GGG-NiSiCr20.5.2	S-NSC 20 5 2			
GGG-NiSiCr30.5.2					0.7679	GGG-NiSiCr30.5.2				
GGG-NiSiCr35.5.2					0.7688	GGG-NiSiCr35.5.2				
Malleable Iron										
GTS-35-10 / MN35-10		B 340/12	815	32510	0.8135	GTS-35-10	MN 35-10			
GTS-45-06 / MN450-6						GTS-45-06	MN450-6			
GTS-55-04 / MP50-5							MP50-5			
GTS-65-02 / MN650-3		P 570/3	858	70003	0.8165	GTS-65-02	MN650-3			
GTS-70-02 / MN700-2		P 690/2	862	A220-80002	0.8170	GTS-70-02	MN700-2	GMN 70		
GTW-35-04					0.8035	GTW-35-04				
GTW-40-05					0.8040	GTW-40-05				
GTW-45-07					0.8045	GTW-45-07				

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
Gray Iron																			
230HB	760																		
235HB	770																		
250HB	810																		
175HB	570																		
185HB	620																		
205HB	660																		
220HB	730																		
Spheroidal-Ductile Iron																			
150-200HB	660																		
200-250HB	810																		
200-250HB	810																		
200-250HB	810																		
150-180HB	600																		
155-220HB	730																		
190-255HB	820																		
200-260HB	840																		
240-300HB	970																		
265-300HB	970																		
130-170HB	570																		
130-180HB	600																		
	390																		
140-200HB	660																		
	370																		
140-200HB	660																		
140-190HB	630																		
	370																		
	390																		
120-170HB	570																		
170-240HB	780																		
	370																		
	380																		
	370																		
Malleable Iron																			
150HB	350-500																		
175HB	580																		
205HB	670																		
230HB	650-880																		
265HB	700-950																		
	340-740																		
	360-740																		
	400-740																		

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Aluminum & Alloys <16% Si										
1050		1B			3.0255	Al99,5	A5	4507		
1070					3.0275	Al99,7		4508		
1080		1A			3.0128	Al99,8	A8	4509		
1100										
2011		FC1		2011	3.1655	AlCuBiPb	A-U5PbBi	6362		
2014		H15			3.1255	AlCuSiMn	A-U4SG	3581		
2017				2017	3.1325	AlCuMg1	A-U4G	3579		
2024		L97		2024	3.1355	AlCuMg2	A-U4G1			
2117										
2218						AlCuMgNi2				
2224										
3003					3.0517	AlMnCu	A-M1	3568		
3004					3.0526	AlMn1Mg1	A-M1G			
3005					3.0525	AlMn1Mg0.5	A-MG0.5			
3103		N3			3.0515	AlMn1		7780		
3105										
5005		N41		5005	3.3315	AlMg1	A-G0,6	5764-66		
5052		2L56		5052	3.3523	AlMg2,5	A-G2,5C	4574		
5056		N6		5056	3.3555	AlMg5	A-G5	3576		
5083		N8		5083	3.3547	ASiMg4,5Mn	A-G4,5MC	7790		
5086					3.3545	AlMg4Mn				
5154		N5			3.3535	AlMg3,5	A-G3	3575		
5251		N4			3.3525	AlMg2Mo3	A-G2M	3574		
5454		N51		5454	3.3537	AlMg2,5Mn	A-G2,5MC	7789		
5657						AlMg0,8Si				
5754		N5		5754	3.3535	AlMg3	A-G3M	3575		
6061		H20					A-GSUC	6170		
6063		H9		6063	3.3206	AlMgSi0,5	A-GS	3569		
6070										
6151										
6262										
6351		H30		6351	3.2315	AlMgSi1	A-SGM0,7	3571		
6463		91E			3.3207	EAlMgSi0,5		3570		
7001										
7003										
7020		H17			3.4335	AlZn4,5Mg1	A-Z5G	7791		
7022					3.4345	AlZnMgCu0,5				
7050										
7075		DTD5074		7075	3.4365	AlZnMgCu1,5	A-Z5GU AS5U3	3735		
7175										
7178										
7475										
AS7G						AlSi7Mg				
Aluminum & Alloys >16% Si										
4032										

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
Aluminum & Alloys <16% Si																			
105	0.4		-					0.25	0.5		99.50min	-				0.05	0.05	0.05	-
100	0.25							0.25	0.03		rem	0.03				0.03	0.04	0.04	
100	0.15							0.25	0.02		rem	0.03				0.02	0.03	0.03	
90	Si+Fe1.0max		-					0.05			99.00min	-				-	0.1	0.05-0.20	-
310	0.7		-					0.4	-		rem	-				-	0.3	50-60	Pb, Bi 0.2-0.6
430	0.7		0.1					0.5-1.2	0.4-1.2		rem	0.15				0.2-0.8	0.25	3.9-5.0	-
390	0.7		0.1					0.2-0.8	0.4-1.0		rem	0.15				0.4-0.8	0.25	3.5-4.5	-
465	0.5		0.1					0.5	0.3-0.9		rem	0.15				1.2-1.8	0.25	3.8-4.9	-
296	0.7		0.1					0.8	0.2		rem					0.2-0.5	0.25	2.2-3.0	-
331	1	1.7-2.3	0.1					0.9	0.2		rem	-				1.2-1.8	0.25	3.5-4.5	-
	0.15		0.1					0.12	0.30-0.9		rem	0.15				1.2-1.8	0.25	3.8-4.4	-
140	0.7		-					0.6	1.0-1.5		rem	-				-	0.1	0.05-0.20	-
200	0.7							0.3	0.51-1.0		rem					0.8-1.3	0.25	0.25	-
165	0.7		0.1					0.6	1.0-1.5		rem	0.1				0.2-0.6	0.25	0.3	-
	0.7		0.1					0.5	0.9-1.5		rem	0.1+Zr				0.3	0.2	0.1	-
175	0.7		0.2					0.6	0.3-0.8		rem	0.1				0.2-0.8	0.4	0.3	-
159	0.7		0.1					0.3	0.2		rem					0.5-1.1	0.25	0.2	-
260	0.4		0.15-0.35					0.25	0.1		rem	-				2.2-2.8	0.1	0.1	-
300	0.4		0.05-0.20					0.3	0.05-0.20		rem	-				4.5-5.6	0.1	0.1	-
335	0.4		0.05-0.25					0.4	0.4-1.0		rem	0.15				4.0-4.9	0.25	0.1	-
300	0.5		0.05-0.25					0.4	0.20-0.7		rem	0.15				3.5-4.5	0.25	0.1	-
269	0.4							0.45	0.1		rem					3.1-3.9	0.2	0.1	-
	0.7		0.1					0.5	0.2-0.7		rem	0.1				1.6-2.2	0.25	0.25	-
276	0.4		0.05-0.2					0.25	0.5-1.0		rem	0.05-0.2				2.4-3.0	0.25	0.1	-
193	0.1							0.08	0.03		rem					0.6-1.0		0.1	-
	0.4		0.3					0.4	0.5		rem	0.15				2.6-3.6	0.2	0.1	-
300	0.7		0.04-0.35					0.4-0.8	0.15		rem	0.15				0.8-1.2	0.25	0.15-0.40	-
200	0.35		0.1					0.2-0.6	0.1		rem	0.1				0.45-0.9	0.1	0.1	-
379	0.5		0.1					1.0-1.7	0.40-1.0		rem	0.15				0.50-1.2	0.25	0.15-0.40	-
	1		0.15-0.35					0.6-1.2	0.2		rem	0.15				0.45-0.8	0.25	0.35	-
400	0.7		0.04-0.14					0.4-0.8	0.15		rem	0.15				0.8-1.2	0.25	0.15-0.40	Pb, Bi 0.40-0.7
310	0.5		-					0.7-1.3	0.4-0.8		rem	0.2				0.40-0.8	0.2	0.1	-
241	0.15		-					0.20-0.6	0.05		rem	-				0.45-0.9	0.05	0.2	-
	0.4		0.18-0.35					0.35	0.2		rem	0.2				2.6-3.4	6.8-8.0	1.6-2.6	-
400	0.35		0.2					0.3	0.3		rem	0.2				0.50-1.0	5.0-6.5	0.2	Zr0.05-0.25
	0.4		0.1-0.35					0.35	0.05-0.5		rem					1.0-1.4	4.0-5.0	0.2	Zr0.08-0.2
	0.5		0.1-0.3					0.5	0.1-0.4		rem					2.6-3.7	4.3-5.2	0.5-1.0	
530	0.15		0.04					0.12	0.1		rem	0.06				1.9-2.6	5.7-6.7	2.0-2.6	Zr0.08-0.15
570	0.5		0.18-0.28					0.4	0.3		rem	0.2				2.1-2.9	5.1-6.1	1.2-2.0	-
590	0.2		0.18-0.28					0.15	0.1		rem	0.1				2.1-2.9	5.1-6.1	1.2-2.0	-
600	0.5		0.18-0.35					0.4	0.3		rem	0.2				2.4-3.1	6.3-7.3	1.6-2.4	-
565	0.12		0.18-0.25					0.1	0.06		rem	0.06				1.9-2.6	5.2-6.2	1.2-1.9	-
50/90HB	250																		
Aluminum & Alloys >16% Si																			
379	1	0.5-1.3	0.1					11.0-13.5	-		rem	-				0.8-1.3	0.25	0.5-1.3	-



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Commercial Name	UNS Number	UK: BS,EN	Sweden: SS	USA: AISI/SAE	Germany: Wnr	Germany: DIN	France: AFNOR	Italy: UNI	Spain: UNF	Japan: JIS
Aluminum Lithium										
2050										
2090										
2091										
2094										
2095										
2097										
2098										
2099										
2195										
2196										
2197										
2198										
2199										
2297										
2397										
8017										
8024										
8090										
8091										
8093										
HTA Iron Based Alloys										
20CB-3				ASTM B463						
21-6-9				ASTM A666						
AL 4750				ASTM B753						
Armco 18										
Armco 20-45-5										
RA 330				5592, 5716						
Crucible A-286	UNS S66286	HR 5152		ASTM 368	1.4980	X5NiCrTi2515	Z06 NCT 25			
Discaloy 16/25/6				5725			Z3NCT25			
Discaloy 24				ASTM A638			Z3NCT25			
Greek Ascology				5508						
Haynes 556				5768		X12CrCoNi2120	Z12CKNDWNb21.20.20			
Incoloy 800	UNS N08800	3082.76		ASME SB409		X10NiCrAlTi3220	Z10NC3221			
Incoloy 801	UNS N08801			5552	1.4868	G.X50CrNi3030	Z5NCT3220			
Incoloy 802							Z4NC3221			
Incoloy 803										
Incoloy DS		3072.76				X12NiCrSi3616				
Invar 36	UNS K93600 K93603			ASTM F1684						
Invar 42				ASTM F30						
Maraging C200	UNS K92810									
Maraging C250	UNS K92890			6501, 6512, 6520			Z2NKD18.8			
Maraging C300	UNS K93120			6514						
Maraging C350										
Maraging T200										

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- ◆ H Hard Materials



Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
Aluminum Lithium																			
	520			0.05				0.08	0.20-0.50		rem	0.1	0.70-1.30			0.20-0.60	0.25	3.20-3.90	Zr0.25
	510			0.05				0.1	0.05		rem	0.15	1.90-2.60			0.25	0.1	2.40-3.0	Zr0.08-0.15
	400			0.1				0.2	0.1		rem	0.1	1.70-2.3			1.10-1.90	0.25	1.80-2.50	Zr0.04-0.16
								0.12	0.25		rem	0.1	0.70-1.40			0.25-0.80	0.25	4.40-5.20	Zr0.04-0.18
								0.12	0.25		rem	0.1	0.70-1.40			0.25-0.80	0.25	3.90-4.60	Zr0.04-0.18
								0.12	0.10-0.60		rem	0.15	1.20-1.80			0.35	0.35	2.50-3.10	Zr0.08-0.16
								0.12	0.35		rem	0.1	0.80-1.30			0.25-0.80	0.35	3.20-3.80	Zr0.04-0.18
								0.05	0.10-0.50		rem	0.1	1.60-2.00			0.10-0.50	0.40-1.00	2.40-3.00	Zr0.05-0.12
								0.12	0.25		rem	0.1	0.08-0.16			0.25-0.80	0.25	3.70-4.30	Zr0.08-0.16
								0.12	0.35		rem	0.1	1.40-2.10			0.25-0.80	0.35	2.50-3.30	Zr0.04-0.18
								0.1	0.10-0.50		rem	0.12	1.20-1.70			0.25	0.05	2.50-3.10	Zr0.08-0.15
				0.05				0.08	0.5		rem	0.1	0.80-1.10			0.25-0.80	0.35	2.90-3.50	Zr0.04-0.18
								0.05	0.10-0.50		rem	0.1	1.40-1.80			0.050-0.40	0.20-0.90	2.30-2.90	Zr0.05-0.12
								0.1	0.10-0.50		rem	0.12	1.10-1.70			0.25	0.05	2.50-3.10	Zr0.08-0.15
								0.1	0.10-0.50		rem	0.12	1.10-1.70			0.25	0.05-0.15	2.50-3.10	Zr0.08-0.15
								0.1	0.01-0.05		rem		0.003				0.05	0.10-0.20	
								0.1			rem		3.40-4.20						Zr0.08-0.25
	450			0.1				0.2	0.1		rem	0.1	2.20-2.70			0.60-1.30	0.25	1.00-1.60	Zr0.04-0.16
				0.1				0.3	0.1		rem	0.1	2.40-2.80			0.50-1.20	0.25	1.60-2.20	Zr0.08-0.16
				0.1				0.1	0.1		rem	0.1	1.90-2.60			0.90-1.60	0.25	1.00-1.60	Zr0.04-0.14
HTA Iron Based Alloys																			
95HRB	690	41.0	33.0	20.0		2.2		1	2	0.07									Cu 3.3
93HRB	660	62.0	6.5	21.0				1	9	0.08									No 0.3
55HRB	350	50.0	48.0	0.1	0.5	0.3			0.3	0.01				0.03	0.01				Cu 0.3
		66.0	3.7	17.2				0.47	12.5	0.06									
		25.6	46.0	20.0		2.3		1	5	0.08									Nb 0.4
		43.8	35.5	18.5				1.13	1	0.04				0.01	0.01				Cu 0.5
250HB	810	56.0	25.0	14.5		1.3		0.2	0.2	0.05	0.2	2.1							
290HB	930	50.1	25.0	16.0		6.0		0.7	1.35	0.12		0.3							Nb 0.4
280HB	900	54.3	26.0	13.5		2.7		0.8	0.9	0.04	0.1	1.7							
300HB	970	80.0	2.0	12.0		0.2	2.5	0.3	0.4	0.15									
260HB	840	29.0	20.0	21.0	20.0	3.0	2.5	0.4	1.5	0.1	0.3								Nb + Ta
184HB	630	44.5	32.5	21.0				0.5	0.75	0.05	0.37	0.37			0.007				Cu 0.37
180HB	600	45.1	32.0	20.5				0.5	0.8	0.05		1.1							
180HB	600	44.4	32.5	21.5				0.4	0.8	0.4									
		39.0	35.0	25.0						0.08	0.15	0.15							
180HB	600	41.7	37.0	18.0				2.3	1	0.06									
75HRB	460	62.0	36.0		0.4	0.0		0.15	0.3	0.008	0.03				0.001				
55HRB	350	58.0	41.0	0.2	0.0				0.2	0.01	0.001			0.01	0.007				
43-48HRC	1360	69.0	18.5		8.5	3.3		0.05	0.05	0.01		0.2		0.005	0.005				
48-52HRC	1590	68.0	18.5		7.8	4.8		0.05	0.05	0.02	0.1	0.4		0.005	0.005				
50-55HRC	1700	67.0	18.5		8.8	4.8		0.05	0.05	0.02	0.1	0.73		0.005	0.005				
55-60HRC	2010	63.0	18.5		12.0	4.8		0.05	0.05	0.02	0.1	1.4		0.005	0.005				
43-47HRC	1400	77.6	18.5			3.0		0.05	0.05	0.01		0.7		0.005	0.005				

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HTA Iron Based Alloys										
Maraging T250				6518, 6519, 6591						
Maraging T300										
Marval 18										
Marval X12										
Multimet N-155				5768	1.4971		Z12CNKDW20			
Multimet N-156										
S 590				5533		X40CoCrNi2020	Z42CKNDW			
Sanicro 30						X2NiCrAlTi3220				
Super Invar 32-5										
Udimet B-250										
Udimet B-300										
W-545				AISI:665			Z8NCTDA2613			
HTA Cobalt Based Alloys										
F 1537	UNS R31537 & R31538			ASTM F1537			CoCr28Mo			
Fe50Co50										
HS 21		3531		ASTM F-75		CoCr28Mo	KC27D5NFe			
HS 25				AISI 670		CoCr20W15Ni	KC20WN			
HS 30				5380		CoCr26Ni14Mo				
HS 31		3146		ASTM A567		CoCr25NiW	KC25NW			
HS 36						CoCr19W14NiB				
Jetalloy 209										
K13C20N126	UNS R3003 & R3008			ASTM F1058		K13C20N126Fe15D7	K13C20N126Fe15D7			
L 251										
L 605	UNS R30605			5759	2.4964	CoCr20W15Ni	KC20WN			
M 203										
M 204										
M 205										
MAR-M 247										
MAR-M 302						CoCrW10TaZrB	KC21W10Ta9			
MAR-M 322						CoCr22W9TaZrNb	KC21W9Ta			
MAR-M 509		3146.3				CoCr24Ni10W7TaZrB	KC23N10W7Ta			
MAR-M 905							KC20N20Ta7			
MAR-M 918						CoCr20Ni20Ta	KC20N20Ta7			
MP159	UNS R30159									
MP35N	UNS R30035									
S 816				5534	2.4979	CoCr20Ni20W				
Stellite 1							KC33W13			
Stellite 100										
Stellite 12							KC28W8			
Stellite 151										
Stellite 188							KC22N22W14Fe			
Stellite 19										
Stellite 20										
Stellite 21										
Stellite 23										

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
HTA Iron Based Alloys																			
49-52HRC	1600	76.8	18.5			3.0		0.03	0.05	0.02	0.1	1.4		0.005	0.005				
52-55HRC	1800	76.8	18.5			3.0		0.03	0.05	0.02	0.1	1.4		0.005	0.005				
50HRC	1700	68.0	18.0		8.5	5.0		0.1		0.01	0.1	0.5							
32HRC	1000	75.0	9.4	12.0		2.0		0.05	0.02	0.01	0.7	0.3							
266HB	850	32.0	20.0	21.0	20.0	3.0				0.1									
260HB	840	19.7	33.0	17.0	24.0	3.0	2.0			0.33									
270HB	870	24.9	20.0	21.0	20.0	4.0	4.0	1.25	0.4	0.43									
150HB	510	14.6	34.0	22.0				0.55	0.55	0.03	0.3	0.5							Cu 0.1
	600	62.0	31.8	0.03	5.4			0.09	0.39	0.05	0.07						.08		
470HB	1590	68.6	18.0		7.9	4.9		0.1	0.1	0.08	0.1								
470HB	1590	67.0	18.0		9.0	5.0		0.1	0.1	0.08	0.1								
280HB	900	53.0	26.0	13.3		1.8		0.8	1.5	0.08	0.15								
HTA Cobalt Based Alloys																			
41HRC	1290	0.3	0.2	28.0	64.0	6.0		0.5	0.5	0.1									N 0.2
1050HV		1.0	3.0	27.0	62.0	5.0		0.6	0.6	0.2		0.3							
		3.0	10.0	20.0	48.0		15.0	2.0	1.5			0.1							
		1.0	16.0	24.0	51.4	6.0		0.6	0.6			0.4							
		1.5	10.0	25.0	54.0		8.0	0.8	0.6			0.4							
		2.0	10.0	18.0	53.1		15.0		1.5			0.4							
180/230HB		1.0	10.0	20.0	52.0		15.0				2.0	0.0							
500/700HV	1450-1650																		
		1.0	10.0	19.0	55.6		14.0					0.4							
80HRB	510	0.5	10.0	20.0	52.0		15.0		1.7	0.1									
		1.0	24.5	19.5	38.0		12.0	1.0	0.8	2.2	0.7	0.1							
			24.5	18.5	43.0		12.0	1.0	1.0			0.1							
			24.5	18.5	42.0		12.0			2.8		0.1							
	800	0.5	59.0	8.3	10.0	0.7	10.0				5.5	1.0							Ta 3.0
				21.5	57.0		10.0					0.9							Ta 9.0
				21.5	60.0		9.0	0.1	0.1	1.0	0.8	1.0							Ta 4.5, Zr 2.25
		1.0	10.0	21.5	50.0		7.0	0.1	0.1		0.2	0.6							Ta 3.5, Zr 0.5
			20.0	20.0	55.0					0.5	0.1								Ta 7.5, Zr 0.1
		0.5	20.0	20.0	50.0			0.1	0.1			0.1							Ta 7.5, Zr 0.1
		9.0	25.5	19.0	35.7	7.0					0.2	3.0							Zr 0.6
28HRC	900		35.0	20.0	35.0	9.8				0.013									
		4.0	20.0	20.0	46.0	4.0	4.0	0.4	1.2			0.4							
				33.0	50.0					2.5									
				34.0	43.0					2.0									
463HB	1560	2.0	3.0	29.0	59.0		9.0			1.8									
		2.0	1.0	20.0	65.0		13.0			0.5									
		3.0	22.0	22.0	37.0		14.0			0.1									
52HRC	1800	3.0	3.0	31.0	52.0		10.5			1.7									
				33.0	45.0		18.0			2.5									
		3.0	2.5	27.0	60.0	5.5				0.3									
		2.0	1.5	25.0	65.0		5.0			0.4									

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HTA Cobalt Based Alloys										
Stellite 25 (L605)				5759	2.4964	CoCr20W15Ni	KC20WN			
Stellite 3										
Stellite 30										
Stellite 31 (X40)		3146.2		ASTM A567		CoCr25NiW	KC25N10W7Fe			
Stellite 4										
Stellite 45										
Stellite 6							KC26NW			
Stellite 7										
Stellite 8 (F75)										
V-36						CoCr25Ni20MoWNB	KC25N20DFeWNB			
WI-52						CoCr21Mo11W	KC21W11ANbT			
X 40		3146.2		ASTM A567		CoCr25NiW	KC25N10W7Fe			
X 45							KC25N10W7Fe			
X 50										
X 63										
HTA Nickel Based Alloys										
200	UNS N02200									
201	UNS N02201									
718 Plus										
Allcorr										
Astroloy	UNS N13017						NK17C15D5AT			
Duraloy 22H										
Duraloy Super 22H										
GMR 235				AISI 686			NC15Fe10D5AT			
GMR 235-D						NiCr16MoAl	NC15D5FeAT			
Hastelloy B				5396A	2.48	S.NiMo30	ND27FeV			
Hastelloy B-2	UNS N10665									
Hastelloy C	UNS N10002			5388C		NiCr17Mo17FeW	NC17DWY			
Hastelloy C-22										
Hastelloy C-276	UNS N10276				2.4819	G-NiMo30	NC15D14KFe			
Hastelloy C-4	UNS N06455									
Hastelloy G	UNS N06007						NC22Fe19D6KtA			
Hastelloy G-3	UNS N06985				2.4619					
Hastelloy N	UNS N10003									
Hastelloy R235										
Hastelloy S	UNS N06635						NC15D14KFe			
Hastelloy W	UNS N10004									
Hastelloy X	UNS N06002	HR6, 204		5536	2.4603	NiCr22FeMo	NC22FeD			
Haynes 188	UNS R30188			5772			KC22N22W14Fe			
Haynes 25	UNS R30605			5759		LW2.4964	KC20WN			
Haynes 263	UNS N07263						NC20K20D6T			
Haynes 600	UNS N06600			5540	2.4816	NiCr15Fe				
Haynes 601	UNS N06601			5715	2.4851					
Haynes 625	UNS N06625			ASME SB443	2.4856	NiCr22Mo9Nb	NC22FeDNB			
Haynes 690	UNS N06690				2.4642	NiCr29Fe	NC30Fe			
Haynes 75										
Haynes X-750	UNS N07750			5542	2.4669		NC15TNbA			

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
HTA Cobalt Based Alloys																			
350HB	1130	2.0	10.0	20.0	52.0		15.0			0.2									
450HB	1490			30.0	52.0		13.0			2.4									
		2.0	15.0	26.0	50.0	6.0				0.5									
			10.0	25.0	56.0		7.0			0.3									
47HRC	1560	3.0	3.0	31.0	53.0		14.0			1.0									
		2.0	10.5	25.0	56.0	0.5	7.5			0.3									
300HB	970	3.0	3.0	26.0	66.0		5.0			1.0									Nb 6.0
				26.0	66.0		5.0			0.4									
				20.0	63.0	6.0				0.2									
		3.0	20.0	25.0	43.2	4.0	2.0	0.4	1.0			0.3							Nb 2.0
		2.0	1.0	21.0	62.6		11.0	0.3	0.3		0.3	0.5							Nb 2.0
		2.0	10.5	25.5	53.0		7.5	0.8	0.8			0.5							
		2.0	10.5	25.5	54.7		7.0		0.7			0.3							B 0.01
		4.0	20.5	22.5	40.3		12.0					0.8							
		1.0	10.0	25.0	57.6	6.0													
HTA Nickel Based Alloys																			
45HRB	310	0.4	99.8					0.35	0.35	0.15					0.01				0.25
45HRB	310	0.4	99.9					0.35	0.35	0.2					0.01				0.25
42HRC	1330	9.0	53.0	19.0	9.0	2.8	1	0.01	0.35	0.06	1.6	0.75		0.02	0.01				
85HRB	550		56.0	31.0			2			0.02	0.25	0.25							Nb 0.4
40HRC	1270		55.4	15.0	17.0	5.25				0.06	4	3.5							
			50.0	30.0															
			48.0	28.0	3.0														
	620	10.0	63.3	15.5		5.2		0.4	0.2	0.15	3	2							
	620	4.5	63.0	15.5		5				0.15	3.5	2.5							
90HRB	600	5.0	62.0	1.5	2.5	28		0.05	0.5	0.02									V 0.4
90HRB	600	1.0	81.0	0.5	0.5	16		0.05	0.5	0.01				0.02	0.015				
200HB	660	6.0	54.1	15.0	2.0	17	5			0.04									
94HRB	660	3.0	56.0	22.0	2.5														
191HV	630	5.5	56.0	15.0	2.5														
	750	3.0	58.0	16.0	2.0														
		20.0	46.0	22.0	2.5														
		20.0	40.0	22.0	5.0														
80HRB	510	4.0	72.5	7.0		16.5				0.02									
		10.0	61.0	15.5	2.5	5.5				0.15	2	2.5							
61HRA	780	3.0	67.0	16.0	2.0														
94HRB	660	4.0	66.5	5.0	1.3	24.5				0.02									
80HRB	510	18.5	48.6	21.8	1.5	9	0.6			0.1									
		3.0	22.0	22.0	37.0														
	1000	3.0	10.0	20.0	bal		15		1.5	0.1									
		0.7	51.4	20.0	20.0	6				0.06	1	1.5							
85HRB	550	8.0	72.0	15.5						0.08									
65HRB	430	14.0	60.5	23.0															
95HRB	660	5.0	61.4	21.5		9				0.1									
88HRB	570	9.0	58.0	29.0				0.2	0.2	0.25					0.007				Cu 0.2
		5.0	73.7	20.0						0.12	0.25	0.4							Cu 0.5
		7.0	74.9	16.0						0.08	0.8	0.25							

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- ◆ Aluminum & Alloys
- ◆ High Temp. Alloys
- ◆ Hard Materials



Materials Cross Reference

Commercial Name	UNS Number	UK: BS,EN	Sweden: SS	USA: AISI/SAE	Germany: Wnr	Germany: DIN	France: AFNOR	Italy: UNI	Spain: UNF	Japan: JIS
HTA Nickel Based Alloys										
IN100	UNS N13100			5397	2.4674	NIco15Cr10MoAlTi	NK15CAT			
Incoloy 020				ASTM B463	2.4660		20CB-3			
Incoloy 804							NC29Fe25			
Incoloy 825	UNS N08825	3072.76		ASME SB163	2.4858	NIcr21Mo	NC21FeDU			
Incoloy 901	UNS N09901			5660	2.4662	NIfe35Cr14MoTi	Z8NCDT42			
Incoloy 903	UNS N19903					NIfe42K15Nb	Z3NK28			
Incoloy 925	UNS N09925									
Inconel alloy 050										
Inconel alloy 182										
Inconel alloy 22				ASME SB575			NI Mo16Cr15			
Inconel alloy 230										
Inconel alloy 600	UNS N06600	3072.76		5540	2.4640	NIcr15Fe	NC15Fe			
Inconel alloy 600SP										
Inconel alloy 601	UNS N06601			5715	2.4851		NC23Fe14A			
Inconel alloy 601GC										
Inconel alloy 603XL										
Inconel alloy 604										
Inconel alloy 606										
Inconel alloy 613										
Inconel alloy 617	UNS N06617				2.4663	NIcr23Co12Mo	NC22K12D9A			
Inconel alloy 62										
Inconel alloy 622					2.4602					
Inconel alloy 625	UNS N06625			ASME SB443.4	2.4856	NIcr22Mo9Nb	NC22FeDNB			
Inconel alloy 625LCF	UNS N06626									
Inconel alloy 657										
Inconel alloy 671										
Inconel alloy 672										
Inconel alloy 686										
Inconel alloy 690	UNS N06690				2.4642		NC30Fe			
Inconel alloy 691										
Inconel alloy 693										
Inconel alloy 702				5550			NC15A			
Inconel alloy 706	UNS N09706			AMS 5702			NFe10C16NbT			
Inconel alloy 718	UNS N07718	HR8		5383	2.4668	NIcr19Fe19NbMo	NC19FeNb			
Inconel alloy 718 DA										
Inconel alloy 718 OP	UNS N07718									
Inconel alloy 720										
Inconel alloy 721							NC16Fe8TM			
Inconel alloy 722	UNS N07722			5541		NIcr16FeTi	NC16FeTi			
Inconel alloy 725										
Inconel alloy 725HS										
Inconel alloy 738										
Inconel alloy 740										
Inconel alloy 783	UNS R30783									
Inconel alloy 800										
Inconel alloy 800H	UNS N08810									

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
HTA Nickel Based Alloys																			
			61.6	10.0	15.0	3				0.18	5.5	4.7							V 1.0
		38.0	34.0	20.0	2.5														Nb 0.6 Cu 3.5
		25.4	41.0	29.5				0.5	0.75	0.06	0.25	0.6							Cu 0.4
80HRB	510	29.5	42.0	21.5			3	0.5	0.65	0.03	0.2	0.9							Cu 2.25
180-300HB	600-970	34.0	44.3	12.5		6.2		0.22	0.48	0.05		2.5							
380HB	1250	41.0	39.0		15.0						0.7	1.4							Nb 3.0
32HRC	1000	25.4	45.0	21.0		3					0.3	2.1							Cu 1.8
36HRC	1130	18.0	50.0	20.0	3.0														
		7.5	66.0	16.0															
90HRB	600	2.5	58.0	22.0															
		1.0	60.0	22.0	1.0														
85HRB	550	8.0	76.0	16.0						0.075									
		8.0	77.0	15.0															
65HRB	400	14.0	61.0	24.0				0.2	0.5	0.05	1.3				0.008				Cu 0.5
77HRB	480	14.0	61.0	24.0															
			73.0	22.0															
		8.0	72.0	16.0				0.2	0.2	0.04									
		1.0	73.0	20.0															
		6.0	76.0	16.0															
180HB	600	1.0	53.0	22.0	13.0	9				0.07	1								
		8.0	74.0	15.0															
100HRB	780	2.5	58.0	22.0		14.2	3.2												
95HRB	690	4.0	61.0	22.0		9				0.05	0.3	0.3							Cb 3.7
		4.0	61.0	22.0															
		0.5	47.5	50.0															
			51.5	48.0															
			54.0	45.0															
90HRB	600	1.0	58.0	21.0															
85HRB	550	9.0	62.0	29.0				0.2	0.2	0.25					0.007				
		9.0	59.0	30.0															
		5.0	60.0	30.0															
		1.0	79.0	16.0				0.2	0.05	0.04	3.4	0.7							
40HRC	1270	37.0	42.0	16.0						0.03		1.8							Cb 2.9
42HRC	1330	18.0	54.0	18.0		3.1				0.02	0.5	0.9							Cb 5.2
40-47HRC	1560	bal	50-55	17-21	1.0	2.8-3.3		0.35	0.35	0.08	2-8	.65-1.15		0.015	0.015				Cb+Ta 5-5.5
38HRC	1200	18.0	54.0	18.0		3.1				0.02	0.5	0.9							Cb 5.2
43HRC	1380	14.7	58.0	18.0	14.7	3	1.25				2.5	5							
		7.0	71.0	16.0				0.15	2.25	0.07	0.1	3							Cu 0.2
34HRC	1070	7.0	74.0	16.0						0.04	0.7	2.4							
37HRC	1170	9.0	58.0	21.0		8					0.3	1.5							Nb 3.5
		9.0	58.0	21.0															
		0.5		16.0	8.5	1.8	2.6	0.3	0.2	0.17	3.4	3.4							Nb 0.9 Ta 1.8 Zr 0.1
		1.0	48.0	25.0	20.0														
34HRC	1070	26.0	28.5	3.0	34.0						5.4	0.1							Nb 0.3
86HRB	550	46.0	31.0	21.0															
70HRB	450	44.0	32.0	21.0				0.35	1	0.08	0.4	0.4		0.02	0.01			0.3	

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HTA Nickel Based Alloys										
Inconel alloy 82										
Inconel alloy 939										
Inconel alloy C-276	UNS N10276									
Inconel alloy G										
Inconel alloy G-3										
Inconel alloy HX	UNS N06002					NIcR22Fe18Mo	NC22FeD			
Inconel alloy MA 6000										
Inconel alloy MA754	UNS N07754									
Inconel alloy MA758										
Inconel alloy X-750	UNS N07750			5542	2.4669	NIcR16FeTi	NC15FeTNb			
Inconel alloy X-751	UNS N07751									
Jessop G81						NIcR20Co18Ti				
M-252	UNS N07252			5551		G-NiCr19Co				
Monel 400	UNS N04400	3072.76		4544	2.4360	NIcCu30Fe	NU30			
Monel K500	UNS N05500	3072.76		4676	2.4375	NIcCu30Al				
Monel R405	UNS N04405			4674						
Nimocast 713		HC203		5391A		G.NiCr13Al16MoNb	NC13AD			
Nimocast 80		3146								
Nimocast 90										
Nimocast PD16						NIcFe33Cr17Mo				
Nimocast PE10		HC202					NC20N13			
Nimocast PK24										
Nimonic 101										
Nimonic 105		HR3			2.4634	NIcCo20Cr15MoAlTi	NCKD20ATV			
Nimonic 115		HR401, 601			2.4636	NIcCo15Cr15MoAlTi	NCVK15ATD			
Nimonic 75	UNS N06075	HR5, 203.4			2.4630	NIcR20Ti	NC20T			
Nimonic 80A	UNS N07080	HR401, 601			2.4631	NIcR20TiAl	NC20TA			
Nimonic 86										
Nimonic 90	UNS N07090	HR2, 202			2.4632	NIcR20Co18Ti	Nc20ATV			
Nimonic 901	UNS N09901			5660, 5661	2.4662	NIcR15MoTi	Z8NCDT42			
Nimonic 91										
Nimonic 95							NC19K18Fe5TA			
Nimonic C22	UNS N06022			ASME SB575						
Nimonic C263	UNS N07263	HR10			2.4650	NIcR20CoMoTi	NCK20D			
Nimonic C276	UNS N10276			ASME SB575	2.4819		NIcMo16Cr15			
Nimonic PE13		HR6, 204		5536E		NIcR22Fe18Mo	NC22FeD			
Nimonic PE16		HR207				NIcFe33Cr17Mo	NW11AC			
Nimonic PK25				5751A	2.4666	NIcR18CoMo	NKCD20ATU			
Nimonic PK31										
Nimonic PK33		5057				NIcR20Co16MoTi	NC19KDUN			
R-235				AISI 686						
Refractaloy 26				AISI 690			Z6NKCDDT38			
René 100					2.4674	NIcCo15Cr10MoAlTi	NK15C10A5T			
René 104										
René 125							NK10C8W7ATaTD			
René 41	UNS N07041			5712, 5713	2.4973	NIcR19Co11MoTi	NC19KDT			
René 63							NK15C14D6AWT			

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
HTA Nickel Based Alloys																			
		2.0	72.0	19.0															
			48.0	22.5	19.0														
90HRB	600	5.0	59.0	15.5	0.5	16	3.5			0.01									
		20.0	44.0	22.0	1.0														
		20.0	44.0	22.0	3.0														
90HRB	600	18.0	47.0	22.0	1.5	9	0.6												
			55.0	15.0	15.0														
29HRC	930	1.0	77.5	20.0							0.3	0.5							
320HV	1050		68.0	30.0															
32HRC	1000	7.0	72.0	16.0															
35HRC	1100	7.0	73.0	15.0				0.2	0.5	0.05	1.2	2.3			0.005				Cb 1.1 Cu 0.2
		0.5	79.3	20.0	13.0			0.2	0.5	0.08	1.5	2.5							
27-30HRC	900			18.0-20.0	9.0-11.0	9.0-10.5		0.5	0.5	0.15	0.75-1.25	2.25-2.75			0.015				
70HRB	440	1.2	66.0					0.25		0.15					0.01				
27HRC	860	1.0	66.0					0.25	0.7	0.1	2.7	0.6			0.01				
150HB	510	1.3	63.0					0.25	1	0.15									Cu 31.5
			72.6	13.5		4.5				0.12	6	0.9							
		5.0	69.9	20.0	2.0														
		5.0	52.9	20.0	18.0														
		34.0	43.8	16.5						0.06	1.2	1.2							
			56.4	20.0		6	2.5			0.03									
			61.1	9.5	15.5	9				0.17	5.5	4.7							
			48.0	24.2	19.7	1.5					1.4	3							Nb 1
320HB	1040	1.0	54.0	15.0	20.0	5		0.5	0.5	0.1	4.7	1.2							
350HB	1130	1.0	59.0	15.0	14.0	4				0.16	5	4							
170HB	570	4.0	76.0	20.0				0.45	0.45	0.45	0.1	0.35							
350HB	1130	1.5	70.0	19.5	1.0			0.2	0.55	0.08	1.4	2.4							
			65.0	25.0		10													Ce 0.03
28HRC	870	0.3	58.3	19.5	18.0					0.065	1.4	2.4							
36HRC	1130	35.6	43.0	12.5		6				0.05		2.8							B 0.015
			48.0	29.0	20.0														
		5.0	49.9	19.5	18.0			1	1	0.1	2	3.5							
85HRB	550	4.0	57.0	21.2	1.2	13.5	3	0.04	0.2	0.07				0.01					V 0.17
28HRC	870	0.7	54.9	20.0	20.0	5.85				0.06	0.45	2.15							
80HRB	510	5.0	59.5	15.5	0.5	16	3.5			0.01									
		18.5	49.0	21.8	1.5	9	0.6	0.5	0.5	0.1									
250HB	810	1.2	43.0	16.0	2.0	3.5				0.05	1.2	1.2							
			49.9	19.0	19.5	4		0.75	0.75	0.08	2.9	2.9							B 0.01
			53.0	20.0	14.0	4.5					0.4	2.3							Nb 5.0
350HB	1130	1.0	55.0	18.0	14.0	7		0.25	0.25	0.05	2.1	2							
		10.0	63.3	15.0	1.2	5.5		0.3	0.1	0.12	20	2.5							
		16.0	38.0	19.0	20.0	3.2		1	0.8	0.03	0.2	2.8							
			60.6	10.0	15.0	3				0.18	5.5	4.7							V 1.0
			52.4	11.0	20.5	3.7	2			0.04	3.4	3.6							Nb 0.9 Ta 2.4 B 0.03
			60.0	8.9	10.0	2	7			0.1	4.7	2.5							Hf 1.05 Ta 3.0
36HRC	1130	3.0	52.5	19.0	11.0	9.75				0.06	1.6	2.5							B 0.007
		3.5	54.4	14.0	15.0	6	3.5	0.2	0.1	0.05	3.8	2.5							

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HTA Nickel Based Alloys										
René 77							NC15K15ADT			
René 80							NC14K9T5DWA			
René 95							NC14K8			
Stelloy HS27						NiCo32Cr26Mo	KC20WN			
TRW VIA						NiTa9Co8W6CrAl	NTa9K7C6W5A5DT			
Udimet 500	UNS N07500			AISI 684	2.4983	NiCr18CoMoAlTi	NCK19DAT			
Udimet 520										
Udimet 630						NiCr19NbMo	NC18Fe18Nb6DWT			
Udimet 700				AISI 687	2.4636	NiCo15Cr15MoAlTi	NCKD20AT			
Udimet 710							NCK18TDA			
Udimet 718		HR8		5383	2.4668	NiCr19Fe19NbMo	NC19FeNb			
Udimet 720							NC18K15TDA			
Waspaloy®	UNS N07001			5544	2.4654	NiCr20Co14MoTi	NC20K14			
HTA Titanium Based Alloys										
Ti-10.2.3										
Ti-11.5Mo-6Zr-4.5Sn										
Ti-12Mo-6Zr-2Fe (TMZF)										
Ti-13Nb-13Zr										
Ti-13V-11Cr-3Al				4917		TiV13Cr11Al3				
Ti-15-333	UNS R58153									
Ti-15Mo (Alpha + Beta)										
Ti-15Mo (Beta)										
Ti-15Mo-3Nb-3Al-0.2Si				ASTM Grade 21						
Ti-3Al-2.5V	UNS R56320			4943, 4944						
Ti-3Al-8V-6Cr-4Mo-4Zr	UNS R58640									
Ti-425										
Ti-425 MIL										
Ti-45Nb										
Ti-48Al-2Cr-2Nb										
Ti-4Al-4Mo-2Sn-0.5Si		5103				TiAl4Mo4Sn2Si0.5	T-A4DE			
Ti-4Al-4Mo-4Sn-0.5Si		5203				TiAl4Mo4Sn4Si0.5				
Ti-5Al-2.5Fe (Tikrutan)										
Ti-5Al-2.5Sn	UNS R54520	TA 14,17		ASTM B 265	3.7115	TiAl5Sn2	T-A5E			
Ti-5Al-2Sn-2Zr-4Cr-4Mo	UNS R58650			4995		Ti5Al2Sn2Zr4Cr4Mo				
Ti-5Al-5Mo-5V-1Cr-1Fe										TC18
Ti-5Al-5V-5Mo-3Cr										
Ti-6-2-4-6	UNS R56260			4981						
Ti-6-7	UNS R56700									
Ti-6Al-2Sn-2Zr-2Mn-2Cr-0.2Si										
Ti-6Al-4V	UNS R56400	TA10 TA11 TA12 TA13 TA28 TA56		4906, 4920, 4928, 4965, 4967		TiAl6V4	T.A6V:AIR:9183			TC4
Ti-6Al-4V ELI	UNS R56401			4907, 4930, 4931						
Ti-6Al-4V MIL	UNS R56400	TA10 TA11 TA12 TA13 TA28 TA56		4906, 4920, 4928, 4965, 4967		TiAl6V4	T.A6V:AIR:9183			
Ti-6Al-4V MIL (HT)	UNS R56400	TA10 TA11 TA12 TA13 TA28 TA56		4906, 4920, 4928, 4965, 4967		TiAl6V4	T.A6V:AIR:9183			

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
HTA Nickel Based Alloys																			
		0.4	58.0	15.0	15.0	4.2		0.1	0.1	0.17	4.3	3.3							
			61.0	14.0	9.5	4				0.15		4							
		0.3	64.5	14.0	8.0	3.5				0.15		2.5							
		2.0	30.0	25.0	30.0														
			70.5	6.0	7.5	2	5.8			0.13	5.4	1							
		4.0	52.0	19.0	18.0	4		0.1	0.1	0.07	3	3							
40HRC	1270		56.9	19.0	12.0	6	1				2	3							
		18.0	51.0	19.0	18.0	3				0.04	0.6	1.1							
		1.0	53.0	15.0	19.0					0.1	4.4	3.4							
		0.5	55.0	18.0	15.0	1.5				0.07	2.5	5							
42HRC	1330	19.0	54.0	18.0		3				0.05	0.6	1							
	1600		55.0	18.0	14.8	3	1.2			0.035	2.5	5							
38HRC	1200	1.0	57.7	19.5	13.0	4.3				0.05	1.4	3							Zr 0.07
HTA Titanium Based Alloys																			
HRC35	1100																		
	1037	0.085																	Nb13.18 Zr13.49
HRC40	1270																		
HRC32	1000	0.12		3						0.02	3								V 15.0
HRC38	1200	0.1				15													
HRC24	820	0.1				15													
	930	< 0.4				15					3	76.0/80.8							Nb 3.0
HRC24	820	0.13									3								V 2.5
HRC32	1000	0.35		6.5		4.5				0.05	4								V 8.5 Zr 4.5
HRC36	1130	1.5									4								V 2.5 O 0.25
HRC36	1130	1.2/1.8									4.5								V 2.5 O 0.25
													55						Nb 45
HRC22	800			2							48.03	47.97							Nb 2
HRC35	1100																		
	1020	2.5									5								
HRC36	1130																		
HRC38	1200	0.3		3.5/4.5		3.5/4.5					4.5/5.5								Sn 1.5/2.5 Zr 1.5/2.5
HRC40	1270																		
HRC40	1270																		
HRC36	1130																		
HRC32	1000	0.15									6								Nb 7
				2				0.2	2		6								Sn 2 Zr 2
HRC30-34	1130	0.3								0.1	5.5/6.75								V 4
HRC32	1000	0.25								0.08	5.5/6.75								V 3.5/4.5 O 0.13
HRC30-34	1130	0.3								0.1	5.5/6.75								V 3.5/4.5 O 0.2
HRC35-39	1200	0.3								0.1	5.5/6.75								V 3.5/4.5 O 0.2

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- ◆ P Alloyed Steels
- ◆ M Stainless Steels
- ◆ M PH Stainless
- ◆ K Cast Irons
- ◆ N Aluminum & Alloys
- ◆ S High Temp. Alloys
- ◆ H Hard Materials



Materials Cross Reference

Commercial Name	UNS Number	UK: BS,EN	Sweden: SS	USA: AISI/SAE	Germany: Wnr	Germany: DIN	France: AFNOR	Italy: UNI	Spain: UNF	Japan: JIS
HTA Titanium Based Alloys										
Ti-6Al-4Zr-2Mo-2Sn	UNS R54620									
Ti-6Al-4Zr-2Mo-2Sn-0.2Si	UNS R54620 modified			4919, 4975, 4976		TiAl6Zr4Mo2Sn2				
Ti-6Al-5Zr-0.5Mo-0.25Si						TiAl6Zr5Mo0.5Si0.25	T.AGZ.50			
Ti-6Al-5Zr-4Mo-Cu-0.2Si		M201				TiAl6Zr5Mo4CuSi0.2				
Ti-6Al-6V-2Sn	UNS R56620			4971		TiAl16V6Sn2				
Ti-6Al-7Nb						TiAl7Nb				
Ti-7Al-4Mo				ASTM B381		TiAl7Mo4				
Ti-8Al-1Mo-1V	UNS R54810			4915, 4933, 4972		TiAl8Mo1V1				
Ti-8Mo-8V-2Fe-3Al										
Ti-99.5	UNS R50700			ASTM Grade 1 B381F4		Ti-99.5	AIR:9182T60			
Ti-99.6	UNS R50550	TA2, TA3, TA4, TA5		ASTM Grade 2 B381F3		Ti-99.6	AIR:9182T50			
Ti-99.7	UNS R50400	TA2.5		ASTM Grade 3 B381F2		Ti-99.7	AIR:9182T40			
Ti-99.8	UNS R50250	TA6, TA7, TA8, TA9		ASTM Grade 4 B381F1		Ti-99.8	AIR:9182T35			
Hard Steel >1400Mpa										
500										
521										
600										
60SPb20										
70SPb20										
A100										
A2 / Z100CDV5 (HT)		BA2	2260	A2	1.2363	X100CrMoV5 1 X2NiCoMoTi180905	Z100CDV5 Z2NKD180905	X100CrMoV51KU	X100CrMoV5 F5227	SKD12
Durimphy										
Ferrium® S53®										
H10										
H11										
H12										
H19										
H21 / Z30WCV9										
Hardox 450										
Hardox 500										
Hardox 550										
Hardox 600										
K12										
K12 (HT)										
L6 / 55NCDV07 (HT)										
Mh97+Pb										
Z38CDV5										
Chilled Cast Iron 1400Mpa										
GGG120B / EN-GJS-1200-2										
GGG140B / EN-GJS-1400-1										
GGG80B / EN-GJS-800-8										
GGG90B / EN-GJS-1000-5										

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Hardness HRB HRC HB	Rm N/mm ²	Fe	Ni	Cr	Co	Mo	W	Si	Mn	C	Al	Ti	Li	P	S	Mg	Zn	Cu	Others
HTA Titanium Based Alloys																			
HRC28	900																		
HRC28	900	0.05				2		0.12		0.1	6								Zr 4.0
HRC35	1100	0.5								0.05	5.5							0.5	V 5.5 Sn 2.0 O 0.2
	1000										6	84.5/88.0							Nb 7.0
HRC35	1100	0.13				1					8								V 1.0 O 0.12
HRB100	780	0.5								0.1									O 0.4
HRB90	600	0.3								0.1									O 0.35
HRB80	510	0.3								0.1									O 0.25
HRB70	430	0.2								0.1									O 0.18
Hard Steel >1400Mpa																			
447-534HB	1490-1730	91.6	4	2		0.37		0.45	1.2	0.32				0.02	0.005				
470-550HB	1590-1800	91.4	4	2		0.5		0.5	1.2	0.32				0.025	0.005				
574-634HB	> 2060	91.8	4.25	1.5		0.37		0.5	1	0.52				0.02	0.005				
55/61HRc																			
63/65HRc																			
64/67HRc																			
55/64HRc																			
54HRC	1040-2000		5.5	10	14	2	1			0.21				0.02	0.005				V 0.3
	1930																		
	1180-1670																		
	1180-1570																		
	1080-1270																		
	1270-1670																		
	1180-1770																		
450HBW	1500																		
500HBW	1730																		
550HBW	1950																		
600HBW	>2000																		
48-54HRC	1590-1930																		
58-64HRC																			
	1200-1700																		
64/66HRC																			
	1400-1500																		
Chilled Cast Iron 1400Mpa																			
341-444HB	1490																		
444-555HB	2010																		
269-321HB	1040																		
302-363HB	1150																		

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Metalcutting Safety

IMPORTANT SAFETY INSTRUCTIONS

Read before using the tools in this catalog!

Projectile and Fragmentation Hazards:

Modern metalcutting operations involve high spindle and cutter speeds and high temperatures and cutting forces. Hot metal chips may fly off the workpiece during metalcutting. Although cutting tools are designed and manufactured to withstand high cutting forces and temperatures, they can sometimes fragment, particularly if they are subjected to over-stress, severe impact, or other abuse.

To avoid injury:

- Always wear appropriate personal protective equipment, including safety goggles, when operating metalcutting machines or working nearby.
- Always make sure all machine guards are in place.

Breathing and Skin Contact Hazards:

Grinding carbide or other advanced cutting tool materials produces dust or mist containing metallic particles. Breathing this dust or mist — especially over an extended period — can cause temporary or permanent lung disease or make existing medical conditions worse. Contact with this dust or mist can irritate eyes, skin, and mucous membranes and may make existing skin conditions worse.

To avoid injury:

- Always wear breathing protection and safety goggles when grinding.
- Provide ventilation control and collect and properly dispose of dust, mist, or sludge from grinding.
- Avoid skin contact with dust or mist.

For more information, read the applicable Material Safety Data Sheet provided by Kennametal and consult General Industry Safety and Health Regulations, Part 1910, Title 29 of the Code of Federal Regulations.

These safety instructions are general guidelines. Many variables affect machining operations. It is impossible to cover every specific situation. The technical information included in this catalog and recommendations on machining practices may not apply to your particular operation. For more information, consult Kennametal's Metalcutting Safety booklet, available free from Kennametal at 724.539.5747 or fax 724.539.5439. For specific product safety and environmental questions, contact our Corporate Environmental Health and Safety Office at 724.539.5066 or fax 724.539.5372.

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