EMUGE FRANKEN

Thread Cutting Technology · Clamping Technology · Milling Technology

Made in Germany

SELECTION 2015

Valid until 31.12.2015

The Economical Solution for Tapping and Milling

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EMUGE-FRANKEN UK Ltd.

EMUGE-FRANKEN UK are the UK subsidiary of EMUGE-FRANKEN Germany. We have been established in Rotherham in the UK for over 20 years. Part of the EMUGE-FRANKEN group which has over 90 years experience in the development & production of precision tools for the machining industry.

We particularly specialise in threading technology, thread milling technology, gauging technology, milling technology, tool clamping / holding & work piece clamping.

- We have a full UK distributor network who will be happy to deal with your enquiries.
- We have available a full range of literature including electronic content for all your tooling requirements.
- We can offer sales/product training on our range both in house in Rotherham and Germany and also at your premises.
- We attend trade fairs / exhibitions throughout the world and look forward to welcoming you on our stand.
- We offer a full next day delivery service of goods direct from Germany by UPS to either you or your customers.
- We also have a small selection of standard items in stock in Rotherham for collections or next day delivery.

Please call us or email us for full details.

EMUGE-FRANKEN in GERMANY – A company association with more than 90 years of experience

EMUGE develops and produces precision tools for the machining industry. Custom-made solutions in the thread cutting and in the thread milling technology form the center of our business.

The most modern production facilities and an extensive checking and testing system guarantee the high quality of our products.

This, of course, goes also for our programme of precision clamping tools. Only the right choice of a high-precision tap holder or tapping attachment makes it possible to maximise the efficiency of our machining tools.

Our newly developed twist drills and a comprehensive programme of thread gauges complete our product range.

Ever since its foundation, **FRANKEN** has been developing and manufacturing milling tools. As a result, the company today offers a very wide range of solid carbide and HSS end mills as well as milling cutters with inserts.

Our products include end mills, slot drills, die-sinking end mills, shell end mills, gear cutters, and even the most sophisticated special profile milling cutters.

With this large variety of tool types and cutting materials, consistently high standards and uncompromising precision, our product range of milling cutters meets even the highest quality requirements.

In addition to our selection of cutting tools, we also offer a comprehensive range of clamping systems, tool holders and accessories.

Our Technical Service Department provides application-based consulting services and we also offer support to customers in developing modern milling strategies using our own machines in the R&D Department.

Please note:
The cutting/circumferential speeds (v_c in m/min) listed in the respective columns are standard values which have to be adjusted to individual work conditions (material, lubrication, machine etc.).

The suitability is marked as follows:

- **Tap / Cold-forming tap is very suitable**
- Tap / Cold-forming tap is suitable

= Suitable coolant-lubricant

E = Emulsion
O = Thread cutting oil
P = Thread cutting paste

				Taps		Cold-forming taps
				Rekord 1/2 B-STEEL-TIN	**Enorm 1/2 STEEL-TIN**	**Drück 1/2 STEEL-SN-TIN**
				B / 4-5	C / 2-3	C / 2-3
				E / O	E / O	E / O / P
			Thread depth and hole type	max. 3 x d_1	max. 2.5 x d_1	max. 3 x d_1
			M	8	9	18
			UNC	12	13	19
			UNF	16	17	
P		**Steel materials**				
	1.1	Cold-extrusion steels, Construction steels, Free-cutting steels, etc.	≤ 600 N/mm²	**15 - 45**	**15 - 45**	**20 - 80**
	2.1	Construction steels, Cementation steels, Steel castings, etc.	≤ 800 N/mm²	**10 - 40**	**10 - 40**	**20 - 60**
	3.1	Cementation steels, Heat-treatable steels, Cold work steels, etc.	≤ 1000 N/mm²	**5 - 25**	**5 - 25**	10 - 40
	4.1	Heat-treatable steels, Cold work steels, Nitriding steels, etc.	≤ 1200 N/mm²	5 - 20	5 - 20	
	5.1	High-alloyed steels, Cold work steels, Hot work steels, etc.	≤ 1400 N/mm²			
M		**Stainless steel materials**				
	1.1	Ferritic, martensitic	≤ 950 N/mm²	**5 - 20**	**5 - 20**	10 - 25 [2]
	2.1	Austenitic	≤ 950 N/mm²	**5 - 20**	**5 - 20**	10 - 25 [2]
	3.1	Austenitic-ferritic (Duplex)	≤ 1100 N/mm²	5 - 15	5 - 15	
	4.1	Austenitic-ferritic heat-resistant (Super Duplex)	≤ 1250 N/mm²			
K		**Cast materials**				
	1.1	Cast iron with lamellar graphite (GJL)	100-250 N/mm²			
	1.2		250-450 N/mm²			
	2.1	Cast iron with nodular graphite (GJS)	350-500 N/mm²	**10 - 30**	**10 - 30**	
	2.2		500-900 N/mm²	10 - 25	10 - 25	
	3.1	Cast iron with vermicular graphite (GJV)	300-400 N/mm²			
	3.2		400-500 N/mm²			
	4.1	Malleable cast iron (GTMW, GTMB)	250-500 N/mm²			
	4.2		500-800 N/mm²			
N		**Non ferrous materials**				
		Aluminium alloys				
	1.1	Aluminium wrought alloys	≤ 200 N/mm²			
	1.2		≤ 350 N/mm²			
	1.3		≤ 550 N/mm²			
	1.4	Aluminium cast alloys	Si ≤ 7%	15 - 40		20 - 60
	1.5		7% < Si ≤ 12%	15 - 40		20 - 60
	1.6		12% < Si ≤ 17%			
		Copper alloys				
	2.1	Pure copper, low-alloyed copper	≤ 400 N/mm²			20 - 40
	2.2	Copper-zinc alloys (brass, long-chipping)	≤ 550 N/mm²	**20 - 60**	**20 - 60**	40 - 80
	2.3	Copper-zinc alloys (brass, short-chipping)	≤ 550 N/mm²			
	2.4	Copper-aluminium alloys (alu bronze, long-chipping)	≤ 800 N/mm²	**5 - 25**	**5 - 25**	
	2.5	Copper-tin alloys (tin bronze, long-chipping)	≤ 700 N/mm²	**5 - 25**	**5 - 25**	
	2.6	Copper-tin alloys (tin bronze, short-chipping)	≤ 400 N/mm²			
	2.7	Special copper alloys	≤ 600 N/mm²			
	2.8		≤ 1400 N/mm²			
		Magnesium alloys				
	3.1	Magnesium wrought alloys	≤ 500 N/mm²			
	3.2	Magnesium cast alloys	≤ 500 N/mm²			
		Synthetics				
	4.1	Duroplastics (short-chipping)				
	4.2	Thermoplastics (long-chipping)				
	4.3	Fibre-reinforced synthetics (fibre content ≤ 30%)				
	4.4	Fibre-reinforced synthetics (fibre content > 30%)				
		Special materials				
	5.1	Graphite				
	5.2	Tungsten-copper alloys				
	5.3	Composite materials				
S		**Special materials**				
		Titanium alloys				
	1.1	Pure titanium	≤ 450 N/mm²			
	1.2	Titanium alloys	≤ 900 N/mm²			
	1.3		≤ 1250 N/mm²			
		Nickel alloys, cobalt alloys and iron alloys				
	2.1	Pure nickel	≤ 600 N/mm²			
	2.2	Nickel-base alloys	≤ 1000 N/mm²			
	2.3		≤ 1600 N/mm²			
	2.4	Cobalt-base alloys	≤ 1000 N/mm²			
	2.5		≤ 1600 N/mm²			
	2.6	Iron-base alloys	≤ 1500 N/mm²			
H		**Hard materials**				
	1.1	High strength steels, hardened steels, hard castings	44 - 50 HRC			
	1.2		50 - 55 HRC			
	1.3		55 - 60 HRC			
	1.4		60 - 63 HRC			
	1.5		63 - 66 HRC			

[2] Restricted application possibilities with emulsion

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Sets of taps

	WM-Satz-3S (No.1Z, No.1, F)	WM-Satz-2S (No.1, F)	WM-Satz-4S (No.1Z, No.1, No.2, F)	WM-Satz-3S (No.1, No.2, F)		
	C / 2-3	C / 2-3	C / 2-3	C / 2-3		
	O / P	O / P	O / P	O / P		
	max. 2 x d_1				Thread depth and hole type	
	10	10	11	11	M	
	14	14	15	15	UNC	
					UNF	
	1 - 3	1 - 3	1 - 3	1 - 3	1.1	P
	1 - 3	**1 - 3**	**1 - 3**	**1 - 3**	2.1	
	1 - 3	**1 - 3**	**1 - 3**	**1 - 3**	3.1	
	1 - 3	**1 - 3**	**1 - 3**	**1 - 3**	4.1	
	1 - 3	1 - 3	1 - 3	1 - 3	5.1	
	1 - 3	**1 - 3**	**1 - 3**	**1 - 3**	1.1	M
	1 - 3	**1 - 3**	**1 - 3**	**1 - 3**	2.1	
	1 - 3	1 - 3	1 - 3	1 - 3	3.1	
	1 - 3	1 - 3	1 - 3	1 - 3	4.1	
					1.1	K
					1.2	
					2.1	
					2.2	
					3.1	
					3.2	
					4.1	
					4.2	
					1.1	N
					1.2	
					1.3	
					1.4	
					1.5	
					1.6	
					2.1	
					2.2	
					2.3	
					2.4	
					2.5	
					2.6	
					2.7	
					2.8	
					3.1	
					3.2	
					4.1	
					4.2	
					4.3	
					4.4	
					5.1	
					5.2	
					5.3	
					1.1	S
					1.2	
					1.3	
	1 - 3	**1 - 3**	**1 - 3**	**1 - 3**	2.1	
	1 - 3	1 - 3	1 - 3	1 - 3	2.2	
					2.3	
	1 - 3	1 - 3	1 - 3	1 - 3	2.4	
					2.5	
					2.6	
					1.1	H
					1.2	
					1.3	
					1.4	
					1.5	

Please note:
The cutting values listed in the respective columns are standard values which have to be adjusted to individual work conditions (material, lubrication, machine etc.).

The suitability is marked as follows:

- **Thread milling cutter is very suitable**
- Thread milling cutter is suitable

v_c = Cutting speed [m/min]
f_z = Feed per tooth [mm]

Circular thread milling cutters

				ZGF-VHM 2xD-HA-TICN			
			M, MF	20			
				v_c	f_z		
				coated	ø d_1 ≤ 4 mm	ø d_1 ≤ 8 mm	ø d_1 > 8 mm
P		**Steel materials**					
	1.1	Cold-extrusion steels, Construction steels, Free-cutting steels, etc.	≤ 600 N/mm²	**80 - 250**	0.005 - 0.04	0.04 - 0.07	0.05 - 0.15
	2.1	Construction steels, Cementation steels, Steel castings, etc.	≤ 800 N/mm²	**60 - 150**	0.005 - 0.04	0.04 - 0.07	0.05 - 0.15
	3.1	Cementation steels, Heat-treatable steels, Cold work steels, etc.	≤ 1000 N/mm²	**40 - 120**	0.005 - 0.03	0.03 - 0.05	0.04 - 0.12
	4.1	Heat-treatable steels, Cold work steels, Nitriding steels, etc.	≤ 1200 N/mm²	**40 - 120**	0.003 - 0.02	0.02 - 0.05	0.04 - 0.12
	5.1	High-alloyed steels, Cold work steels, Hot work steels, etc.	≤ 1400 N/mm²	**40 - 120**	0.003 - 0.02	0.02 - 0.05	0.04 - 0.12
M		**Stainless steel materials**					
	1.1	Ferritic, martensitic	≤ 950 N/mm²	**40 - 120**	0.003 - 0.03	0.03 - 0.05	0.04 - 0.12
	2.1	Austenitic	≤ 950 N/mm²	**40 - 120**	0.003 - 0.03	0.03 - 0.05	0.04 - 0.12
	3.1	Austenitic-ferritic (Duplex)	≤ 1100 N/mm²	**30 - 80**	0.003 - 0.02	0.02 - 0.05	0.04 - 0.10
	4.1	Austenitic-ferritic heat-resistant (Super Duplex)	≤ 1250 N/mm²	30 - 60	0.003 - 0.02	0.02 - 0.04	0.03 - 0.08
K		**Cast materials**					
	1.1	Cast iron with lamellar graphite (GJL)	100-250 N/mm²	**100 - 200**		0.04 - 0.07	0.05 - 0.15
	1.2		250-450 N/mm²	**100 - 200**		0.04 - 0.07	0.05 - 0.15
	2.1	Cast iron with nodular graphite (GJS)	350-500 N/mm²	**80 - 200**		0.04 - 0.07	0.05 - 0.15
	2.2		500-900 N/mm²	**80 - 200**		0.04 - 0.07	0.05 - 0.15
	3.1	Cast iron with vermicular graphite (GJV)	300-400 N/mm²	**80 - 200**		0.04 - 0.07	0.05 - 0.15
	3.2		400-500 N/mm²	**80 - 200**		0.04 - 0.07	0.05 - 0.15
	4.1	Malleable cast iron (GTMW, GTMB)	250-500 N/mm²	**80 - 200**		0.04 - 0.07	0.05 - 0.15
	4.2		500-800 N/mm²	**80 - 200**		0.04 - 0.07	0.05 - 0.15
N		**Non ferrous materials**					
		Aluminium alloys					
	1.1	Aluminium wrought alloys	≤ 200 N/mm²	**150 - 400**	0.01 - 0.05	0.05 - 0.08	0.07 - 0.20
	1.2		≤ 350 N/mm²	**150 - 400**	0.01 - 0.05	0.05 - 0.08	0.07 - 0.20
	1.3		≤ 550 N/mm²	**150 - 400**	0.01 - 0.05	0.05 - 0.08	0.07 - 0.20
	1.4	Aluminium cast alloys	Si ≤ 7%	**150 - 400**	0.01 - 0.05	0.05 - 0.08	0.07 - 0.20
	1.5		7% < Si ≤ 12%	**150 - 400**	0.01 - 0.05	0.05 - 0.08	0.07 - 0.20
	1.6		12% < Si ≤ 17%	**100 - 200**	0.01 - 0.05	0.05 - 0.08	0.07 - 0.20
		Copper alloys					
	2.1	Pure copper, low-alloyed copper	≤ 400 N/mm²	**150 - 400**	0.008 - 0.05	0.05 - 0.08	0.07 - 0.20
	2.2	Copper-zinc alloys (brass, long-chipping)	≤ 550 N/mm²	**150 - 400**	0.008 - 0.05	0.05 - 0.08	0.07 - 0.20
	2.3	Copper-zinc alloys (brass, short-chipping)	≤ 550 N/mm²	**150 - 400**	0.008 - 0.05	0.05 - 0.08	0.07 - 0.20
	2.4	Copper-aluminium alloys (alu bronze, long-chipping)	≤ 800 N/mm²	**100 - 250**	0.008 - 0.04	0.04 - 0.07	0.05 - 0.15
	2.5	Copper-tin alloys (tin bronze, long-chipping)	≤ 700 N/mm²	**100 - 250**	0.008 - 0.04	0.04 - 0.07	0.05 - 0.15
	2.6	Copper-tin alloys (tin bronze, short-chipping)	≤ 400 N/mm²	**100 - 250**	0.008 - 0.04	0.04 - 0.07	0.05 - 0.15
	2.7	Special copper alloys	≤ 600 N/mm²	**40 - 80**	0.003 - 0.02	0.02 - 0.05	0.04 - 0.15
	2.8		≤ 1400 N/mm²	**30 - 60**	0.003 - 0.02	0.02 - 0.05	0.04 - 0.15
		Magnesium alloys					
	3.1	Magnesium wrought alloys	≤ 500 N/mm²	**150 - 400**	0.01 - 0.05	0.05 - 0.08	0.07 - 0.20
	3.2	Magnesium cast alloys	≤ 500 N/mm²	**150 - 400**	0.01 - 0.05	0.05 - 0.08	0.07 - 0.20
		Synthetics					
	4.1	Duroplastics (short-chipping)		**100 - 400**	0.01 - 0.05	0.05 - 0.10	0.08 - 0.25
	4.2	Thermoplastics (long-chipping)		**100 - 400**	0.01 - 0.05	0.05 - 0.10	0.08 - 0.25
	4.3	Fibre-reinforced synthetics (fibre content ≤ 30%)		**80 - 120**	0.01 - 0.05	0.05 - 0.10	0.08 - 0.25
	4.4	Fibre-reinforced synthetics (fibre content > 30%)		**80 - 120**	0.01 - 0.05	0.05 - 0.10	0.08 - 0.25
		Special materials					
	5.1	Graphite		**100 - 200**		0.04 - 0.07	0.08 - 0.25
	5.2	Tungsten-copper alloys		**30 - 60**		0.02 - 0.04	0.03 - 0.08
	5.3	Composite materials					
S		**Special materials**					
		Titanium alloys					
	1.1	Pure titanium	≤ 450 N/mm²	**30 - 80**	0.003 - 0.03	0.03 - 0.05	0.04 - 0.10
	1.2	Titanium alloys	≤ 900 N/mm²	**30 - 80**	0.003 - 0.03	0.03 - 0.05	0.04 - 0.10
	1.3		≤ 1250 N/mm²	**30 - 60**	0.003 - 0.02	0.02 - 0.04	0.03 - 0.08
		Nickel alloys, cobalt alloys and iron alloys					
	2.1	Pure nickel	≤ 600 N/mm²	30 - 60	0.003 - 0.02	0.02 - 0.04	0.03 - 0.08
	2.2	Nickel-base alloys	≤ 1000 N/mm²	30 - 60	0.003 - 0.02	0.02 - 0.04	0.03 - 0.08
	2.3		≤ 1600 N/mm²	30 - 40	0.003 - 0.02	0.02 - 0.04	0.03 - 0.08
	2.4	Cobalt-base alloys	≤ 1000 N/mm²	30 - 60	0.003 - 0.02	0.02 - 0.04	0.03 - 0.08
	2.5		≤ 1600 N/mm²	30 - 40	0.003 - 0.02	0.02 - 0.04	0.03 - 0.08
	2.6	Iron-base alloys	≤ 1500 N/mm²	30 - 40	0.003 - 0.02	0.02 - 0.04	0.03 - 0.08
H		**Hard materials**					
	1.1	High strength steels, hardened steels, hard castings	44 - 50 HRC	30 - 60		0.015 - 0.04	0.03 - 0.08
	1.2		50 - 55 HRC	30 - 60		0.015 - 0.04	0.03 - 0.08
	1.3		55 - 60 HRC				
	1.4		60 - 63 HRC				
	1.5		63 - 66 HRC				

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The EMUGE Tool Catalogue 140 provides an overview of the following product groups including all related technical information

- Taps
- Cold-forming taps
- Thread milling cutters
- Dies
- Twist drills
- Thread gauges
- Tap holders and tapping attachments

Description of the Symbols

Thread hole type

	Through hole
	Blind hole

Chamfer forms and lead taper forms

B 4-5 Thr. C 2-3 Thr.	Indicates the chamfer forms and lead taper forms of these tools with the respective length of the chamfer and lead taper.

Cutting material

HSSE	High speed steel

Spiral flutes

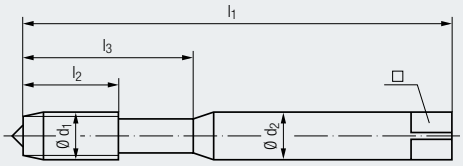
R35	Direction and degree of helix angle

Cutting conditions

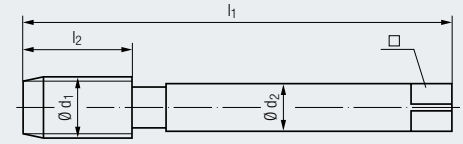
v_c Page	The cutting conditions and work parameters for these tools are to be found on the page number given in the symbol.

M ISO Metric coarse thread DIN 13

DIN 371



DIN 376



HSSE

ISO 2/6H

B 4-5 Thr.

V_c 4

STEEL
Steel materials

STEEL
Steel materials

Coating: **TIN**

- For steel materials
- With reinforced and reduced shank
- For through holes up to max. 3 x d_1
- Straight flutes with spiral point
- Chamfer form B (4-5 threads)
- Tolerance ISO 2/6H
- Titanium-nitride coating

P	1.1-3.1	4.1
M	1.1-2.1	3.1
K	2.1	2.2
N	2.2, 2.4-2.5	
N		1.4-1.5

DIN 371 – Reinforced shank

	ø d_1 mm	P mm	l_1	l_2	l_3	ø d_2	□		Rekord 1B-STEEL-TIN Article no.	£
M	3	0.5	56	11	18	3.5	2.7	2.5	B0201400.0030XX	£12.30
	4	0.7	63	13	21	4.5	3.4	3.3	B0201400.0040XX	£13.30
	5	0.8	70	15	25	6	4.9	4.2	B0201400.0050XX	£13.60
	6	1	80	17	30	6	4.9	5	B0201400.0060XX	£17.20
	8	1.25	90	20	35	8	6.2	6.8	B0201400.0080XX	£18.40
	10	1.5	100	22	39	10	8	8.5	B0201400.0100XX	£23.20

DIN 376 – Reduced shank

	ø d_1 mm	P mm	l_1	l_2	l_3	ø d_2	□		Rekord 2B-STEEL-TIN Article no.	£
M	12	1.75	110	24	–	9	7	10.2	C0201400.0112XX	£27.60
	16	2	110	27	–	12	9	14	C0201400.0116XX	£38.40
	20	2.5	140	32	–	16	12	17.5	C0201400.0120XX	£66.60

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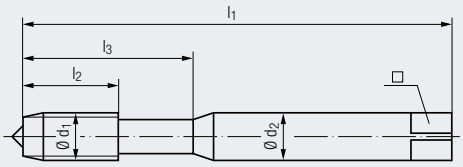
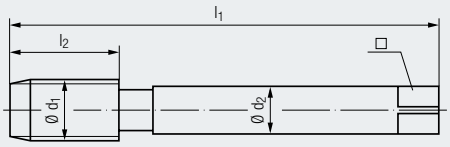
M ISO Metric coarse thread DIN 13

DIN 371



DIN 376



HSSE | R35

ISO 2/6H

C 2-3 Thr.

V_c 4

STEEL
Steel materials

STEEL
Steel materials

Coating: **TIN**

- For steel materials
- With reinforced and reduced shank
- For blind holes up to max. 2.5 x d_1
- 35° right-hand spiral flutes
- Chamfer form C (2-3 threads)
- Tolerance ISO 2/6H
- Titanium-nitride coating

P	1.1-3.1	4.1
M	1.1-2.1	3.1
K	2.1	2.2
N	2.2, 2.4-2.5	

DIN 371 – Reinforced shank

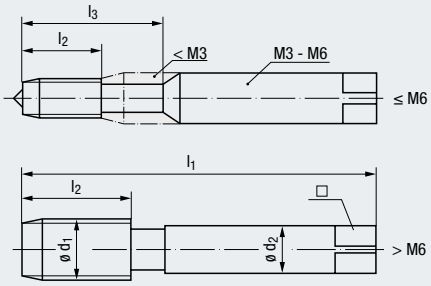
	ø d_1 mm	P mm	l_1	l_2	l_3	ø d_2	□		Enorm 1-STEEL-TIN Article no.	£
M	3	0.5	56	6	18	3.5	2.7	2.5	B0501400.0030XX	£12.90
	4	0.7	63	7	21	4.5	3.4	3.3	B0501400.0040XX	£14.10
	5	0.8	70	8	25	6	4.9	4.2	B0501400.0050XX	£14.30
	6	1	80	10	30	6	4.9	5	B0501400.0060XX	£18.00
	8	1.25	90	14	35	8	6.2	6.8	B0501400.0080XX	£20.20
	10	1.5	100	16	39	10	8	8.5	B0501400.0100XX	£24.70

DIN 376 – Reduced shank

	ø d_1 mm	P mm	l_1	l_2	l_3	ø d_2	□		Enorm 2-STEEL-TIN Article no.	£
M	12	1.75	110	18	–	9	7	10.2	C0501400.0112XX	£29.00
	16	2	110	22	–	12	9	14	C0501400.0116XX	£39.40
	20	2.5	140	25	–	16	12	17.5	C0501400.0120XX	£69.10

M ISO Metric coarse thread DIN 13

DIN 352



HSSE

C
2-3 Thr.

V_c
5

Tolerance	–	–

- With reinforced and reduced shank
- For blind and through holes up to max. 2 x d_1
- Chamfer form C (2-3 threads)

P	2.1-4.1	1.1, 5.1
M	1.1-2.1	3.1-4.1
S	2.1	2.2, 2.4

DIN 352 – Reinforced and reduced shank

	ø d_1 mm	P mm	l_1	l_2	l_3	ø d_2	□		WM-Satz-V-No.1Z [1] Article no.	£	WM-Satz-V-No.1 Article no.	£
M	3	0.5	40	10	18	3.5	2.7	2.5	H0413019.0030XX	£14.70	H0423019.0030XX	£13.40
	3.5	0.6	45	11	20	4	3	2.9	H0413019.0035XX	£19.10	H0423019.0035XX	£17.60
	4	0.7	45	12	22	4.5	3.4	3.3	H0413019.0040XX	£14.70	H0423019.0040XX	£13.40
	5	0.8	50	14	25	6	4.9	4.2	H0413019.0050XX	£16.30	H0423019.0050XX	£14.60
	6	1	56	16	28	6	4.9	5	H0413019.0060XX	£16.60	H0423019.0060XX	£14.80
	8	1.25	63	20	–	6	4.9	6.8	H0413019.0080XX	£18.10	H0423019.0080XX	£16.60
	10	1.5	70	22	–	7	5.5	8.5	H0413019.0100XX	£22.70	H0423019.0100XX	£20.90
	12	1.75	75	24	–	9	7	10.2	H0413019.0112XX	£28.90	H0423019.0112XX	£26.40
	14	2	80	26	–	11	9	12	H0413019.0114XX	£37.10	H0423019.0114XX	£33.90
	16	2	80	27	–	12	9	14	H0413019.0116XX	£46.30	H0423019.0116XX	£43.10
	20	2.5	95	32	–	16	12	17.5	H0413019.0120XX	£70.70	H0423019.0120XX	£64.40

[1] The taper tap No. 1Z with cylindrical pilot is an additional aid for true alignment especially when tapping by hand. It can be deleted when tapping by machine. The profile graduation of No.1Z, and No.1 is the same.

When using the above serial hand taps please ensure that you only turn clockwise until you reach the usable thread depth

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–	6HX

P	2.1-4.1	1.1, 5.1
M	1.1-2.1	3.1-4.1
S	2.1	2.2, 2.4

WM-Satz-M-No.2		WM-Satz-F	
Article no.	£	Article no.	£
H0423029.0030XX	£13.40	H0423001.0030XX	£13.40
H0423029.0035XX	£17.60	H0423001.0035XX	£17.60
H0423029.0040XX	£13.40	H0423001.0040XX	£13.40
H0423029.0050XX	£14.60	H0423001.0050XX	£14.60
H0423029.0060XX	£14.80	H0423001.0060XX	£14.80
H0423029.0080XX	£16.60	H0423001.0080XX	£16.60
H0423029.0100XX	£20.90	H0423001.0100XX	£20.90
H0423029.0112XX	£26.40	H0423001.0112XX	£26.40
H0423029.0114XX	£33.90	H0423001.0114XX	£33.90
H0423029.0116XX	£43.10	H0423001.0116XX	£43.10
H0423029.0120XX	£64.40	H0423001.0120XX	£64.40

Set combinations

WM-Satz 3S

(No.1Z, No.1, F) 2)

WM-Satz 2S

(No.1, F)

Set combinations

WM-Satz 4S

(No.1Z, No.1, No.2, F) 2)

WM-Satz 3S

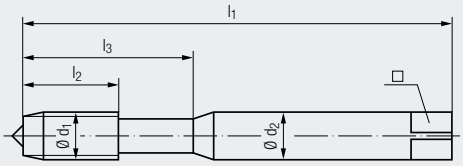
(No.1, No.2, F)

2) No.1 is not needed when tapping in through holes by hand.

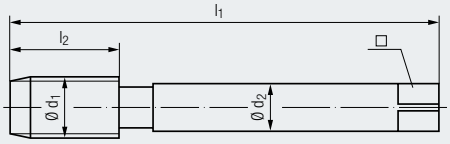
When using the above serial hand taps please ensure that you only turn clockwise until you reach the usable thread depth

UNC Unified coarse thread ASME B1.1

≈ DIN 371



≈ DIN 376



HSSE

2B

B
4-5 Thr.

v_c
4

STEEL
Steel materials

STEEL
Steel materials

Coating TIN

- For steel materials
- With reinforced and reduced shank
- For through holes up to max. 3 x d_1
- Straight flutes with spiral point
- Chamfer form B (4-5 threads)
- Tolerance 2B
- Titanium-nitride coating

P	1.1-3.1	4.1
M	1.1-2.1	3.1
K	2.1	2.2
N	2.2, 2.4-2.5	
N		1.4-1.5

≈ DIN 371 – Reinforced shank

ø d_1 inch	inch	P tpi	l_1	l_2	l_3	ø d_2	□		Rekord 1B-STEEL-TIN Article no.	£
No. 6	0.1380	32	56	12	20	4	3	2.85	B0201400.5005XX	£15.40
No. 8	0.1640	32	63	13	21	4.5	3.4	3.5	B0201400.5006XX	£15.40
1/4	0.2500	20	80	17	30	7	5.5	5.1	B0201400.5009XX	£21.30
5/16	0.3125	18	90	20	35	8	6.2	6.6	B0201400.5010XX	£23.40
3/8	0.3750	16	100	22	39	10	8	8	B0201400.5011XX	£27.90

≈ DIN 376 – Reduced shank

ø d_1 inch	inch	P tpi	l_1	l_2	l_3	ø d_2	□		Rekord 2B-STEEL-TIN Article no.	£
7/16	0.4375	14	100	22	–	8	6.2	9.4	C0201400.5012XX	£32.00
1/2	0.5000	13	110	25	–	9	7	10.8	C0201400.5013XX	£35.90
5/8	0.6250	11	110	27	–	12	9	13.5	C0201400.5015XX	£44.80
3/4	0.7500	10	125	30	–	14	11	16.5	C0201400.5016XX	£67.90
1"	1.0000	8	160	36	–	18	14.5	22.25	C0201400.5018XX	£71.10

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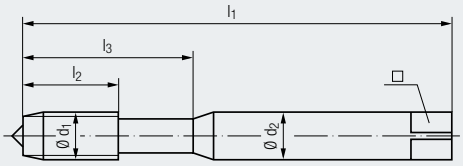
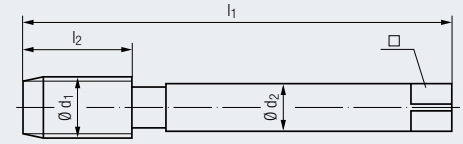
UNC Unified coarse thread ASME B1.1

≈ DIN 371



≈ DIN 376



HSSE | R35

2B

C 2-3 Thr. | V_c 4

STEEL
Steel materials

STEEL
Steel materials

Coating — TIN

- For steel materials
- With reinforced and reduced shank
- For blind holes up to max. 2.5 x d_1
- 35° right-hand spiral flutes
- Chamfer form C (2-3 threads)
- Tolerance 2B
- Titanium-nitride coating

P	1.1-3.1	4.1
M	1.1-2.1	3.1
K	2.1	2.2
N	2.2, 2.4-2.5	

≈ DIN 371 – Reinforced shank

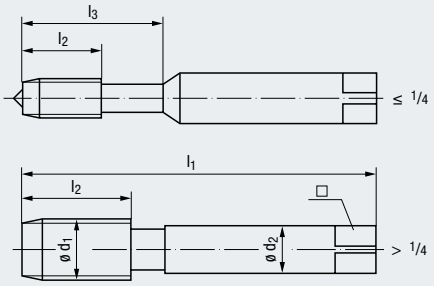
ø d_1 inch	inch	P tpi	l_1	l_2	l_3	ø d_2	□		Enorm 1-STEEL-TIN Article no.	£
No. 6	0.1380	32	56	7	20	4	3	2.85	B0501400.5005XX	£16.00
No. 8	0.1640	32	63	8	21	4.5	3.4	3.5	B0501400.5006XX	£17.30
1/4	0.2500	20	80	13	30	7	5.5	5.1	B0501400.5009XX	£17.80
5/16	0.3125	18	90	14	35	8	6.2	6.6	B0501400.5010XX	£23.90
3/8	0.3750	16	100	16	39	10	8	8	B0501400.5011XX	£28.40

≈ DIN 376 – Reduced shank

ø d_1 inch	inch	P tpi	l_1	l_2	l_3	ø d_2	□		Enorm 2-STEEL-TIN Article no.	£
7/16	0.4375	14	100	18	–	8	6.2	9.4	C0501400.5012XX	£35.60
1/2	0.5000	13	110	20	–	9	7	10.8	C0501400.5013XX	£37.50
5/8	0.6250	11	110	22	–	12	9	13.5	C0501400.5015XX	£46.80
3/4	0.7500	10	125	25	–	14	11	16.5	C0501400.5016XX	£69.80
1"	1.0000	8	160	30	–	18	14.5	22.25	C0501400.5018XX	£76.20

UNC Unified coarse thread ASME B1.1

≈ DIN 352



HSSE

C
2-3 Thr.

V_c
5

Tolerance	–	–

- With reinforced and reduced shank
- For blind and through holes up to max. 2 x d_1
- Chamfer form C (2-3 threads)

P	2.1-4.1	1.1, 5.1
M	1.1-2.1	3.1-4.1
S	2.1	2.2, 2.4

≈ DIN 352 – Reinforced and reduced shank

ø d_1 inch	inch	P tpi	l_1	l_2	l_3	ø d_2	□		WM-Satz-V-No.1Z [1] Article no.	£	WM-Satz-V-No.1 Article no.	£
1/4	0.2500	20	56	16	28	6	4.9	5.1	H0413019.5009XX	£28.90	H0423019.5009XX	£27.60
5/16	0.3125	18	63	20	–	6	4.9	6.6	H0413019.5010XX	£34.70	H0423019.5010XX	£32.70
3/8	0.3750	16	70	22	–	7	5.5	8	H0413019.5011XX	£37.10	H0423019.5011XX	£35.60
7/16	0.4375	14	70	22	–	8	6.2	9.4	H0413019.5012XX	£51.40	H0423019.5012XX	£48.20
1/2	0.5000	13	75	25	–	9	7	10.8	H0413019.5013XX	£51.90	H0423019.5013XX	£49.40
5/8	0.6250	11	80	27	–	12	9	13.5	H0413019.5015XX	£63.50	H0423019.5015XX	£60.60
3/4	0.7500	10	95	32	–	14	11	16.5	H0413019.5016XX	£80.40	H0423019.5016XX	£75.10
1"	1.0000	8	110	36	–	18	14.5	22.25	H0413019.5018XX	£128.80	H0423019.5018XX	£122.10

[1] The taper tap No. 1Z with cylindrical pilot is an additional aid for true alignment especially when tapping by hand. It can be deleted when tapping by machine. The profile graduation of No.1Z, and No.1 is the same.

When using the above serial hand taps please ensure that you only turn clockwise until you reach the usable thread depth

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–	6HX

P	2.1-4.1	1.1, 5.1
M	1.1-2.1	3.1-4.1
S	2.1	2.2, 2.4

WM-Satz-M-No.2		WM-Satz-F	
Article no.	£	Article no.	£
H0423029.5009XX	£27.60	H0423001.5009XX	£27.60
H0423029.5010XX	£32.70	H0423001.5010XX	£32.70
H0423029.5011XX	£35.60	H0423001.5011XX	£35.60
H0423029.5012XX	£48.20	H0423001.5012XX	£48.20
H0423029.5013XX	£49.40	H0423001.5013XX	£49.40
H0423029.5015XX	£60.60	H0423001.5015XX	£60.60
H0423029.5016XX	£75.10	H0423001.5016XX	£75.10
H0423029.5018XX	£122.10	H0423001.5018XX	£122.10

Set combinations

WM-Satz
3S

(No.1Z, No.1, F) [2)]

WM-Satz
2S

(No.1, F)

Set combinations

WM-Satz
4S

(No.1Z, No.1, No.2, F) [2)]

WM-Satz
3S

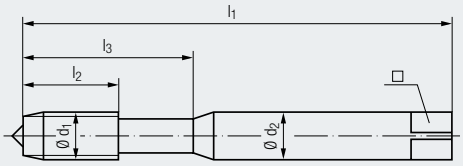
(No.1, No.2, F)

[2)] No.1 is not needed when tapping in through holes by hand.

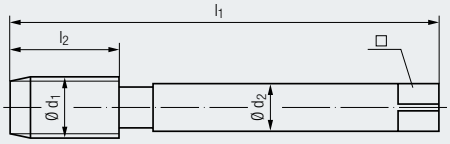
When using the above serial hand taps please ensure that you only turn clockwise until you reach the usable thread depth

UNF Unified fine thread ASME B1.1

≈ DIN 371



≈ DIN 374



HSSE

2B

B
4-5 Thr.

V_c
4

STEEL
Steel materials

STEEL
Steel materials

Coating: TIN

- For steel materials
- With reinforced and reduced shank
- For through holes up to max. 3 x d_1
- Straight flutes with spiral point
- Chamfer form B (4-5 threads)
- Tolerance 2B
- Titanium-nitride coating

P	1.1-3.1	4.1
M	1.1-2.1	3.1
K	2.1	2.2
N	2.2, 2.4-2.5	
N		1.4-1.5

≈ DIN 371 – Reinforced shank

ø d_1 inch	inch	P tpi	l_1	l_2	l_3	ø d_2	□		Rekord 1B-STEEL-TIN Article no.	£
No. 10	0.1900	32	70	15	25	6	4.9	4.1	B0201400.5041XX	£18.40
1/4	0.2500	28	80	17	30	7	5.5	5.5	B0201400.5043XX	£23.90
5/16	0.3125	24	90	17	35	8	6.2	6.9	B0201400.5044XX	£26.10
3/8	0.3750	24	90	18	35	10	8	8.5	B0201400.5045XX	£28.80

≈ DIN 374 – Reduced shank

ø d_1 inch	inch	P tpi	l_1	l_2	l_3	ø d_2	□		Rekord 2B-STEEL-TIN Article no.	£
1/2	0.5000	20	100	22	–	9	7	11.5	C0201400.5047XX	£35.90
5/8	0.6250	18	100	22	–	12	9	14.5	C0201400.5049XX	£45.20
3/4	0.7500	16	110	25	–	14	11	17.5	C0201400.5050XX	£68.50
1"	1.0000	12	140	28	–	18	14.5	23.25	C0201400.5052XX	£76.20

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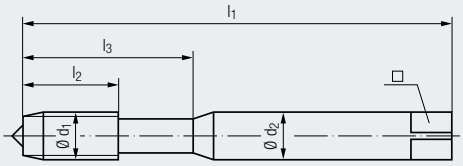
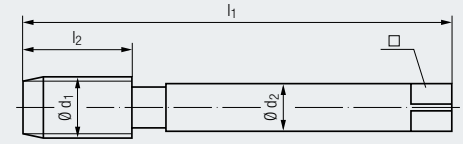
UNF Unified fine thread ASME B1.1

≈ DIN 371



≈ DIN 374



HSSE | R35

2B

C 2-3 Thr.

V_c 4

STEEL
Steel materials

STEEL
Steel materials

Coating	TIN

- For steel materials
- With reinforced and reduced shank
- For blind holes up to max. 2.5 x d_1
- 35° right-hand spiral flutes
- Chamfer form C (2-3 threads)
- Tolerance 2B
- Titanium-nitride coating

P	1.1-3.1	4.1
M	1.1-2.1	3.1
K	2.1	2.2
N	2.2, 2.4-2.5	

≈ DIN 371 – Reinforced shank

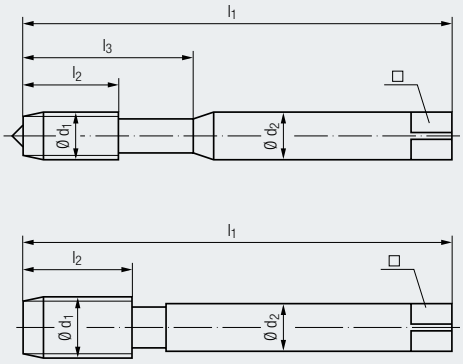
ø d_1 inch	inch	P tpi	l_1	l_2	l_3	ø d_2	□		Enorm 1-STEEL-TIN Article no.	£
No. 10	0.1900	32	70	10	25	6	4.9	4.1	B0501400.5041XX	£19.60
1/4	0.2500	28	80	10	30	7	5.5	5.5	B0501400.5043XX	£25.00
5/16	0.3125	24	90	10	35	8	6.2	6.9	B0501400.5044XX	£26.60
3/8	0.3750	24	90	10	35	10	8	8.5	B0501400.5045XX	£29.60

≈ DIN 374 – Reduced shank

ø d_1 inch	inch	P tpi	l_1	l_2	l_3	ø d_2	□		Enorm 2-STEEL-TIN Article no.	£
1/2	0.5000	20	100	13	–	9	7	11.5	C0501400.5047XX	£37.50
5/8	0.6250	18	100	15	–	12	9	14.5	C0501400.5049XX	£46.40
3/4	0.7500	16	110	17	–	14	11	17.5	C0501400.5050XX	£72.30
1"	1.0000	12	140	20	–	18	14.5	23.25	C0501400.5052XX	£86.40

M ISO Metric coarse thread DIN 13

DIN 2174



HSSE

6HX

C
2-3 Thr.

V_c
4

STEEL
Steel materials

STEEL
Steel materials

Coating TIN

- For steel materials
- With reinforced and reduced shank
- For blind and through holes up to max. 3 x d_1
- Cold-forming tap for the chipless production
- Chamfer form C (2-3 threads)
- Tolerance 6HX
- Titanium-nitride coating

P	1.1-2.1	3.1
M		1.1-2.1 2)
N		1.4-1.5, 2.1-2.2

DIN 2174 – Reinforced shank

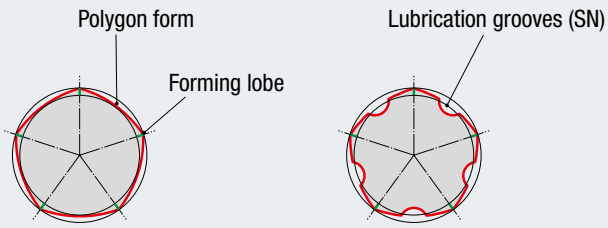
	ø d_1 mm	P mm	l_1	l_2	l_3	ø d_2	□		Drück 1-STEEL-SN-TIN Article no.	£
M	3	0.5	56	11	18	3.5	2.7	2.8	B0921400.0030XX	£18.90
	4	0.7	63	13	21	4.5	3.4	3.7	B0921400.0040XX	£19.90
	5	0.8	70	15	25	6	4.9	4.65	B0921400.0050XX	£21.10
	6	1	80	17	30	6	4.9	5.6	B0921400.0060XX	£24.00
	8	1.25	90	20	35	8	6.2	7.45	B0921400.0080XX	£27.50
	10	1.5	100	22	39	10	8	9.35	B0921400.0100XX	£35.60

DIN 2174 – Reduced shank

	ø d_1 mm	P mm	l_1	l_2	l_3	ø d_2	□		Drück 2-STEEL-SN-TIN Article no.	£
M	12	1.75	110	24	–	9	7	11.25	C0921400.0112XX	£42.10
	16	2	110	27	–	12	9	15.1	C0921400.0116XX	£78.20

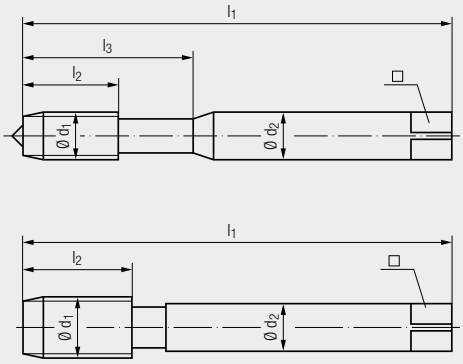
Chipless production of internal threads

Depending on the workpiece material, the essential advantages of the cold-forming of threads are not only excellent surface quality but also higher static and dynamic strength of the thread.
The length of the thread to be produced is not limited by chips which must be removed. The tools feature an excellent stability, especially with small thread sizes.
All ductile materials can be cold-formed. Sufficient lubrication is essential. We generally recommend using oil grooves for through hole threads and horizontal machining. (Exception: very short through hole threads, e.g. sheet metal components). Sometimes, it is necessary to adjust the recommended drill diameter to work conditions.



UNC Unified coarse thread ASME B1.1

≈ DIN 2174



HSSE

2BX

C
2-3 Thr.

V_c
4

STEEL
Steel materials

STEEL
Steel materials

Coating	TIN

- For steel materials
- With reinforced and reduced shank
- For blind and through holes up to max. 3 x d_1
- Cold-forming tap for the chipless production
- Chamfer form C (2-3 threads)
- Tolerance 2BX
- Titanium-nitride coating

P	1.1-2.1	3.1
M		1.1-2.1 2)
N		1.4-1.5, 2.1-2.2

≈ DIN 2174 – Reinforced shank

ø d_1 inch	inch	P tpi	l_1	l_2	l_3	ø d_2	□		Drück 1-STEEL-SN-TIN Article no.	£
No. 6	0.1380	32	56	12	20	4	3	3.15	B0921400.5005XX	£33.20
No. 8	0.1640	32	63	13	21	4.5	3.4	3.8	B0921400.5006XX	£33.20
1/4	0.2500	20	80	17	30	7	5.5	5.75	B0921400.5009XX	£42.50
5/16	0.3125	18	90	20	35	8	6.2	7.3	B0921400.5010XX	£45.60
3/8	0.3750	16	100	22	39	10	8	8.8	B0921400.5011XX	£53.10

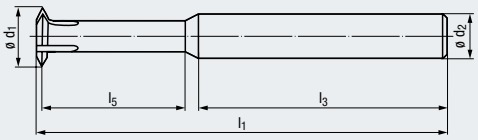
≈ DIN 2174 – Reduced shank

ø d_1 inch	inch	P tpi	l_1	l_2	l_3	ø d_2	□		Drück 2-STEEL-SN-TIN Article no.	£
7/16	0.4375	14	100	22	–	8	6.2	10.25	C0921400.5012XX	£64.00
1/2	0.5000	13	110	25	–	9	7	11.8	C0921400.5013XX	£71.90
5/8	0.6250	11	110	27	–	12	9	14.8	C0921400.5015XX	£88.80

2) Restricted application possibilities with emulsion

M, MF ISO Metric thread DIN 13

VHM | RH + LH | Z1 - Z5 | DIN 6535 HA HB | ø D | v_c / f_z 6



Thread depth	**2 x D**
Coating	TICN

- For universal use
- Solid carbide
- For the machining of internal threads from M1
- For right-hand and left-hand threads
- For blind and through holes threads up to 2 x D
- With straight shank acc. DIN 6535 HA
- Titanium carbonitride coating
- With corrected thread profile (for different thread sizes and pitches)

P	1.1-5.1	
M	1.1-3.1	4.1
K	1.1-4.2	
N	1.1-5.2	
S	1.1-1.3	2.1-2.6
H		1.1-1.2

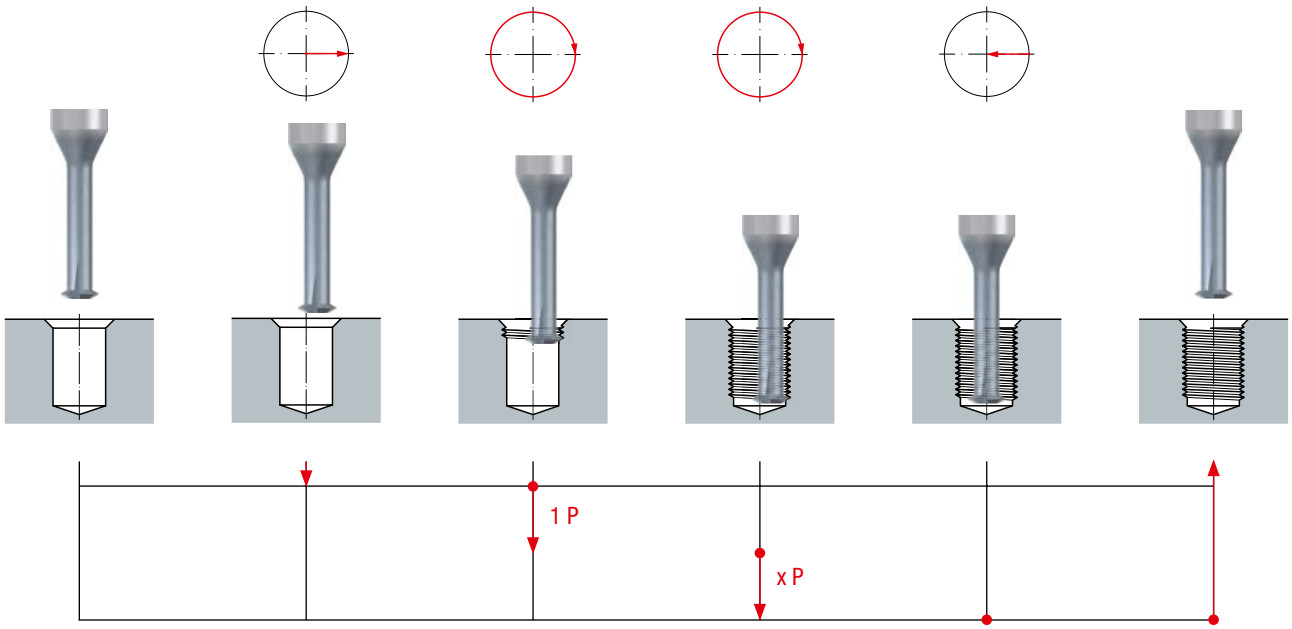
ZGF-VHM-2xD-HA-TICN

ø D	$P_{max.}$ mm	l_1	l_3	l_5	ø d_1	ø d_2	Z	Article no.	£
M1 - M1,2	0.25	39	28	2.8	0.7	3	1	**GF243706.0010XX**	£82.50
M1,4 - M1,8	0.35	39	28	3.5	1.04	3	2	**GF253706.0014XX**	£80.50
M2 - M2,3	0.45	39	28	4.8	1.52	3	3	**GF253706.0020XX**	£81.80
M2,5 - M3	0.5	39	28	6	1.95	3	3	**GF253706.0025XX**	£81.80
M3,5 - M4,5	0.75	42	28	9	2.78	4	3	**GF253706.0035XX**	£84.60
M5 - M7	1	55	36	14	4	6	4	**GF253706.0050XX**	£94.00
M8 - M10 1)	1.5	62	36	19.8	6.5	8	5	**GF253706.0080XX**	£99.90
M12 - M16 1)	2	78	40	31.8	9.9	10	5	**GF253706.0112XX**	£114.50

1) Design with internal coolant supply IKZ

Other designs upon request

Thread milling cycle:



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ZGF is also applicable for UN-threads, EG-M- and EG-UN-threads

Article no.	UNC	UNF					UNEF							
GF243706.0010	–	–	–	–	–	–	–	–	–	–	–	–	–	–
GF253706.0014	–	Nr. 0 - 80	–	–	–	–	–	–	–	–	–	–	–	–
GF253706.0020	Nr. 2 - 56	Nr. 2 - 64	–	–	–	–	–	–	–	–	–	–	–	–
GF253706.0025	Nr. 3 - 48	Nr. 3 - 56	–	–	–	–	–	–	–	–	–	–	–	–
GF253706.0035	Nr. 6 - 32	Nr. 6 - 40	Nr. 8 - 36	–	–	–	–	–	–	–	–	–	–	–
GF253706.0050	–	Nr. 12 - 28	1/4 - 28	–	–	–	Nr. 12 - 32	1/4 - 32	–	–	–	–	–	–
GF253706.0080	5/16 - 18	5/16 - 24	3/8 - 24	7/16 - 20	–	–	5/16 - 32	3/8 - 32	7/16 - 28	1/2 - 28	–	–	–	–
GF253706.0112	1/2 - 13	1/2 - 20	9/16 - 18	3/8 - 24	3/4 - 16	7/8 - 14	9/16 - 24	5/8 - 24	11/16 - 24	3/4 - 20	13/16 - 20	7/8 - 20	15/16 - 20	1 - 20

Article no.	EG-M			EG-UNC		
GF243706.0010	–	–	–	–	–	–
GF253706.0014	–	–	–	–	–	–
GF253706.0020	–	–	–	–	–	–
GF253706.0025	EG M2	EG M2,5	–	–	–	–
GF253706.0035	EG M3	EG M4	–	–	EG Nr. 4 - 40	EG Nr. 5 - 40
GF253706.0050	EG M5	EG M6	–	EG Nr. 8 - 32	–	–
GF253706.0080	EG M8	–	–	EG 1/4 - 20	EG 5/16 - 18	–
GF253706.0112	EG M10	EG M12	EG M16	–	EG 7/16 - 14	EG 1/2 - 13

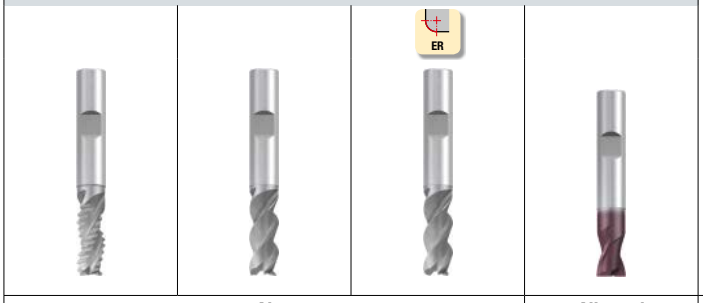
Article no.	EG-UNF					
GF243706.0010	–	–	–	–	–	–
GF253706.0014	–	–	–	–	–	–
GF253706.0020	–	–	–	–	–	–
GF253706.0025	EG Nr. 3 - 56	–	–	–	–	–
GF253706.0035	EG Nr. 4 - 48	EG Nr. 5 - 44	EG Nr. 6 - 40	EG Nr. 8 - 32	–	–
GF253706.0050	EG Nr. 8 - 32	EG Nr. 10 - 32	EG Nr. 12 - 28	EG 1/4 - 28	–	–
GF253706.0080	EG 5/16 - 24	EG 3/8 - 24	EG 7/16 - 20	EG 1/2 - 20	EG 9/16 - 18	EG 5/8 - 18
GF253706.0112	EG 7/16 - 20	EG 1/2 - 20	EG 9/16 - 18	EG 5/8 - 18	EG 3/4 - 16	EG 7/8 - 14

Please note:
The suitability of the solid carbide end mills and slot drills is indicated as follows:

■ = End mill / Slot drill is very suitable
□ = End mill / Slot drill is suitable

Please find the cutting conditions on pages 35 - 39.

Solid carbide end mills and slot drills



				Al			Allround
				WR	W		N
				3 - 20 mm	2 - 20 mm	6 - 20 mm	0.3 - 20 mm
			Flutes	3	2 - 3	3	2
				2448	2444	2446	2510A
				2449	2445	2447	2511A
			Page	25	26	27	28
			v_c / f_z	35	36	36	37
P		**Steel materials**					
	1.1	Cold-extrusion steels, Construction steels, Free-cutting steels, etc.	≤ 600 N/mm²				■
	2.1	Construction steels, Cementation steels, Steel castings, etc.	≤ 800 N/mm²				■
	3.1	Cementation steels, Heat-treatable steels, Cold work steels, etc.	≤ 1000 N/mm²				■
	4.1	Heat-treatable steels, Cold work steels, Nitriding steels, etc.	≤ 1200 N/mm²				■
	5.1	High-alloyed steels, Cold work steels, Hot work steels, etc.	≤ 1400 N/mm²				■
M		**Stainless steel materials**					
	1.1	Ferritic, martensitic	≤ 950 N/mm²				■
	2.1	Austenitic	≤ 950 N/mm²				■
	3.1	Austenitic-ferritic (Duplex)	≤ 1100 N/mm²				■
	4.1	Austenitic-ferritic heat-resistant (Super Duplex)	≤ 1250 N/mm²				■
K		**Cast materials**					
	1.1	Cast iron with lamellar graphite (GJL)	100-250 N/mm²				■
	1.2		250-450 N/mm²				■
	2.1	Cast iron with nodular graphite (GJS)	350-500 N/mm²				■
	2.2		500-900 N/mm²				■
	3.1	Cast iron with vermicular graphite (GJV)	300-400 N/mm²				■
	3.2		400-500 N/mm²				■
	4.1	Malleable cast iron (GTMW, GTMB)	250-500 N/mm²				■
	4.2		500-800 N/mm²				■
N		**Non ferrous materials**					
		Aluminium alloys					
	1.1	Aluminium wrought alloys	≤ 200 N/mm²	■	■	■	■
	1.2		≤ 350 N/mm²	■	■	■	■
	1.3		≤ 550 N/mm²	■	■	■	■
	1.4	Aluminium cast alloys	Si ≤ 7%	□	□	□	□
	1.5		7% < Si ≤ 12%				□
	1.6		12% < Si ≤ 17%				□
		Copper alloys					
	2.1	Pure copper, low-alloyed copper	≤ 400 N/mm²				■
	2.2	Copper-zinc alloys (brass, long-chipping)	≤ 550 N/mm²				■
	2.3	Copper-zinc alloys (brass, short-chipping)	≤ 550 N/mm²				■
	2.4	Copper-aluminium alloys (alu bronze, long-chipping)	≤ 800 N/mm²				■
	2.5	Copper-tin alloys (tin bronze, long-chipping)	≤ 700 N/mm²				■
	2.6	Copper-tin alloys (tin bronze, short-chipping)	≤ 400 N/mm²				■
	2.7	Special copper alloys	≤ 600 N/mm²				■
	2.8		≤ 1400 N/mm²				■
		Magnesium alloys					
	3.1	Magnesium wrought alloys	≤ 500 N/mm²				■
	3.2	Magnesium cast alloys	≤ 500 N/mm²				■
		Synthetics					
	4.1	Duroplastics (short-chipping)					■
	4.2	Thermoplastics (long-chipping)					■
	4.3	Fibre-reinforced synthetics (fibre content ≤ 30%)					
	4.4	Fibre-reinforced synthetics (fibre content > 30%)					
		Special materialsv					
	5.1	Graphite					
	5.2	Tungsten-copper alloys					■
	5.3	Composite materials					
S		**Special materials**					
		Titanium alloys					
	1.1	Pure titanium	≤ 450 N/mm²				■
	1.2	Titanium alloys	≤ 900 N/mm²				■
	1.3		≤ 1250 N/mm²				■
		Nickel alloys, cobalt alloys and iron alloys					
	2.1	Pure nickel	≤ 600 N/mm²				■
	2.2	Nickel-base alloys	≤ 1000 N/mm²				□
	2.3		≤ 1600 N/mm²				□
	2.4	Cobalt-base alloys	≤ 1000 N/mm²				□
	2.5		≤ 1600 N/mm²				□
	2.6	Iron-base alloys	≤ 1500 N/mm²				□
H		**Hard materials**					
	1.1	High strength steels, hardened steels, hard castings	44 - 50 HRC				■
	1.2		50 - 55 HRC				■
	1.3		55 - 60 HRC				
	1.4		60 - 63 HRC				
	1.5		63 - 66 HRC				

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Solid carbide end mills

	Allround									
	N									
	2 - 20 mm	3 - 20 mm	1.5 - 20 mm	2 - 20 mm	3 - 20 mm	3 - 20 mm	3 - 20 mm	3 - 20 mm	3 - 20 mm	
	2	2	3	3	4	4	4 - 5	4	4	Flutes
	2512A	2514A	2516A	2518A	1916A	1998A	2526A	2698A	2698AZ	
	2513A	2515A	2517A	2519A	1917A	1999A	2527A	2699A	2699AZ	
	29	29	30	30	31	31	32	33	34	Page
	38	39	37	38	37	38	39	38	38	v_c / f_z
	■	■	■	■	■	■	■	■	■	1.1
	■	■	■	■	■	■	■	■	■	2.1
	■	■	■	■	■	■	■	■	■	3.1
	■	■	■	■	■	■	■	■	■	4.1
	■	■	■	■	■	■	■	■	■	5.1
	■	■	■	■	■	■	■	■	■	1.1
	■	■	■	■	■	■	■	■	■	2.1
	■	■	■	■	■	■	■	■	■	3.1
	■	■	■	■	■	■	■	■	■	4.1
	■	■	■	■	■	■	■	■	■	1.1
	■	■	■	■	■	■	■	■	■	1.2
	■	■	■	■	■	■	■	■	■	2.1
	■	■	■	■	■	■	■	■	■	2.2
	■	■	■	■	■	■	■	■	■	3.1
	■	■	■	■	■	■	■	■	■	3.2
	■	■	■	■	■	■	■	■	■	4.1
	■	■	■	■	■	■	■	■	■	4.2
	■	■	■	■						1.1
	■	■	■	■	■	■	■	■	■	1.2
	■	■	■	■	■	■	■	■	■	1.3
	□	□	■	■	■	■	■	■	■	1.4
	□	□	□	□	□	□	□	□	□	1.5
	□	□	□	□	□	□	□	□	□	1.6
	■	■	■	■	■	■	■	■	■	2.1
	■	■	■	■	■	■	■	■	■	2.2
	■	■	■	■	■	■	■	■	■	2.3
	■	■	■	■	■	■	■	■	■	2.4
	■	■	■	■	■	■	■	■	■	2.5
	■	■	■	■	■	■	■	■	■	2.6
	■	■	■	■	■	■	■	■	■	2.7
	■	■	■	■	■	■	■	■	■	2.8
	■	■			■	■	■	■	■	3.1
	■	■			■	■	■	■	■	3.2
	■	■	□	□	■	■	■	■	■	4.1
	■	■	□	□						4.2
										4.3
										4.4
										5.1
	■	■	■	■	■	■	■	■	■	5.2
										5.3
	■	■	■	■	■	■	■	■	■	1.1
	■	■	□	□	■	■	■	■	■	1.2
	■	■	□	□	■	■	■	■	■	1.3
	■	■	■	■	■	■	■	■	■	2.1
	□	□	□	□	■	■	■	■	■	2.2
	□	□	□	□	■	■	■	■	■	2.3
	□	□	□	□	■	■	■	■	■	2.4
	□	□	□	□	■	■	■	■	■	2.5
	□	□	□	□	■	■	■	■	■	2.6
	■	■	■	■	■	■	■	■	■	1.1
	■	■	■	■	□	□		□	□	1.2
					□	□		□	□	1.3
										1.4
										1.5

P

M

K

N

S

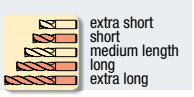
H

The FRANKEN Tool Catalogue 240 provides an overview of the following product groups including all related technical information

- Solid carbide end mills and slot drills
- Solid carbide ball nose and torus end mills
- PCD, CBN and diamond coated end mills
- Tapered solid carbide die-sinking end mills and burrs
- Indexable milling cutters and end mills
- HSS end mills and slot drills
- HSS and solid carbide form end mills
- Milling cutters with bore
- Clamping systems, tool holders and accessories

Description of the Symbols

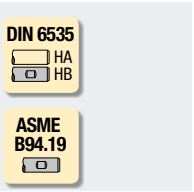
Constructional length



The relevant length is marked in red.

Shank design

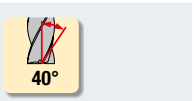
The shank designs to be found on the respective page are marked in grey.



Shank design for metric tools

Shank design for inch tools

Helix angle

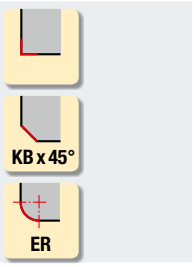


The helix angle of these tools is shown. If there are variable helix angles, these are all shown.

Chip breaker

Depending on form (e.g. round or flat) and size (coarse, medium, fine) of the chip breakers these end mills generate appropriate milling marks.

Cutting edge design and face geometry



Sharp-edged

Bevelled edge

Corner radius

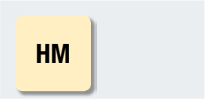
Feed direction

The red arrows mark the recommended feed directions of the respective cutters.

Ramping angle

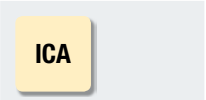
The specified angle is the recommended angle for ramping applications.

Cutting material



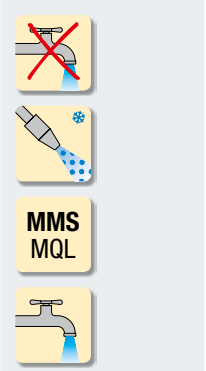
Solid carbide

Internal coolant supply



ICA = Internal coolant supply, axial exit

Coolant and lubrication



Dry machining

Cold-air nozzle

Minimum-quantity lubrication (MQL)

Emulsion

Cutting conditions

The cutting conditions and work parameters for these tools are to be found on the page number given in the symbol.

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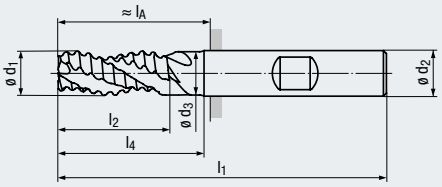
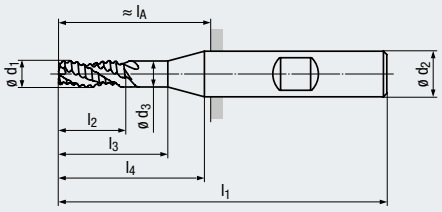
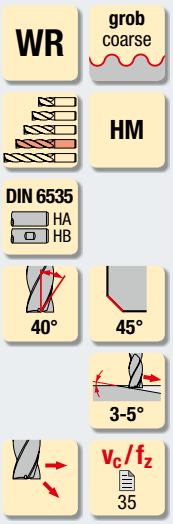
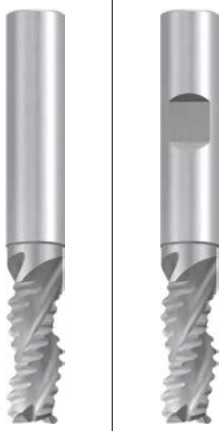


Design l_3:







Al

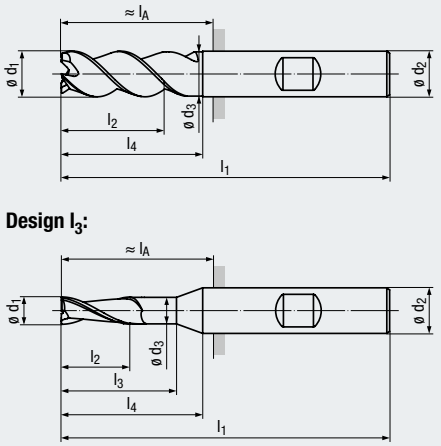
Coating

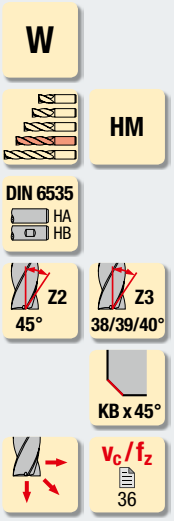
- High performance tool
- Special geometry for high-volume machining
- Centre cutting
- For wrought aluminium alloys
- For aluminium alloys with a silicon content of up to 7%

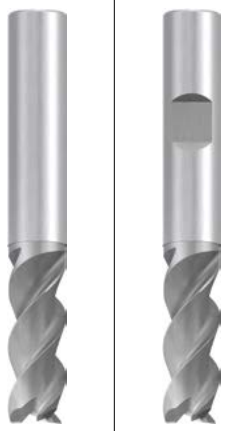
N 1.1-1.3 1.4

DIN 6527 – Long design

Order code										2448	2449
ø d_1 h11	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h6	l_A	Flutes	Dimens.-Code	£	£
3	7	14	57	2.9	20	6	21	**3**	**.003XX**	£42.90	£42.90
4	8	18	57	3.8	20	6	21	**3**	**.004XX**	£42.40	£42.40
5	10	19	57	4.8	20	6	21	**3**	**.005XX**	£41.40	£41.40
6	13	–	57	5.8	20	6	21	**3**	**.006XX**	£39.10	£39.10
8	19	–	63	7.7	25	8	34	**3**	**.008XX**	£43.30	£43.30
10	22	–	72	9.5	30	10	32	**3**	**.010XX**	£49.40	£49.40
12	26	–	83	11.5	35	12	38	**3**	**.012XX**	£53.60	£53.60
16	32	–	92	15.5	40	16	44	**3**	**.016XX**	£88.20	£88.20
20	38	–	104	19.5	50	20	54	**3**	**.020XX**	£111.20	£111.20







Al

Coating

- High performance tool
- Special geometry for high-volume machining
- Low-vibration machining
- With 2 and 3 flutes
- Centre cutting

- For wrought aluminium alloys
- For aluminium alloys with a silicon content of up to 7%
- Suitable for drilling
- Suitable for roughing and finishing

N 1.1-1.3 1.4

DIN 6527 – Long design

Order code											2444	2445
ø d_1 h10	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h6	l_A	KB	Flutes	Dimens.-Code	£	£
2	6	10	57	1.9	20	6	21	0.06	**2**	**.002XX**	£23.50	£23.50
3	7	14	57	2.9	20	6	21	0.1	**2**	**.003XX**	£22.20	£22.20
4	8	18	57	3.8	20	6	21	0.1	**2**	**.004XX**	£22.20	£22.20
5	10	19	57	4.8	20	6	21	0.15	**2**	**.005XX**	£21.70	£21.70
6	13	–	57	5.8	20	6	21	0.125	**3**	**.006XX**	£21.20	£21.20
8	19	–	63	7.7	25	8	34	0.125	**3**	**.008XX**	£33.30	£33.30
10	22	–	72	9.5	30	10	32	0.2	**3**	**.010XX**	£42.20	£42.20
12	26	–	83	11.5	35	12	38	0.2	**3**	**.012XX**	£52.50	£52.50
16	32	–	92	15.5	40	16	44	0.2	**3**	**.016XX**	£84.10	£84.10
20	38	–	104	19.5	50	20	54	0.3	**3**	**.020XX**	£120.10	£120.10

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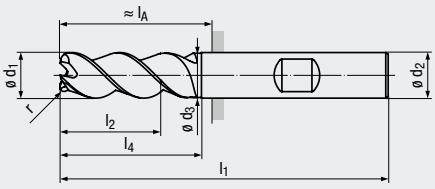
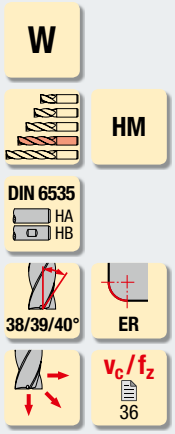
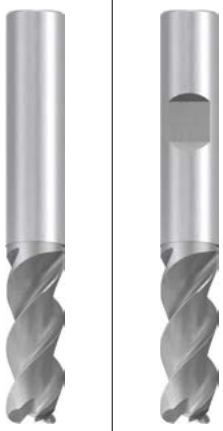






Al

Coating

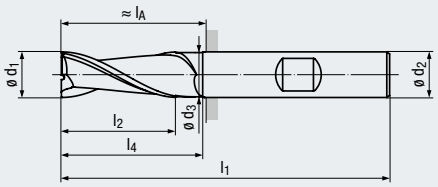
- High performance tool
- Special geometry for high-volume machining
- Low-vibration machining
- Several corner radii per cutting diameter
- Centre cutting
- For wrought aluminium alloys
- For aluminium alloys with a silicon content of up to 7%
- Suitable for drilling
- Suitable for roughing and finishing

N 1.1-1.3 1.4

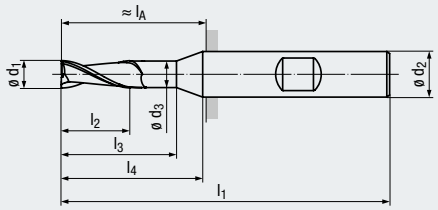
DIN 6527 – Long design

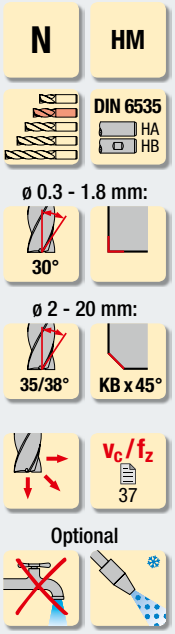
Corner radius

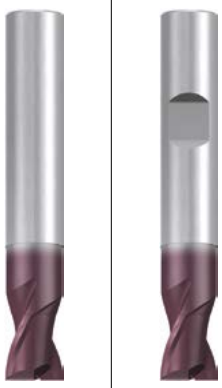
Order code										2446	2447
ø d_1 h10	r ±0.02	l_2	l_1	ø d_3	l_4	ø d_2 h6	l_A	Flutes	Dimens.-Code	£	£
6	0.5	13	57	5.8	20	6	21	**3**	**.006005XX**	£24.80	£24.80
6	1	13	57	5.8	20	6	21	**3**	**.006010XX**	£24.80	£24.80
8	1	19	63	7.7	25	8	27	**3**	**.008010XX**	£36.90	£36.90
8	1.5	19	63	7.7	25	8	27	**3**	**.008015XX**	£37.80	£37.80
8	2	19	63	7.7	25	8	27	**3**	**.008020XX**	£37.80	£37.80
10	1	22	72	9.5	30	10	32	**3**	**.010010XX**	£46.70	£46.70
10	1.5	22	72	9.5	30	10	32	**3**	**.010015XX**	£47.60	£47.60
10	2	22	72	9.5	30	10	32	**3**	**.010020XX**	£47.60	£47.60
12	1	26	83	11.5	35	12	38	**3**	**.012010XX**	£56.50	£56.50
12	1.5	26	83	11.5	35	12	38	**3**	**.012015XX**	£57.30	£57.30
12	2	26	83	11.5	35	12	38	**3**	**.012020XX**	£57.30	£57.30
12	2.5	26	83	11.5	35	12	38	**3**	**.012025XX**	£58.10	£58.10
12	3	26	83	11.5	35	12	38	**3**	**.012030XX**	£58.10	£58.10
12	4	26	83	11.5	35	12	38	**3**	**.012040XX**	£59.70	£59.70
16	1	32	92	15.5	40	16	44	**3**	**.016010XX**	£88.90	£88.90
16	1.5	32	92	15.5	40	16	44	**3**	**.016015XX**	£89.70	£89.70
16	2	32	92	15.5	40	16	44	**3**	**.016020XX**	£89.70	£89.70
16	2.5	32	92	15.5	40	16	44	**3**	**.016025XX**	£91.30	£91.30
16	3	32	92	15.5	40	16	44	**3**	**.016030XX**	£91.30	£91.30
16	4	32	92	15.5	40	16	44	**3**	**.016040XX**	£92.90	£92.90
20	1	38	104	19.5	50	20	54	**3**	**.020010XX**	£124.60	£124.60
20	1.5	38	104	19.5	50	20	54	**3**	**.020015XX**	£125.40	£125.40
20	2	38	104	19.5	50	20	54	**3**	**.020020XX**	£125.40	£125.40
20	2.5	38	104	19.5	50	20	54	**3**	**.020025XX**	£126.90	£126.90
20	3	38	104	19.5	50	20	54	**3**	**.020030XX**	£126.90	£126.90
20	4	38	104	19.5	50	20	54	**3**	**.020040XX**	£128.40	£128.40



Design l_3:







Allround

Coating	TIALN

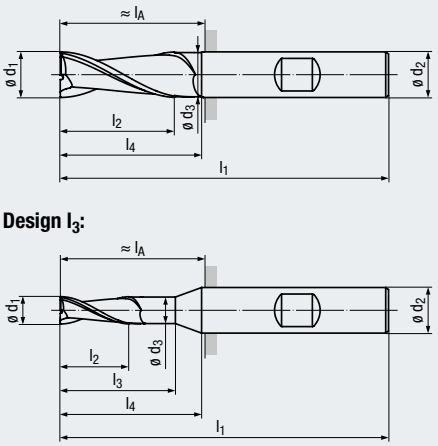
- Multi-functional, high performance tool
- Newly developed geometry
- Low-vibration machining
- Centre cutting
- For almost all materials
- Suitable for roughing and finishing

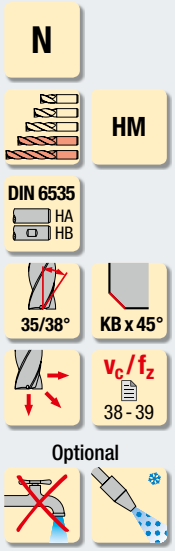
P	1.1-5.1	
M	1.1-4.1	
K	1.1-4.2	
N	1.1-1.3	1.4-1.6
N	2.1-4.2, 5.2	
S	1.1-2.1	2.2-2.6
H	1.1-1.2	

DIN 6527 – Short design

Order code											2510A	2511A
ø d_1 e8	ø d_1 h10	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h5	l_A	KB	Flutes	Dimens.-Code	£	£
	0.3	1	–	38	–	8	3	–	–	2	.0003XX	£20.10	
	0.5	1.5	–	38	–	9	3	–	–	2	.0005XX	£15.60	
	1	3	–	38	–	10	3	–	–	2	.001XX	£13.40	
	1.2	4	–	38	–	10	3	–	–	2	.0012XX	£14.80	
	1.3	4	–	38	–	10	3	–	–	2	.0013XX	£14.80	
	1.4	4	–	38	–	10	3	–	–	2	.0014XX	£14.80	
	1.5	4	–	38	–	10	3	–	–	2	.0015XX	£12.80	
	1.6	4	–	38	–	10	3	–	–	2	.0016XX	£14.80	
	1.8	5	–	38	–	10	3	–	–	2	.0018XX	£14.80	

ø d_1 e8	ø d_1 h10	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h5	l_A	KB	Flutes	Dimens.-Code	£	£
2		3	5	50	1.9	14	6	14	0.04	2	.002XX	£14.30	£14.30
2.5		5	8	54	2.4	18	6	18	0.07	2	.0025XX	£15.60	£15.60
	2.8	5	9	54	2.7	18	6	18	0.07	2	.0028XX	£16.80	£16.80
3		4	7	50	2.9	14	6	14	0.07	2	.003XX	£14.30	£14.30
	3.5	6	9	54	3.3	18	6	18	0.07	2	.0035XX	£15.80	£15.80
	3.8	7	12	54	3.6	18	6	18	0.07	2	.0038XX	£17.10	£17.10
4		5	9	54	3.8	18	6	18	0.07	2	.004XX	£14.40	£14.40
	4.5	8	12	54	4.3	18	6	18	0.12	2	.0045XX	£15.80	£15.80
	4.8	8	16	54	4.6	18	6	18	0.12	2	.0048XX	£17.10	£17.10
5		6	11	54	4.8	18	6	18	0.12	2	.005XX	£14.40	£14.40
	5.75	10	16	54	5.55	18	6	18	0.12	2	.00575XX	£17.10	£17.10
6		7	–	54	5.8	16	6	18	0.12	2	.006XX	£13.60	£13.60
7		8	18	58	6.7	20	8	22	0.12	2	.007XX	£22.80	£22.80
8		9	–	58	7.7	20	8	22	0.12	2	.008XX	£20.50	£20.50
	9	10	22	66	8.7	24	10	26	0.2	2	.009XX	£28.80	£28.80
10		11	–	66	9.5	24	10	26	0.2	2	.010XX	£26.50	£26.50
12		12	–	73	11.5	26	12	28	0.2	2	.012XX	£37.80	£37.80
14		14	–	75	13.5	28	14	30	0.2	2	.014XX	£49.90	£49.90
16		16	–	82	15.5	32	16	34	0.2	2	.016XX	£69.80	£69.80
18		18	–	84	17.5	34	18	36	0.2	2	.018XX	£100.20	£100.20
20		20	–	92	19.5	40	20	42	0.3	2	.020XX	£117.80	£117.80





	Allround	Allround
Coating	TIALN	TIALN
	P 1.1-5.1 M 1.1-4.1 K 1.1-4.2 N 1.1-1.3 1.4-1.6 N 2.1-4.2, 5.2 S 1.1-2.1 2.2-2.6 H 1.1-1.2	P 1.1-5.1 M 1.1-4.1 K 1.1-4.2 N 1.1-1.3 1.4-1.6 N 2.1-4.2, 5.2 S 1.1-2.1 2.2-2.6 H 1.1-1.2

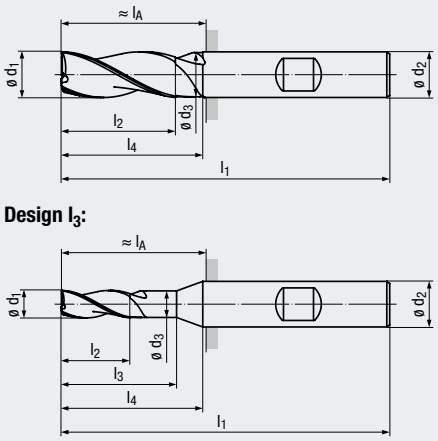
- Multi-functional, high performance tool
- Newly developed geometry
- Low-vibration machining
- Centre cutting
- For almost all materials
- Suitable for roughing and finishing

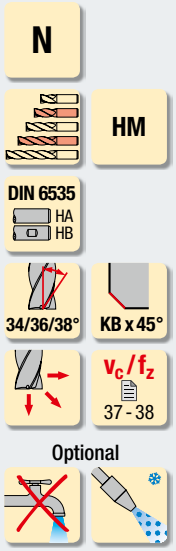
DIN 6527 – Long design

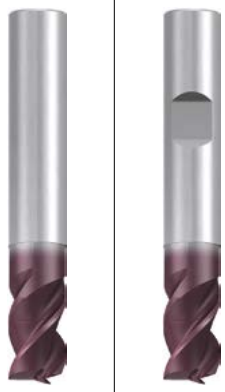
Order code											2512A	2513A		
ø d_1 h10	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h5	l_A	KB	Flutes	Dimens.-Code	£	£		
2	6	8	57	1.9	20	6	21	0.04	**2**	**.002XX**	£16.80	£16.80		
3	7	10	57	2.9	20	6	21	0.07	**2**	**.003XX**	£16.80	£16.80		
4	8	12	57	3.8	20	6	21	0.07	**2**	**.004XX**	£16.80	£16.80		
5	10	15	57	4.8	20	6	21	0.12	**2**	**.005XX**	£16.80	£16.80		
6	10	–	57	5.8	20	6	21	0.12	**2**	**.006XX**	£15.90	£15.90		
7	13	23	63	6.7	25	8	27	0.12	**2**	**.007XX**	£25.80	£25.80		
8	16	–	63	7.7	25	8	27	0.12	**2**	**.008XX**	£23.50	£23.50		
10	19	–	72	9.5	30	10	32	0.2	**2**	**.010XX**	£30.10	£30.10		
12	22	–	83	11.5	35	12	38	0.2	**2**	**.012XX**	£43.90	£43.90		
16	26	–	92	15.5	40	16	44	0.2	**2**	**.016XX**	£80.40	£80.40		
20	32	–	104	19.5	50	20	54	0.3	**2**	**.020XX**	£135.50	£135.50		

Extra long design

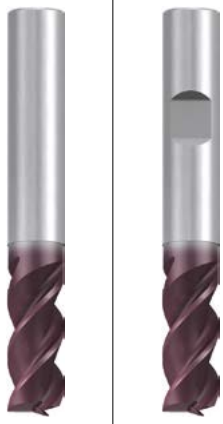
Order code													2514A	2515A
ø d_1 h10	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h5	l_A	KB	Flutes	Dimens.-Code			£	£
3	9	12	62	2.9	23	6	26	0.07	**2**	**.003XX**			£19.40	£19.40
4	12	16	62	3.8	25	6	26	0.07	**2**	**.004XX**			£19.80	£19.80
5	15	20	62	4.8	25	6	26	0.12	**2**	**.005XX**			£19.80	£19.80
6	18	–	62	5.8	25	6	26	0.12	**2**	**.006XX**			£17.80	£17.80
8	24	–	68	7.7	30	8	32	0.12	**2**	**.008XX**			£26.10	£26.10
10	30	–	80	9.5	40	10	40	0.2	**2**	**.010XX**			£34.80	£34.80
12	36	–	93	11.5	45	12	48	0.2	**2**	**.012XX**			£50.20	£50.20
16	48	–	108	15.5	55	16	60	0.2	**2**	**.016XX**			£93.80	£93.80
20	60	–	126	19.5	70	20	76	0.3	**2**	**.020XX**			£162.60	£162.60







Allround



Allround

Coating	TIALN	TIALN
	P 1.1-5.1	P 1.1-5.1
	M 1.1-4.1	M 1.1-4.1
	K 1.1-4.2	K 1.1-4.2
	N 1.1-1.4 / 1.5-1.6	N 1.1-1.4 / 1.5-1.6
	N 2.1-2.8, 5.2 / 4.1-4.2	N 2.1-2.8, 5.2 / 4.1-4.2
	S 1.1, 2.1 / 1.2-1.3	S 1.1, 2.1 / 1.2-1.3
	S 2.2-2.6	S 2.2-2.6
	H 1.1-1.2	H 1.1-1.2

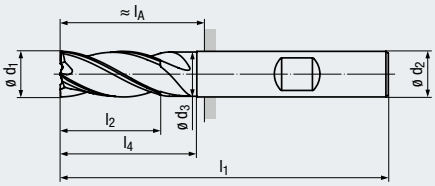
- Multi-functional, high performance tool
- Newly developed geometry
- Low-vibration machining
- Centre cutting
- For almost all materials
- Suitable for roughing and finishing

DIN 6527 – Short design

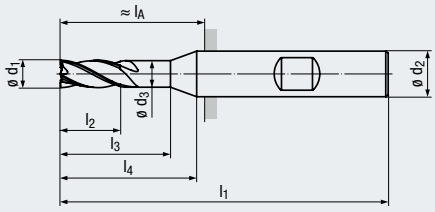
Order code											2516A	2517A		
ø d_1 h10	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h5	l_A	KB	Flutes	Dimens.-Code	£	£		
1.5	3	–	50	–	14	6	14	0.04	**3**	**.0015XX**	£16.10	£16.10		
2	3	5	50	1.9	14	6	14	0.04	**3**	**.002XX**	£14.30	£14.30		
2.5	3	5	50	2.4	14	6	14	0.07	**3**	**.0025XX**	£15.60	£15.60		
2.8	4	7	50	2.7	14	6	14	0.07	**3**	**.0028XX**	£16.80	£16.80		
3	4	7	50	2.9	14	6	14	0.07	**3**	**.003XX**	£13.90	£13.90		
3.5	4	7	50	3.3	14	6	14	0.07	**3**	**.0035XX**	£15.60	£15.60		
3.8	5	9	54	3.6	18	6	18	0.07	**3**	**.0038XX**	£16.40	£16.40		
4	5	9	54	3.8	18	6	18	0.07	**3**	**.004XX**	£13.90	£13.90		
4.5	5	9	54	4.3	18	6	18	0.12	**3**	**.0045XX**	£15.60	£15.60		
4.8	6	11	54	4.6	18	6	18	0.12	**3**	**.0048XX**	£16.40	£16.40		
5	6	11	54	4.8	18	6	18	0.12	**3**	**.005XX**	£13.90	£13.90		
5.5	7	12	54	5.3	18	6	18	0.12	**3**	**.0055XX**	£14.30	£14.30		
5.75	7	16	54	5.55	18	6	18	0.12	**3**	**.00575XX**	£14.90	£14.90		
6	7	–	54	5.8	16	6	18	0.12	**3**	**.006XX**	£12.90	£12.90		
7.75	9	18	58	7.45	20	8	22	0.12	**3**	**.00775XX**	£21.80	£21.80		
8	9	–	58	7.7	20	8	22	0.12	**3**	**.008XX**	£18.80	£18.80		
9.7	11	22	66	9.4	24	10	26	0.2	**3**	**.0097XX**	£28.10	£28.10		
10	11	–	66	9.5	24	10	26	0.2	**3**	**.010XX**	£24.50	£24.50		
11.7	12	24	73	11.2	26	12	28	0.2	**3**	**.0117XX**	£40.20	£40.20		
12	12	–	73	11.5	26	12	28	0.2	**3**	**.012XX**	£34.80	£34.80		
16	16	–	82	15.5	32	16	34	0.2	**3**	**.016XX**	£63.70	£63.70		
20	20	–	92	19.5	40	20	42	0.3	**3**	**.020XX**	£106.10	£106.10		

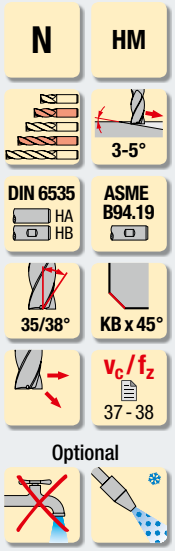
DIN 6527 – Long design

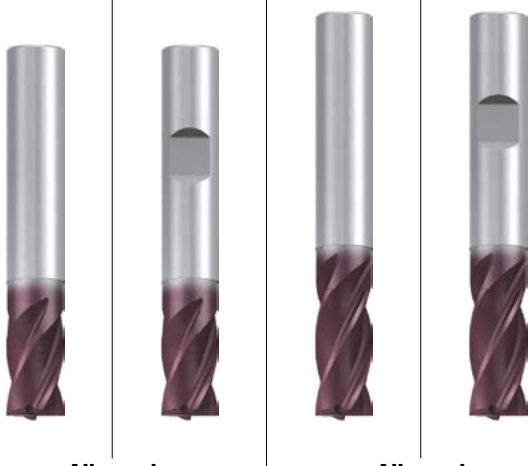
Order code													2518A	2519A
ø d_1 h10	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h5	l_A	KB	Flutes	Dimens.-Code				£
2	6	8	57	1.9	20	6	21	0.04	**3**	**.002XX**			£16.80	£16.80
3	7	10	57	2.9	20	6	21	0.07	**3**	**.003XX**			£16.40	£16.40
4	8	12	57	3.8	20	6	21	0.07	**3**	**.004XX**			£16.40	£16.40
5	10	15	57	4.8	20	6	21	0.12	**3**	**.005XX**			£16.40	£16.40
6	10	–	57	5.8	20	6	21	0.12	**3**	**.006XX**			£14.60	£14.60
7	13	23	63	6.7	25	8	27	0.12	**3**	**.007XX**			£24.50	£24.50
8	16	–	63	7.7	25	8	27	0.12	**3**	**.008XX**			£21.80	£21.80
10	19	–	72	9.5	30	10	32	0.2	**3**	**.010XX**			£27.80	£27.80
12	22	–	83	11.5	35	12	38	0.2	**3**	**.012XX**			£39.80	£39.80
16	26	–	92	15.5	40	16	44	0.2	**3**	**.016XX**			£72.80	£72.80
20	32	–	104	19.5	50	20	54	0.3	**3**	**.020XX**			£122.10	£122.10



Design l_3:







	Allround	Allround
Coating	TIALN	TIALN

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Centre cutting
- 3 lengths available
- For almost all materials
- Suitable for roughing and finishing

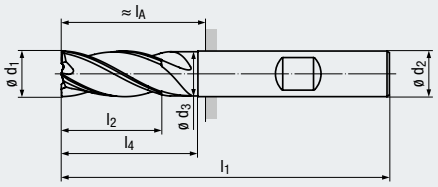
P	1.1-5.1	
M	1.1-4.1	
K	1.1-4.2	
N	1.2-1.4	1.5-1.6
N	2.1-4.1, 5.2	
S	1.1-2.6	
H	1.1	1.2-1.3

DIN 6527 – Short design

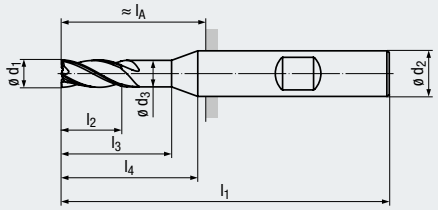
ø d_1 h10	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h6	l_A	KB	Flutes	Dimens.-Code	1916A £	1917A £		
3	5	9	50	2.9	14	6	14	0.07	**4**	**.003XX**	£17.40	£17.40		
4	8	12	54	3.8	18	6	18	0.07	**4**	**.004XX**	£17.10	£17.10		
5	9	16	54	4.8	18	6	18	0.07	**4**	**.005XX**	£17.10	£17.10		
6	10	–	54	5.8	16	6	18	0.12	**4**	**.006XX**	£16.10	£16.10		
8	12	–	58	7.7	20	8	22	0.12	**4**	**.008XX**	£24.10	£24.10		
10	15	–	66	9.5	24	10	26	0.2	**4**	**.010XX**	£31.80	£31.80		
12	18	–	73	11.5	26	12	28	0.2	**4**	**.012XX**	£43.20	£43.20		
16	24	–	82	15.5	32	16	34	0.2	**4**	**.016XX**	£68.40	£68.40		
18	27	–	84	17.5	34	18	36	0.2	**4**	**.018XX**	£89.20	£89.20		
20	30	–	92	19.5	40	20	42	0.3	**4**	**.020XX**	£106.10	£106.10		

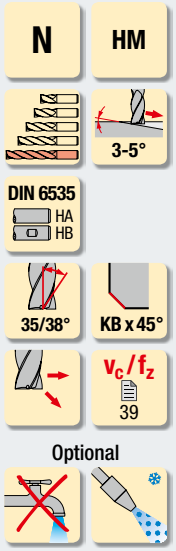
DIN 6527 – Long design

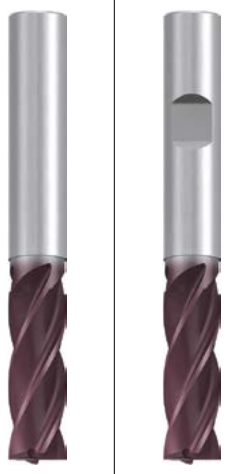
ø d_1 h10	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h6	l_A	KB	Flutes	Dimens.-Code			1998A £	1999A £
3	8	14	57	2.9	20	6	21	0.07	**4**	**.003XX**			£19.10	£19.10
4	11	18	57	3.8	20	6	21	0.07	**4**	**.004XX**			£18.80	£18.80
5	13	19	57	4.8	20	6	21	0.12	**4**	**.005XX**			£18.10	£18.10
6	13	–	57	5.8	20	6	21	0.12	**4**	**.006XX**			£17.40	£17.40
8	19	–	63	7.7	25	8	27	0.12	**4**	**.008XX**			£27.10	£27.10
10	22	–	72	9.5	30	10	32	0.2	**4**	**.010XX**			£35.50	£35.50
12	26	–	83	11.5	35	12	38	0.2	**4**	**.012XX**			£48.20	£48.20
16	32	–	92	15.5	40	16	44	0.2	**4**	**.016XX**			£76.40	£76.40
18	32	–	100	17.5	50	18	52	0.2	**4**	**.018XX**			£99.40	£99.40
20	38	–	104	19.5	50	20	54	0.3	**4**	**.020XX**			£117.80	£117.80



Design l_3:







Allround

Coating	TIALN

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Centre cutting
- 3 lengths available
- For almost all materials
- Suitable for roughing and finishing

P	1.1-5.1	
M	1.1-4.1	
K	1.1-4.2	
N	1.2-1.4	1.5-1.6
N	2.1-4.1, 5.2	
S	1.1-1.3	2.1-2.6
H	1.1	

Extra long design

ø d_1 h10	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h6	l_A	KB	Flutes	Dimens.-Code	2526A £	2527A £
3	9	12	62	2.9	23	6	26	0.07	**4**	**.003XX**	£25.40	£25.40
4	12	16	62	3.8	25	6	26	0.07	**4**	**.004XX**	£25.80	£25.80
5	15	20	62	4.8	25	6	26	0.12	**4**	**.005XX**	£25.80	£25.80
6	18	–	62	5.8	25	6	26	0.12	**4**	**.006XX**	£23.60	£23.60
8	24	–	68	7.7	30	8	32	0.12	**5**	**.008XX**	£36.70	£36.70
10	30	–	80	9.5	35	10	40	0.2	**5**	**.010XX**	£48.90	£48.90
12	36	–	93	11.5	45	12	48	0.2	**5**	**.012XX**	£70.30	£70.30
16	48	–	112	15.5	60	16	64	0.2	**5**	**.016XX**	£129.40	£129.40
20	60	–	130	19.5	75	20	80	0.3	**5**	**.020XX**	£206.60	£206.60

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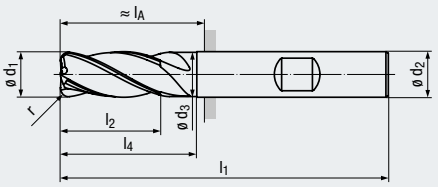
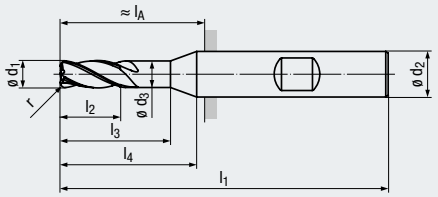
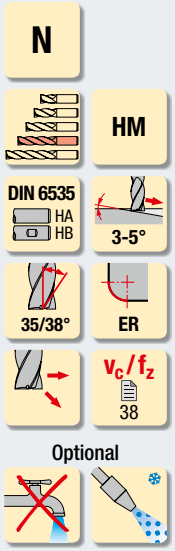


Design l_3:





Allround

Coating: TIALN

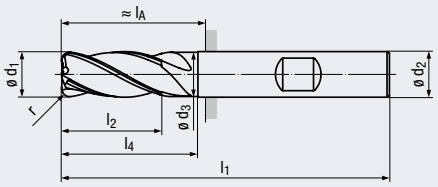
- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Several corner radii per cutting diameter
- Centre cutting
- For almost all materials, including tough materials
- Very suitable for roughing and finishing

P	1.1-5.1	
M	1.1-4.1	
K	1.1-4.2	
N	1.2-1.4	1.5-1.6
N	2.1-4.1, 5.2	
S	1.1-2.6	
H	1.1	1.2-1.3

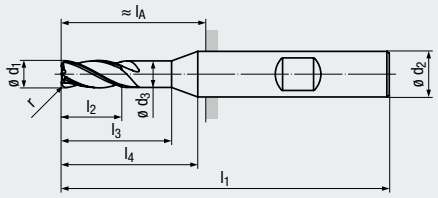
DIN 6527 – Long design

Order code											Corner radius 2698A	Corner radius 2699A
ø d_1 h10	r ±0.02	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h6	l_A	Flutes	Dimens.-Code	£	£
3	0.1	8	14	57	2.9	20	6	21	**4**	**.003001XX**	£23.80	£23.80
3	0.3	8	14	57	2.9	20	6	21	**4**	**.003003XX**	£23.10	£23.10
3	0.5	8	14	57	2.9	20	6	21	**4**	**.003005XX**	£23.10	£23.10
4	0.1	11	18	57	3.8	20	6	21	**4**	**.004001XX**	£23.50	£23.50
4	0.3	11	18	57	3.8	20	6	21	**4**	**.004003XX**	£22.80	£22.80
4	0.4	11	18	57	3.8	20	6	21	**4**	**.004004XX**	£22.80	£22.80
4	0.5	11	18	57	3.8	20	6	21	**4**	**.004005XX**	£22.80	£22.80
5	0.1	13	19	57	4.8	20	6	21	**4**	**.005001XX**	£23.10	£23.10
5	0.3	13	19	57	4.8	20	6	21	**4**	**.005003XX**	£22.50	£22.50
5	0.5	13	19	57	4.8	20	6	21	**4**	**.005005XX**	£22.50	£22.50
5	1	13	19	57	4.8	20	6	21	**4**	**.005010XX**	£22.50	£22.50
6	0.1	13	–	57	5.8	20	6	21	**4**	**.006001XX**	£21.80	£21.80
6	0.5	13	–	57	5.8	20	6	21	**4**	**.006005XX**	£20.80	£20.80
6	1.0	13	–	57	5.8	20	6	21	**4**	**.006010XX**	£20.80	£20.80
6	1.5	13	–	57	5.8	20	6	21	**4**	**.006015XX**	£22.50	£22.50
8	0.15	19	–	63	7.7	25	8	27	**4**	**.008001XX**	£31.50	£31.50
8	0.5	19	–	63	7.7	25	8	27	**4**	**.008005XX**	£30.50	£30.50
8	1	19	–	63	7.7	25	8	27	**4**	**.008010XX**	£30.50	£30.50
8	1.5	19	–	63	7.7	25	8	27	**4**	**.008015XX**	£31.80	£31.80
8	2	19	–	63	7.7	25	8	27	**4**	**.008020XX**	£31.80	£31.80
10	0.15	22	–	72	9.5	30	10	32	**4**	**.010001XX**	£39.80	£39.80
10	0.5	22	–	72	9.5	30	10	32	**4**	**.010005XX**	£39.20	£39.20
10	1	22	–	72	9.5	30	10	32	**4**	**.010010XX**	£39.20	£39.20
10	1.5	22	–	72	9.5	30	10	32	**4**	**.010015XX**	£39.80	£39.80
10	2	22	–	72	9.5	30	10	32	**4**	**.010020XX**	£39.80	£39.80
12	0.2	26	–	83	11.5	35	12	38	**4**	**.012002XX**	£52.90	£52.90
12	0.5	26	–	83	11.5	35	12	38	**4**	**.012005XX**	£52.20	£52.20
12	1	26	–	83	11.5	35	12	38	**4**	**.012010XX**	£52.20	£52.20
12	1.5	26	–	83	11.5	35	12	38	**4**	**.012015XX**	£52.90	£52.90
12	2	26	–	83	11.5	35	12	38	**4**	**.012020XX**	£52.90	£52.90
12	3	26	–	83	11.5	35	12	38	**4**	**.012030XX**	£53.60	£53.60
14	1	26	–	83	13.5	35	14	38	**4**	**.014010XX**	£63.60	£63.60
16	0.3	32	–	92	15.5	40	16	44	**4**	**.016003XX**	£83.70	£83.70
16	0.5	32	–	92	15.5	40	16	44	**4**	**.016005XX**	£82.60	£82.60
16	1	32	–	92	15.5	40	16	44	**4**	**.016010XX**	£82.60	£82.60
16	1.5	32	–	92	15.5	40	16	44	**4**	**.016015XX**	£83.30	£83.30
16	2	32	–	92	15.5	40	16	44	**4**	**.016020XX**	£83.30	£83.30
16	3	32	–	92	15.5	40	16	44	**4**	**.016030XX**	£84.00	£84.00
16	4	32	–	92	15.5	40	16	44	**4**	**.016040XX**	£85.50	£85.50
20	0.3	38	–	104	19.5	50	20	54	**4**	**.020003XX**	£124.10	£124.10
20	0.5	38	–	104	19.5	50	20	54	**4**	**.020005XX**	£122.90	£122.90
20	1	38	–	104	19.5	50	20	54	**4**	**.020010XX**	£122.90	£122.90
20	1.5	38	–	104	19.5	50	20	54	**4**	**.020015XX**	£123.70	£123.70
20	2	38	–	104	19.5	50	20	54	**4**	**.020020XX**	£123.70	£123.70
20	3	38	–	104	19.5	50	20	54	**4**	**.020030XX**	£125.70	£125.70

Other corner radii available on request



Design l_3:



N

ICA

HM

DIN 6535 HA HB

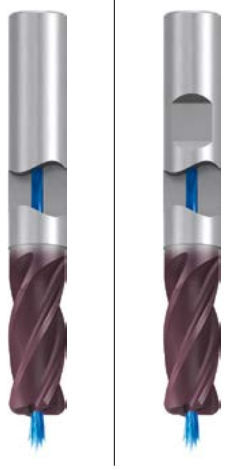
35/38°

ER

3-5°

v_c/f_z 38

Optional



Allround

Coating	TIALN

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Several corner radii per cutting diameter
- Internal coolant supply, axial exit (ICA)
- For almost all materials, including tough materials
- Very suitable for roughing and finishing

P	1.1-5.1	
M	1.1-4.1	
K	1.1-4.2	
N	1.2-1.4	1.5-1.6
N	2.1-4.1, 5.2	
S	1.1-2.6	
H	1.1	1.2-1.3

DIN 6527 – Long design

Order code											Corner radius	
											2698AZ	2699AZ
ø d_1 h10	r ±0.02	l_2	l_3	l_1	ø d_3	l_4	ø d_2 h6	l_A	Flutes	Dimens.-Code	£	£
3	0.3	8	14	57	2.9	20	6	21	**4**	**.003003XX**	£28.80	£28.80
3	0.5	8	14	57	2.9	20	6	21	**4**	**.003005XX**	£28.80	£28.80
4	0.3	11	18	57	3.8	20	6	21	**4**	**.004003XX**	£28.00	£28.00
4	0.5	11	18	57	3.8	20	6	21	**4**	**.004005XX**	£28.00	£28.00
5	0.3	13	19	57	4.8	20	6	21	**4**	**.005003XX**	£27.30	£27.30
5	0.5	13	19	57	4.8	20	6	21	**4**	**.005005XX**	£27.30	£27.30
6	0.5	13	–	57	5.8	20	6	21	**4**	**.006005XX**	£25.90	£25.90
6	1.0	13	–	57	5.8	20	6	21	**4**	**.006010XX**	£25.90	£25.90
6	1.5	13	–	57	5.8	20	6	21	**4**	**.006015XX**	£27.30	£27.30
8	0.5	19	–	63	7.7	25	8	27	**4**	**.008005XX**	£36.80	£36.80
8	1	19	–	63	7.7	25	8	27	**4**	**.008010XX**	£36.80	£36.80
8	1.5	19	–	63	7.7	25	8	27	**4**	**.008015XX**	£37.90	£37.90
8	2	19	–	63	7.7	25	8	27	**4**	**.008020XX**	£37.90	£37.90
10	1	22	–	72	9.5	30	10	32	**4**	**.010010XX**	£46.90	£46.90
10	1.5	22	–	72	9.5	30	10	32	**4**	**.010015XX**	£47.70	£47.70
10	2	22	–	72	9.5	30	10	32	**4**	**.010020XX**	£47.70	£47.70
12	1	26	–	83	11.5	35	12	38	**4**	**.012010XX**	£62.90	£62.90
12	1.5	26	–	83	11.5	35	12	38	**4**	**.012015XX**	£63.70	£63.70
12	2	26	–	83	11.5	35	12	38	**4**	**.012020XX**	£63.70	£63.70
12	3	26	–	83	11.5	35	12	38	**4**	**.012030XX**	£64.40	£64.40
16	1	32	–	92	15.5	40	16	44	**4**	**.016010XX**	£96.00	£96.00
16	1.5	32	–	92	15.5	40	16	44	**4**	**.016015XX**	£96.70	£96.70
16	2	32	–	92	15.5	40	16	44	**4**	**.016020XX**	£96.70	£96.70
16	3	32	–	92	15.5	40	16	44	**4**	**.016030XX**	£97.80	£97.80
20	1.5	38	–	104	19.5	50	20	54	**4**	**.020015XX**	£150.00	£150.00
20	2	38	–	104	19.5	50	20	54	**4**	**.020020XX**	£150.00	£150.00
20	3	38	–	104	19.5	50	20	54	**4**	**.020030XX**	£152.00	£152.00

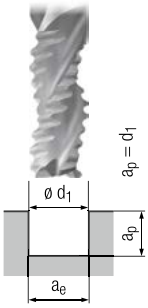
Other corner radii available on request

NSERT UK ENGINEERING CUTTING TOOLS www.nsert-uk.com 0191 5487099

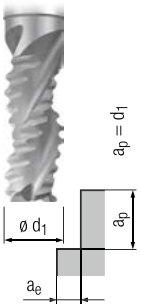
Solid carbide end mills – long design

Valid for
2448
2449

WR



$a_e = d_1$



$a_e = 0.4 \times d_1$

		v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]			MMS MQL	
P	1.1								
	2.1								
	3.1								
	4.1								
	5.1								
M	1.1								
	2.1								
	3.1								
	4.1								
K	1.1								
	1.2								
	2.1								
	2.2								
	3.1								
	3.2								
	4.1								
	4.2								
N	1.1	210	0.009 x d_1	295	0.011 x d_1			□	■
	1.2	300	0.008 x d_1	435	0.010 x d_1			□	■
	1.3	270	0.007 x d_1	385	0.008 x d_1			□	■
	1.4	190	0.008 x d_1	270	0.010 x d_1			□	■
	1.5								
	1.6								
	2.1								
	2.2								
	2.3								
	2.4								
	2.5								
	2.6								
	2.7								
	2.8								
	3.1								
	3.2								
	4.1								
	4.2								
	4.3								
	4.4								
	5.1								
	5.2								
	5.3								
S	1.1								
	1.2								
	1.3								
	2.1								
	2.2								
	2.3								
	2.4								
	2.5								
	2.6								
H	1.1								
	1.2								
	1.3								
	1.4								
	1.5								

■ = very suitable □ = suitable

NSERT UK
ENGINEERING CUTTING TOOLS
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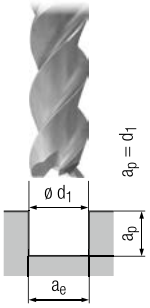
0191 5487099

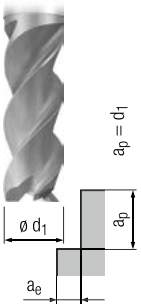
Solid carbide end mills – long design

Valid for
2444
2445
2446
2447

W



$a_e = d_1$



$a_e = 0.4 \times d_1$

		v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]			MMS MQL	
P	1.1								
	2.1								
	3.1								
	4.1								
	5.1								
M	1.1								
	2.1								
	3.1								
	4.1								
K	1.1								
	1.2								
	2.1								
	2.2								
	3.1								
	3.2								
	4.1								
	4.2								
N	1.1	210	0.006 x d_1	295	0.011 x d_1			□	■
	1.2	300	0.005 x d_1	435	0.010 x d_1			□	■
	1.3	270	0.005 x d_1	385	0.008 x d_1			□	■
	1.4	190	0.005 x d_1	270	0.010 x d_1			□	■
	1.5								
	1.6								
	2.1								
	2.2								
	2.3								
	2.4								
	2.5								
	2.6								
	2.7								
	2.8								
	3.1								
	3.2								
	4.1								
	4.2								
	4.3								
	4.4								
	5.1								
	5.2								
	5.3								
S	1.1								
	1.2								
	1.3								
	2.1								
	2.2								
	2.3								
	2.4								
	2.5								
	2.6								
H	1.1								
	1.2								
	1.3								
	1.4								
	1.5								

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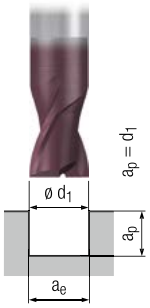
■ = very suitable □ = suitable

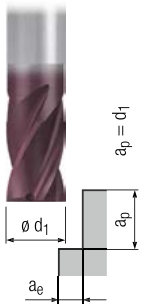
Solid carbide end mills and slot drills – short design

Valid for
1916A
1917A
2510A
2511A
2516A
2517A

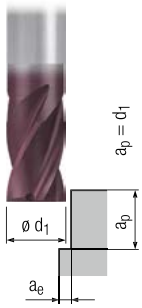
N



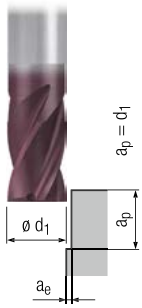
$a_e = d_1$



$a_e = 0.4 \times d_1$



$a_e = 0.2 \times d_1$



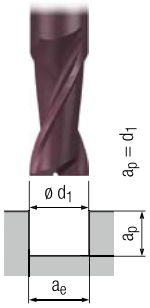
$a_e = 0.02 \times d_1$

		v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]			MMS MQL	
P	1.1	170	0.005 x d_1	190	0.006 x d_1	200	0.007 x d_1	240	0.008 x d_1	□	■	□	■
	2.1	150	0.004 x d_1	170	0.005 x d_1	180	0.006 x d_1	210	0.007 x d_1	□	■	□	■
	3.1	130	0.004 x d_1	140	0.005 x d_1	160	0.005 x d_1	180	0.006 x d_1	□	■	□	■
	4.1	120	0.003 x d_1	130	0.004 x d_1	140	0.004 x d_1	170	0.005 x d_1	□	■		
	5.1	100	0.003 x d_1	110	0.003 x d_1	120	0.004 x d_1	140	0.004 x d_1	□	■		
M	1.1	80	0.003 x d_1	90	0.004 x d_1	100	0.004 x d_1	110	0.005 x d_1			□	■
	2.1	70	0.003 x d_1	80	0.004 x d_1	80	0.004 x d_1	100	0.005 x d_1			□	■
	3.1	50	0.002 x d_1	60	0.003 x d_1	60	0.003 x d_1	70	0.004 x d_1			□	■
	4.1	30	0.002 x d_1	30	0.003 x d_1	40	0.003 x d_1	40	0.004 x d_1			□	■
K	1.1	170	0.005 x d_1	190	0.006 x d_1	200	0.007 x d_1	240	0.008 x d_1	□	■		
	1.2	170	0.005 x d_1	190	0.006 x d_1	200	0.007 x d_1	240	0.008 x d_1	□	■		
	2.1	150	0.004 x d_1	170	0.005 x d_1	180	0.006 x d_1	210	0.006 x d_1	□	■		
	2.2	150	0.004 x d_1	170	0.005 x d_1	180	0.006 x d_1	210	0.006 x d_1	□	■		
	3.1	130	0.004 x d_1	140	0.005 x d_1	160	0.006 x d_1	180	0.006 x d_1	□	■		
	3.2	130	0.004 x d_1	140	0.005 x d_1	160	0.006 x d_1	180	0.006 x d_1	□	■		
	4.1	100	0.003 x d_1	110	0.004 x d_1	120	0.004 x d_1	140	0.005 x d_1	□	■		
	4.2	80	0.003 x d_1	90	0.004 x d_1	100	0.004 x d_1	110	0.005 x d_1	□	■		
N	1.1	500	0.009 x d_1	550	0.011 x d_1	600	0.013 x d_1	700	0.014 x d_1			□	■
	1.2	500	0.008 x d_1	550	0.010 x d_1	600	0.011 x d_1	700	0.013 x d_1			□	■
	1.3	500	0.007 x d_1	550	0.008 x d_1	600	0.010 x d_1	700	0.011 x d_1			□	■
	1.4	340	0.008 x d_1	370	0.010 x d_1	410	0.011 x d_1	480	0.013 x d_1			□	■
	1.5	320	0.007 x d_1	350	0.008 x d_1	380	0.010 x d_1	450	0.011 x d_1			□	■
	1.6	220	0.006 x d_1	240	0.007 x d_1	260	0.008 x d_1	310	0.010 x d_1			□	■
	2.1	150	0.005 x d_1	170	0.006 x d_1	180	0.007 x d_1	210	0.008 x d_1			□	■
	2.2	150	0.005 x d_1	170	0.006 x d_1	180	0.007 x d_1	210	0.008 x d_1			□	■
	2.3	150	0.005 x d_1	170	0.006 x d_1	180	0.007 x d_1	210	0.008 x d_1		□	□	■
	2.4	130	0.004 x d_1	140	0.005 x d_1	160	0.006 x d_1	180	0.006 x d_1			□	■
	2.5	130	0.004 x d_1	140	0.005 x d_1	160	0.006 x d_1	180	0.006 x d_1			□	■
	2.6	130	0.004 x d_1	140	0.005 x d_1	160	0.006 x d_1	180	0.006 x d_1		□	□	■
	2.7	80	0.003 x d_1	90	0.004 x d_1	100	0.004 x d_1	110	0.005 x d_1			□	■
	2.8	80	0.003 x d_1	90	0.004 x d_1	100	0.004 x d_1	110	0.005 x d_1			□	■
	3.1	340	0.009 x d_1	370	0.011 x d_1	410	0.013 x d_1	480	0.014 x d_1			□	■
	3.2	340	0.007 x d_1	370	0.008 x d_1	410	0.010 x d_1	480	0.011 x d_1			□	■
	4.1	340	0.008 x d_1	370	0.009 x d_1	410	0.011 x d_1	480	0.012 x d_1		□	□	■
	4.2	500	0.008 x d_1	550	0.009 x d_1	600	0.011 x d_1	700	0.012 x d_1			□	■
	4.3												
	4.4												
	5.1												
	5.2	80	0.003 x d_1	90	0.004 x d_1	100	0.004 x d_1	110	0.005 x d_1				■
	5.3												
S	1.1	80	0.004 x d_1	90	0.004 x d_1	100	0.005 x d_1	110	0.006 x d_1				■
	1.2	70	0.003 x d_1	80	0.004 x d_1	80	0.004 x d_1	100	0.005 x d_1				■
	1.3	40	0.003 x d_1	40	0.003 x d_1	50	0.004 x d_1	60	0.004 x d_1				■
	2.1	70	0.002 x d_1	80	0.002 x d_1	80	0.003 x d_1	100	0.003 x d_1				■
	2.2	30	0.002 x d_1	30	0.002 x d_1	35	0.003 x d_1	40	0.003 x d_1				■
	2.3	20	0.002 x d_1	25	0.002 x d_1	25	0.003 x d_1	30	0.003 x d_1				■
	2.4	20	0.002 x d_1	25	0.002 x d_1	25	0.003 x d_1	30	0.003 x d_1				■
	2.5	20	0.002 x d_1	20	0.002 x d_1	20	0.003 x d_1	30	0.003 x d_1				■
	2.6	20	0.002 x d_1	20	0.002 x d_1	20	0.003 x d_1	30	0.003 x d_1				■
H	1.1	100	0.003 x d_1	110	0.003 x d_1	120	0.004 x d_1	140	0.004 x d_1	□	■		
	1.2	80	0.003 x d_1	90	0.003 x d_1	100	0.004 x d_1	110	0.004 x d_1	□	■		
	1.3			90	0.003 x d_1	100	0.003 x d_1	110	0.004 x d_1	□	■		
	1.4												
	1.5												

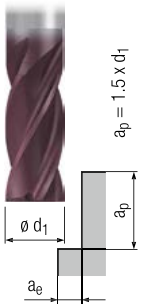
■ = very suitable □ = suitable

Solid carbide end mills – long design

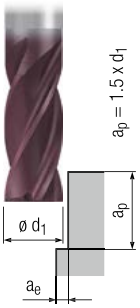
N



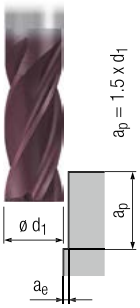
$a_e = d_1$



$a_e = 0.4 \times d_1$



$a_e = 0.2 \times d_1$



$a_e = 0.02 \times d_1$

Valid for

1998A
1999A
2512A
2513A
2518A
2519A
2698A
2699A
2698AZ
2699AZ

		v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]			MMS MQL	
P	1.1	140	0.005 x d_1	150	0.005 x d_1	170	0.006 x d_1	200	0.007 x d_1	□	■	□	■
	2.1	130	0.004 x d_1	140	0.005 x d_1	160	0.005 x d_1	180	0.006 x d_1	□	■	□	■
	3.1	110	0.004 x d_1	120	0.004 x d_1	130	0.005 x d_1	150	0.005 x d_1	□	■	□	■
	4.1	100	0.003 x d_1	110	0.003 x d_1	120	0.004 x d_1	140	0.004 x d_1	□	■		
	5.1	90	0.003 x d_1	100	0.003 x d_1	110	0.003 x d_1	130	0.004 x d_1	□	■		
M	1.1	70	0.003 x d_1	80	0.003 x d_1	80	0.004 x d_1	100	0.004 x d_1			□	■
	2.1	60	0.003 x d_1	70	0.003 x d_1	70	0.004 x d_1	80	0.004 x d_1			□	■
	3.1	40	0.002 x d_1	40	0.003 x d_1	50	0.003 x d_1	60	0.003 x d_1			□	■
	4.1	30	0.002 x d_1	30	0.003 x d_1	40	0.003 x d_1	40	0.003 x d_1			□	■
K	1.1	140	0.005 x d_1	150	0.006 x d_1	170	0.006 x d_1	200	0.007 x d_1	□	■		
	1.2	140	0.005 x d_1	150	0.006 x d_1	170	0.006 x d_1	200	0.007 x d_1	□	■		
	2.1	130	0.004 x d_1	140	0.005 x d_1	160	0.005 x d_1	180	0.006 x d_1	□	■		
	2.2	130	0.004 x d_1	140	0.005 x d_1	160	0.005 x d_1	180	0.006 x d_1	□	■		
	3.1	110	0.004 x d_1	120	0.005 x d_1	130	0.005 x d_1	150	0.006 x d_1	□	■		
	3.2	110	0.004 x d_1	120	0.005 x d_1	130	0.005 x d_1	150	0.006 x d_1	□	■		
	4.1	90	0.003 x d_1	100	0.003 x d_1	110	0.004 x d_1	130	0.004 x d_1	□	■		
	4.2	70	0.003 x d_1	80	0.003 x d_1	80	0.004 x d_1	100	0.004 x d_1	□	■		
N	1.1	430	0.009 x d_1	470	0.010 x d_1	520	0.011 x d_1	600	0.013 x d_1			□	■
	1.2	430	0.008 x d_1	470	0.009 x d_1	520	0.010 x d_1	600	0.011 x d_1			□	■
	1.3	430	0.007 x d_1	470	0.008 x d_1	520	0.009 x d_1	600	0.010 x d_1			□	■
	1.4	290	0.008 x d_1	320	0.009 x d_1	350	0.010 x d_1	410	0.011 x d_1			□	■
	1.5	270	0.007 x d_1	300	0.008 x d_1	320	0.009 x d_1	380	0.010 x d_1			□	■
	1.6	190	0.006 x d_1	210	0.007 x d_1	230	0.008 x d_1	270	0.008 x d_1			□	■
	2.1	130	0.005 x d_1	140	0.006 x d_1	160	0.006 x d_1	180	0.007 x d_1			□	■
	2.2	130	0.005 x d_1	140	0.006 x d_1	160	0.006 x d_1	180	0.007 x d_1			□	■
	2.3	130	0.005 x d_1	140	0.006 x d_1	160	0.006 x d_1	180	0.007 x d_1		□	□	■
	2.4	120	0.004 x d_1	130	0.005 x d_1	140	0.005 x d_1	170	0.006 x d_1			□	■
	2.5	120	0.004 x d_1	130	0.005 x d_1	140	0.005 x d_1	170	0.006 x d_1			□	■
	2.6	120	0.004 x d_1	130	0.005 x d_1	140	0.005 x d_1	170	0.006 x d_1		□	□	■
	2.7	70	0.003 x d_1	80	0.003 x d_1	80	0.004 x d_1	100	0.004 x d_1			□	■
	2.8	70	0.003 x d_1	80	0.003 x d_1	80	0.004 x d_1	100	0.004 x d_1			□	■
	3.1	290	0.009 x d_1	320	0.010 x d_1	350	0.011 x d_1	410	0.013 x d_1			□	■
	3.2	290	0.007 x d_1	320	0.008 x d_1	350	0.009 x d_1	410	0.010 x d_1			□	■
	4.1	290	0.008 x d_1	320	0.009 x d_1	350	0.009 x d_1	410	0.011 x d_1		□	□	■
	4.2	430	0.008 x d_1	470	0.009 x d_1	520	0.009 x d_1	600	0.011 x d_1			□	■
	4.3												
	4.4												
	5.1												
	5.2	70	0.003 x d_1	80	0.003 x d_1	80	0.004 x d_1	100	0.004 x d_1				■
	5.3												
S	1.1	70	0.004 x d_1	80	0.004 x d_1	80	0.004 x d_1	100	0.005 x d_1				■
	1.2	60	0.003 x d_1	70	0.003 x d_1	70	0.004 x d_1	80	0.004 x d_1				■
	1.3	40	0.003 x d_1	40	0.003 x d_1	50	0.003 x d_1	60	0.004 x d_1				■
	2.1	60	0.002 x d_1	70	0.002 x d_1	70	0.003 x d_1	80	0.003 x d_1				■
	2.2	20	0.002 x d_1	20	0.002 x d_1	15	0.003 x d_1	30	0.003 x d_1				■
	2.3	20	0.002 x d_1	25	0.002 x d_1	25	0.003 x d_1	30	0.003 x d_1				■
	2.4	20	0.002 x d_1	25	0.002 x d_1	25	0.003 x d_1	30	0.003 x d_1				■
	2.5	20	0.002 x d_1	20	0.002 x d_1	20	0.003 x d_1	30	0.003 x d_1				■
	2.6	20	0.002 x d_1	20	0.002 x d_1	20	0.003 x d_1	30	0.003 x d_1				■
H	1.1	90	0.003 x d_1	100	0.003 x d_1	110	0.003 x d_1	130	0.004 x d_1	□	■		
	1.2	70	0.003 x d_1	80	0.003 x d_1	80	0.003 x d_1	100	0.004 x d_1	□	■		
	1.3			70	0.003 x d_1	70	0.003 x d_1	80	0.003 x d_1	□	■		
	1.4												
	1.5												

■ = very suitable □ = suitable

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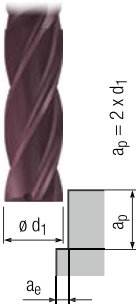
Solid carbide end mills – extra long design

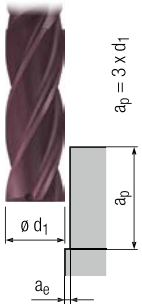
N

Valid for
2514A
2515A
2526A
2527A

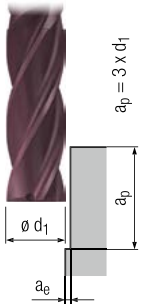


$a_e = 0.1 \times d_1$

$a_e = 0.02 \times d_1$



$a_e = 0.02 \times d_1$



$a_e = 0.01 \times d_1$

		v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]	v_c [m/min]	f_z [mm]			MMS MQL	
P	1.1	120	0.005 x d_1	140	0.006 x d_1	130	0.006 x d_1	140	0.006 x d_1	□	■	□	■
	2.1	110	0.004 x d_1	130	0.005 x d_1	120	0.005 x d_1	130	0.005 x d_1	□	■	□	■
	3.1	90	0.004 x d_1	110	0.005 x d_1	100	0.005 x d_1	110	0.005 x d_1	□	■	□	■
	4.1	80	0.003 x d_1	100	0.004 x d_1	90	0.004 x d_1	100	0.004 x d_1	□	■		
	5.1	70	0.003 x d_1	80	0.003 x d_1	80	0.003 x d_1	80	0.003 x d_1	□	■		
M	1.1	60	0.003 x d_1	70	0.004 x d_1	70	0.004 x d_1	70	0.004 x d_1			□	■
	2.1	50	0.003 x d_1	60	0.004 x d_1	60	0.004 x d_1	60	0.004 x d_1			□	■
	3.1	40	0.002 x d_1	50	0.003 x d_1	40	0.003 x d_1	50	0.003 x d_1			□	■
	4.1	20	0.002 x d_1	20	0.003 x d_1	20	0.003 x d_1	20	0.003 x d_1			□	■
K	1.1	120	0.005 x d_1	140	0.006 x d_1	130	0.006 x d_1	140	0.006 x d_1	□	■		
	1.2	120	0.005 x d_1	140	0.006 x d_1	130	0.006 x d_1	140	0.006 x d_1	□	■		
	2.1	110	0.004 x d_1	130	0.005 x d_1	120	0.005 x d_1	130	0.005 x d_1	□	■		
	2.2	110	0.004 x d_1	130	0.005 x d_1	120	0.005 x d_1	130	0.005 x d_1	□	■		
	3.1	90	0.004 x d_1	110	0.005 x d_1	100	0.005 x d_1	110	0.005 x d_1	□	■		
	3.2	90	0.004 x d_1	110	0.005 x d_1	100	0.005 x d_1	110	0.005 x d_1	□	■		
	4.1	70	0.003 x d_1	80	0.004 x d_1	80	0.004 x d_1	80	0.004 x d_1	□	■		
	4.2	60	0.003 x d_1	70	0.004 x d_1	70	0.004 x d_1	70	0.004 x d_1	□	■		
N	1.1	360	0.009 x d_1	430	0.011 x d_1	400	0.011 x d_1	430	0.011 x d_1			□	■
	1.2	360	0.008 x d_1	430	0.010 x d_1	400	0.010 x d_1	430	0.010 x d_1			□	■
	1.3	360	0.007 x d_1	430	0.008 x d_1	400	0.008 x d_1	430	0.008 x d_1			□	■
	1.4	240	0.008 x d_1	290	0.010 x d_1	260	0.010 x d_1	290	0.010 x d_1			□	■
	1.5	230	0.007 x d_1	280	0.008 x d_1	250	0.008 x d_1	280	0.008 x d_1			□	■
	1.6	160	0.006 x d_1	190	0.007 x d_1	180	0.007 x d_1	190	0.007 x d_1			□	■
	2.1	110	0.005 x d_1	130	0.006 x d_1	120	0.006 x d_1	130	0.006 x d_1			□	■
	2.2	110	0.005 x d_1	130	0.006 x d_1	120	0.006 x d_1	130	0.006 x d_1			□	■
	2.3	110	0.005 x d_1	130	0.006 x d_1	120	0.006 x d_1	130	0.006 x d_1		□	□	■
	2.4	100	0.004 x d_1	120	0.005 x d_1	110	0.005 x d_1	120	0.005 x d_1			□	■
	2.5	100	0.004 x d_1	120	0.005 x d_1	110	0.005 x d_1	120	0.005 x d_1			□	■
	2.6	100	0.004 x d_1	120	0.005 x d_1	110	0.005 x d_1	120	0.005 x d_1		□	□	■
	2.7	60	0.003 x d_1	70	0.004 x d_1	70	0.004 x d_1	70	0.004 x d_1			□	■
	2.8	60	0.003 x d_1	70	0.004 x d_1	70	0.004 x d_1	70	0.004 x d_1			□	■
	3.1	240	0.009 x d_1	290	0.011 x d_1	260	0.011 x d_1	290	0.011 x d_1			□	■
	3.2	240	0.007 x d_1	290	0.008 x d_1	260	0.008 x d_1	290	0.008 x d_1			□	■
	4.1	240	0.008 x d_1	290	0.009 x d_1	260	0.009 x d_1	290	0.009 x d_1		□	□	■
	4.2	360	0.008 x d_1	430	0.009 x d_1	400	0.009 x d_1	430	0.009 x d_1			□	■
	4.3												
	4.4												
	5.1												
	5.2	60	0.003 x d_1	70	0.004 x d_1	70	0.004 x d_1	70	0.004 x d_1				■
	5.3												
S	1.1	60	0.004 x d_1	70	0.004 x d_1	70	0.004 x d_1	70	0.004 x d_1				■
	1.2	50	0.003 x d_1	60	0.004 x d_1	60	0.004 x d_1	60	0.004 x d_1				■
	1.3	30	0.003 x d_1	40	0.003 x d_1	30	0.003 x d_1	40	0.003 x d_1				■
	2.1	50	0.002 x d_1	60	0.002 x d_1	60	0.002 x d_1	60	0.002 x d_1				■
	2.2	20	0.002 x d_1	20	0.002 x d_1	15	0.002 x d_1	20	0.002 x d_1				■
	2.3	10	0.002 x d_1	15	0.002 x d_1	15	0.002 x d_1	10	0.002 x d_1				■
	2.4	10	0.002 x d_1	15	0.002 x d_1	15	0.002 x d_1	10	0.002 x d_1				■
	2.5	10	0.002 x d_1	10	0.002 x d_1	10	0.002 x d_1	10	0.002 x d_1				■
	2.6	10	0.002 x d_1	10	0.002 x d_1	10	0.002 x d_1	10	0.002 x d_1				■
H	1.1	70	0.003 x d_1	80	0.003 x d_1	80	0.003 x d_1	80	0.003 x d_1	□	■		
	1.2	60	0.003 x d_1	70	0.003 x d_1	70	0.003 x d_1	70	0.003 x d_1	□	■		
	1.3												
	1.4												
	1.5												

■ = very suitable □ = suitable

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