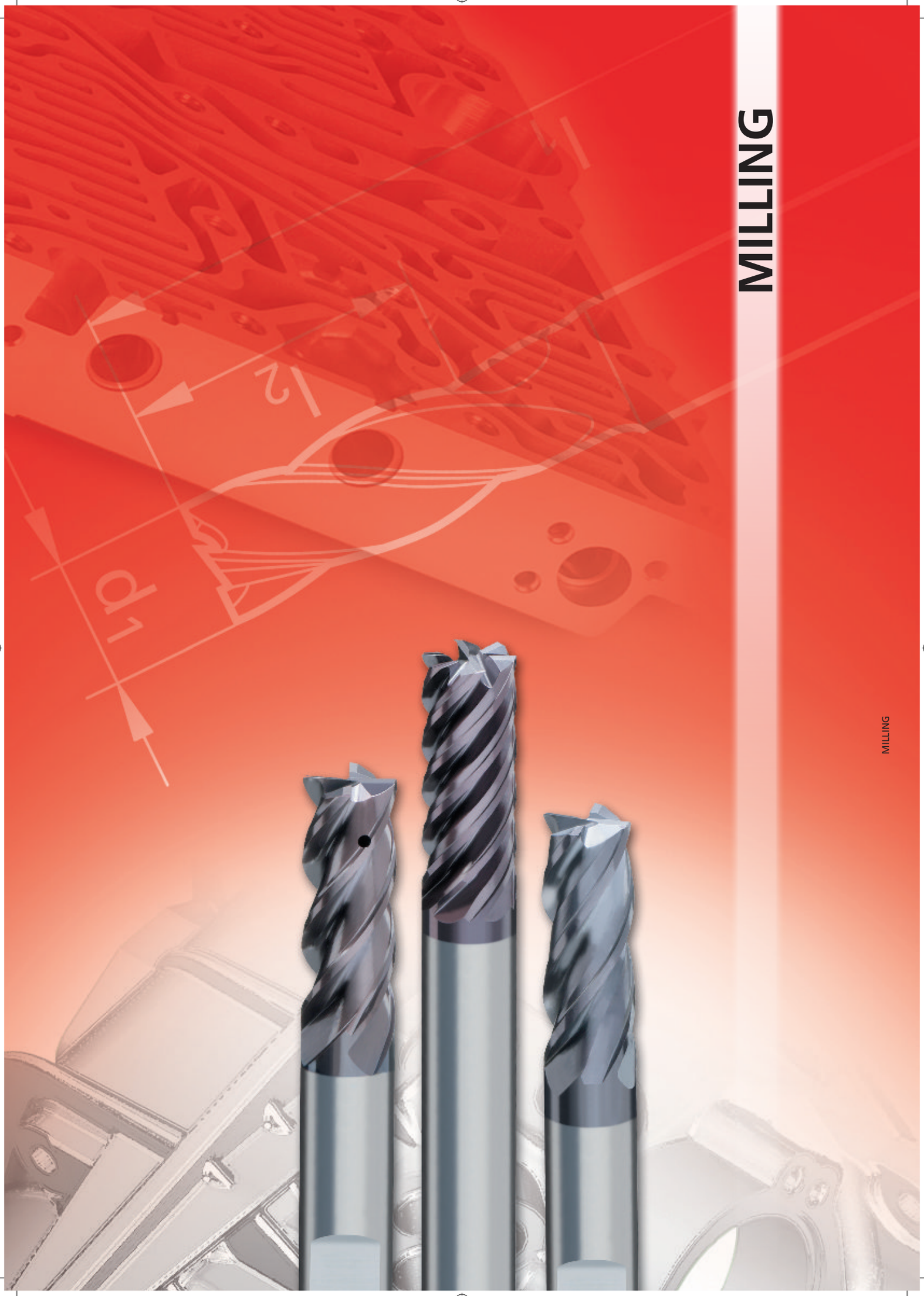
MILLING



Solid carbide milling cutters

Type	Shank	Flute form	Tool material	Surface	Standard	d1	Catalogue no.	Discount group	Page
End Mills, type F-UT N									
									
F-UT N	HB	35°/38°	Solid carbide	FIRE	DIN 6527 K	6,000 - 20,000	**64550**	106	564
									
F-UT N	HA	35°/38°	Solid carbide	FIRE	DIN 6527 L	4,000 - 20,000	**54551**	106	564
									
F-UT N	HB	35°/38°	Solid carbide	FIRE	DIN 6527 L	4,000 - 20,000	**64551**	106	564
									
F-UT N	HA	35°/38°	Solid carbide	FIRE	Stock std.	10,000 - 25,000	**54552**	106	565
End Mills, type F-UT Al									
									
F-UT AL	HA	40°/42°	Solid carbide	bright	DIN 6527 L	4,000 - 20,000	**74554**	106	569
									
F-UT AL	HB	40°/42°	Solid carbide	bright	DIN 6527 L	4,000 - 20,000	**74555**	106	569
Finishing End Mills, type F-UT FS									
									
F-UT FS	HA	44°/45°/46°	Solid carbide	FIRE	DIN 6527 L	8,000 - 20,000	**64558**	106	571
									
F-UT FS	HB	44°/45°/46°	Solid carbide	FIRE	DIN 6527 L	8,000 - 20,000	**64559**	106	271
End Mills, type F-UT VA									
									
F-UT VA	HA	40°/42°	Solid carbide	FIRE	DIN 6527 L	4,000 - 20,000	**54556**	106	573
									
F-UT VA	HB	40°/42°	Solid carbide	FIRE	DIN 6527 L	4,000 - 20,000	**64557**	106	573

Solid carbide milling cutters

Type	Shank	Flute form	Tool material	Surface	Standard	d1	Catalogue no.	Discount group	Page
End Mills, type F-UT VA									
									
F-UT VA	HB	40°/42°	Solid carbide	FIRE	DIN 6527 L	6,000 - 20,000	**64567**	106	573
Slot drills, 2-fluted									
									
N	HB	30°	Solid carbide	bright	DIN 6527 K	2,000 - 20,000	**74520**	117	575
									
N	HB	30°	Solid carbide	FIRE	DIN 6527 K	2,000 - 20,000	**54520**	117	575
									
N	HA	30°	Solid carbide	FIRE	DIN 6527 L	2,000 - 20,000	**54519**	117	577
									
N	HB	30°	Solid carbide	bright	DIN 6527 L	2,000 - 20,000	**74521**	117	579
									
N	HB	30°	Solid carbide	FIRE	DIN 6527 L	2,000 - 20,000	**54521**	117	579
									
N	cyl.	30°	Solid carbide	bright	Stock std.	3,000 - 20,000	**74404**	117	581
									
N	cyl.	30°	Solid carbide	FIRE	Stock std.	3,000 - 20,000	**54404**	117	581
Slot drills, 3-fluted									
									
N	HB	30°	Solid carbide	bright	DIN 6527 K	2,000 - 20,000	**74522**	117	583
									
N	HB	30°	Solid carbide	FIRE	DIN 6527 K	2,000 - 20,000	**64522**	117	583
									
N	HA	30°	Solid carbide	FIRE	DIN 6527 L	2,000 - 20,000	**54523**	117	585

Solid carbide milling cutters

Type	Shank	Flute form	Tool material	Surface	Standard	d1	Catalogue no.	Discount group	Page
Slot drills, 3-fluted									
									
N	HB	30°	Solid carbide	bright	DIN 6527 L	2,000 - 20,000	**74523**	117	585
									
N	HB	30°	Solid carbide	FIRE	DIN 6527 L	2,000 - 20,000	**64523**	117	585
									
N	cyl.	30°	Solid carbide	bright	Stock std.	3,000 - 20,000	**74424**	117	587
									
N	cyl.	30°	Solid carbide	FIRE	Stock std.	3,000 - 20,000	**54424**	117	587
									
W	HA	45°	Solid carbide	bright	Stock std.	6,000 - 20,000	**74479**	106	589
Micro Slot drills, 3-fluted									
									
N	Ø<2 HA/HB	30°	Solid carbide	FIRE	Stock std.	0,300 - 20,000	**64080**	117	591
									
NH	Ø<2 HA/HB	45°	Solid carbide	FIRE	Stock std.	1,000 - 10,000	**64180**	106	591
Slot drills type W, 2-fluted									
									
W	HB	45°	Solid carbide	bright	DIN 6527 K	4,000 - 20,000	**74204**	117	594
									
W	HB	45°	Solid carbide	bright	DIN 6527 L	3,000 - 20,000	**74202**	117	594
									
W	cyl.	45°	Solid carbide	bright	Stock std.	5,000 - 16,000	**74206**	117	594

Solid carbide milling cutters

Type	Shank	Flute form	Tool material	Surface	Standard	d1	Catalogue no.	Discount group	Page
Slot drills NH, 3-fluted									
									
NH	HB	45°	Solid carbide	FIRE	DIN 6527 K	3,000 - 20,000	**64570**	106	598
									
NH	HA	45°	Solid carbide	bright	DIN 6527 L	3,000 - 20,000	**74478**	106	600
									
NH	HA	45°	Solid carbide	FIRE	DIN 6527 L	1,000 - 20,000	**64478**	106	600
									
NH	HB	45°	Solid carbide	bright	DIN 6527 L	3,000 - 20,000	**74471**	106	602
									
NH	HB	45°	Solid carbide	FIRE	DIN 6527 L	3,500 - 20,000	**64571**	106	602
End mills, 4-fluted									
									
N	HA	30°	Solid carbide	FIRE	DIN 6527 L	2,000 - 20,000	**54524**	117	604
									
N	HB	30°	Solid carbide	bright	DIN 6527 L	2,000 - 20,000	**74525**	117	604
									
N	HB	30°	Solid carbide	FIRE	DIN 6527 L	2,000 - 20,000	**64525**	117	604
									
N	cyl.	30°	Solid carbide	FIRE	Stock std.	3,000 - 20,000	**54444**	117	606
End mills with corner radius									
									
N	HA	30°	Solid carbide	FIRE	DIN 6527 L	6,000 - 16,000	**54522**	106	608
									
N	HA	30°	Solid carbide	FIRE	DIN 6527 L	6,000 - 20,000	**54526**	106	608

Solid carbide milling cutters

Type	Shank	Flute form	Tool material	Surface	Standard	d1	Catalogue no.	Discount group	Page
End mills with corner radius									
									
N	HA	45°	Solid carbide	FIRE	DIN 6527 L	6,000 - 20,000	**54206**	106	608
Finishing End Mills, multiple fluted									
									
NH	HA	45°	Solid carbide	FIRE	Stock std.	3,000 - 20,000	**54205**	106	612
									
NH	HB	45°	Solid carbide	FIRE	Stock std.	6,000 - 20,000	**54201**	106	612
									
H	HA	55°	Solid carbide	FIRE	Stock std.	3,000 - 20,000	**54207**	106	614
									
NH	HA	45°	Solid carbide	FIRE	Stock std.	6,000 - 20,000	**54225**	106	616
									
NH	HB	45°	Solid carbide	FIRE	Stock std.	6,000 - 20,000	**54221**	106	616
									
H	HA	55°	Solid carbide	FIRE	Stock std.	6,000 - 20,000	**54227**	106	618
Roughing end mills									
									
NF	HB	30°	Solid carbide	FIRE	DIN 6527 L	6,000 - 25,000	**54496**	106	620
									
NF	HB	45°	Solid carbide	FIRE	DIN 6527 L	6,000 - 25,000	**54497**	106	620
									
WR	HB	30°	Solid carbide	bright	DIN 6527 L	6,000 - 20,000	**74203**	106	623
									
WR	HB	30°	Solid carbide	bright	DIN 6527 L	6,000 - 20,000	**74303**	106	623

Solid carbide milling cutters

Type	Shank	Flute form	Tool material	Surface	Standard	d1	Catalogue no.	Discount group	Page
Roughing end mills									
									
NRf	HB	30°	Solid carbide	FIRE	DIN 6527 L	6,000 - 20,000	**64495**	106	625
									
NRf	HB	30°	Solid carbide	FIRE	DIN 6527 L	6,000 - 20,000	**64595**	106	625
									
HR	HB	20°	Solid carbide	FIRE	DIN 6527 L	6,000 - 20,000	**64497**	106	628
Ball nose end mills									
									
N	HA	30°	Solid carbide	bright	DIN 6527 L	3,000 - 20,000	**74543**	106	630
									
N	HA	30°	Solid carbide	FIRE	DIN 6527 L	0,500 - 20,000	**54541**	106	630
									
N	HB	30°	Solid carbide	FIRE	DIN 6527 L	0,500 - 20,000	**64542**	106	630
									
N	cyl.	30°	Solid carbide	bright	Stock std.	3,000 - 12,000	**74545**	106	632
									
N	cyl.	30°	Solid carbide	FIRE	Stock std.	3,000 - 12,000	**64545**	106	632
									
N	cyl.	30°	Solid carbide	bright	DIN 6528	4,000 - 20,000	**74531**	106	634
									
N	cyl.	30°	Solid carbide	FIRE	DIN 6528	4,000 - 20,000	**54531**	106	634
									
N	HB	30°	Solid carbide	FIRE	DIN 6527 L	3,000 - 20,000	**64532**	106	636
									
N	cyl.	30°	Solid carbide	FIRE	Stock std.	3,000 - 12,000	**64535**	106	638

Solid carbide milling cutters

Type	Shank	Flute form	Tool material	Surface	Standard	d1	Catalogue no.	Discount group	Page
Trace End Mills with Torus form									
									
H	HA	30°	Solid carbide	FIRE	Stock std.	3,000 - 16,000	**54304**	106	640
									
H	HA	30°	Solid carbide	FIRE	Stock std.	6,000 - 16,000	**54305**	106	640
									
N	cyl.	30°	Solid carbide	TiAlN	Stock std.	2,000 - 12,000	**54302**	106	643
									
N	cyl.	30°	Solid carbide	TiAlN	Stock std.	2,000 - 12,000	**54303**	106	643
Trace End Mills with Ball Nose									
									
H	HA	30°	Solid carbide	FIRE	Stock std.	0,500 - 16,000	**54306**	106	646
									
H	HA	30°	Solid carbide	FIRE	Stock std.	3,000 - 16,000	**54307**	106	646
									
N	cyl.	30°	Solid carbide	TiAlN	Stock std.	2,000 - 12,000	**54300**	106	649
									
N	cyl.	30°	Solid carbide	TiAlN	Stock std.	2,000 - 12,000	**54301**	106	649

High speed steel milling cutters

Type	Shank	Flute form	Tool material	Surface	Standard	d1	Catalogue no.	Discount group	Page
Slot drills, 2-fluted									
									
N	B	30°	M42	bright	DIN 327 D	1,000 - 20,000	**74231**	112	652
									
N	B	30°	M42	FIRE	DIN 327 D	1,000 - 20,000	**64640**	112	652
									
N	B	30°	M42	bright	DIN 844 K	3,000 - 20,000	**74243**	112	654
									
N	B	30°	M42	FIRE	DIN 844 K	3,000 - 20,000	**64670**	112	654
									
N	B	30°	M42	bright	DIN 844 L	3,000 - 20,000	**74244**	112	656
									
N	B	30°	M42	FIRE	DIN 844 L	4,000 - 20,000	**64671**	112	656
Micro Slot drills, 3-fluted									
									
N	B	30°	M42	bright	Stock std.	3,000 - 10,000	**74080**	112	658
									
N	B	30°	M42	FIRE	Stock std.	3,000 - 10,000	**54080**	112	658
									
N	B	30°	M42	bright	Stock std.	3,000 - 10,000	**74180**	112	660
									
N	B	30°	M42	FIRE	Stock std.	3,000 - 10,000	**54180**	112	660
Slot drills, 3-fluted									
									
N	B	30°	M42	bright	DIN 327 D	2,800 - 25,000	**74280**	112	662

High speed steel milling cutters

Type	Shank	Flute form	Tool material	Surface	Standard	d1	Catalogue no.	Discount group	Page
Slot drills, 3-fluted									
									
N	B	30°	M42	FIRE	DIN 327 D	2,800 - 25,000	**64604**	112	662
									
N	B	30°	M42	bright	DIN 844 K	4,000 - 20,000	**74282**	112	664
									
N	B	30°	M42	FIRE	DIN 844 K	3,000 - 20,000	**64641**	112	664
									
N	B	30°	M42	FIRE	DIN 844 L	4,000 - 20,000	**54294**	112	664
End mills, multiple fluted									
									
N	B	30°	M42	bright	DIN 844 K	3,000 - 25,000	**74617**	112	667
									
N	B	30°	M42	FIRE	DIN 844 K	3,000 - 25,000	**64667**	112	667
									
N	B	30°	M42	bright	DIN 844 L	3,000 - 32,000	**74847**	112	669
									
N	B	30°	M42	FIRE	DIN 844 L	3,000 - 32,000	**54847**	112	669
									
N	B	30°	M42	bright	Stock std.	6,000 - 20,000	**74800**	112	671
Ball nose end mills, 2-fluted									
									
N	B	30°	M42	FIRE	DIN 327 D	2,000 - 20,000	**54275**	112	673
									
N	B	30°	M42	bright	Stock std.	3,000 - 20,000	**74276**	112	673

High speed steel milling cutters

Type	Shank	Flute form	Tool material	Surface	Standard	d1	Catalogue no.	Discount group	Page
Ball nose end mills, 2-fluted									
									
N	B	30°	M42	FIRE	Stock std.	3,000 - 20,000	**54276**	112	673
Roughing and Finishing End Mills, 4-fluted									
									
NF	B	30°	M42	bright	DIN 844 K	6,000 - 25,000	**74815**	112	676
									
NF	B	30°	M42	FIRE	DIN 844 K	6,000 - 25,000	**54815**	112	676
									
NF	B	30°	M42	bright	DIN 844 L	6,000 - 25,000	**74835**	112	678
									
NF	B	30°	M42	FIRE	DIN 844 L	6,000 - 20,000	**54835**	112	678
Roughing end mills									
									
NRf	B	30°	HSS-E-PM	bright	DIN 844 K	6,000 - 20,000	**74825**	112	680
									
NRf	B	30°	HSS-E-PM	FIRE	DIN 844 K	6,000 - 20,000	**54825**	112	680
									
NR	B	30°	M42	bright	DIN 844 K	6,000 - 25,000	**74816**	112	682
									
NR	B	30°	M42	FIRE	DIN 844 K	6,000 - 20,000	**54816**	112	682
									
NRf	B	30°	HSS-E-PM	bright	DIN 844 K	6,000 - 25,000	**74845**	112	684
									
NRf	B	30°	HSS-E-PM	FIRE	DIN 844 K	6,000 - 25,000	**54845**	112	684

High speed steel milling cutters

Type	Shank	Flute form	Tool material	Surface	Standard	d1	Catalogue no.	Discount group	Page

Roughing end mills

									
NR	B	30°	M42	bright	DIN 844 L	6,000 - 25,000	**74836**	112	686
									
NR	B	30°	M42	FIRE	DIN 844 L	6,000 - 25,000	**54836**	112	686

STOCK

Die and Mould Industry

Chip – by Chip – to the Top

Application recommendations for End mills, type F-UT

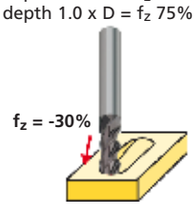
Feed column													
Code-letter		K	L	M	N	O	P	Q	R	S	T	U	Feed f (mm/tooth)
tool-Ø mm	**4.00**	0.011	0.015	0.015	0.016	0.020	0.021	0.020	0.024	0.026	0.028	0.034	
	6.00	0.017	0.024	0.025	0.027	0.031	0.029	0.033	0.039	0.039	0.041	0.047	
	8.00	0.024	0.032	0.032	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.064	
	10.00	0.030	0.038	0.039	0.044	0.050	0.053	0.059	0.065	0.066	0.073	0.080	
	12.50	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.085	0.090	0.100	
	16.00	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.120	
	20.00	0.057	0.066	0.073	0.080	0.090	0.097	0.100	0.110	0.120	0.130	0.140	

For milling cutters with centre cutting, 30% of the stated feed rates apply when plunge feeding: fza = 0.3 x fz

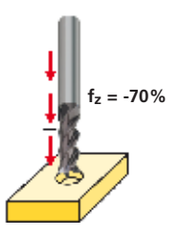
Feed rate codes in bold are the preferred choice for the respective material group.

The new european-wide definitions according to DIN EN for steel and cast are applied for our material examples.

Oblique plunging and slot milling
For oblique plunging the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for drilling depths in excess of 1 x D. This also applies to the transition to radial machining.
slot milling
a_p = cut. depth 0.5 x D = f_z 100%
a_p = cut. depth 1.0 x D = f_z 75%



Drilling
For drilling the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for larger drilling depths in excess of 0.5 x D.



Lubricants:
cutting oil, highly activated ■
soluble oil (emulsion) ■
air only [!]

Material group	Materials examples, **new designations** (old designation in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm^2)	Hard-ness	Coolant
General purpose steels	**1.0035** S185(St33),**1.0486** P275N(StE285),**1.0345** P235GH(H1),**1.0425** P265GH(H2) **1.0050** E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤500 >500-850		■
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36) **1.0727** 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤850 850-1000		■
Unalloyed tempering steels	**1.0402** C22, **1.1178** C30E (Ck30) **1.0503** C45, **1.1191** C45E (Ck45) **1.0601** C60, **1.1221** C60E (Ck60)	≤ 700 700-850 850-1000		■
Alloyed tempering steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4 **1.5710** 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	850-≤1000 1000-1200		■
Unalloyed case hardened steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤750		■
Alloyed case hardened steels	**1.7043** 38Cr4 **1.5752** 15NiCr13 (15NiCr13), **1.7131** 16MnCr5, **1.7264** 20CrMo5	850-≤1000 1000-1200		■
Nitriding steels	**1.8504** 34CrAl6 **1.8519** 31CrMoV9, **1.8550** 34CrAlNi7	≥850-≤1000 >1000-1200		■ ■
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9 **1.2080** X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤850 >850-1000		■ ■
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≥650-1000		■
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤330 HB	■
Stainless steels, sulphured austenitic martensitic	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9 **1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A) **1.4057** X20CrNi 17 2 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤850 ≤850 ≤850		■
Hardened steels	–		≤40-48 HRC >48-60 HRC	■
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		■
Cast iron	**0.6010** EN-GJL-100(GG10), **0.6020** EN-GJL-200(GG20) **0.6025** EN-GJL-250(GG25), **0.6035** EN-GJL-350(GG35)		≤240 HB <300 HB	■ [!]
Spheroidal graphit iron and maleable cast iron	**0.7050** EN-GJS-500-7(GGG50), **0.8035** EN-GJMW-350-4(GTW35) **0.7070** EN-GJS-700-2(GGG70), **0.8170** EN-GJMB-700-2(GTS70)		≤240 HB <300 HB	■
Chilled cast iron	–		≤350 HB	■
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2 **3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 >850-1200		■
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		■
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤450		■
Al cast alloys ≤ 10 % Si > 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9 **3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		■
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤450		[!]
Copper, low alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤400		■
Brass, short-chipping long-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2 **2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600 ≤600		■
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn **2.0790** CuNi18Zn19Pb	≤600 >600-850		■ ■ ■
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10 **2.0980** CuAl11Ni, **2.1247** CuBe2	≤850 >850-1000		■
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren		–	[!]
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon		–	■ [!]
Kevlar Glass/carbon-concentr. plastics	Kevlar GFK/CFK		– –	[!]

Slot drilling

Finishing

Catalogue no.	74555	74554	64550	64551 54551	64567	64557 54556	64558	64559
Tool mat.	Carbide		Carbide		Carbide		Carbide	
Std.	6527 L		6527 K	6527 L	6527 L		6527 L	
Type	F-UT AL		F-UT N		F-UT VA-IK	F-UT VA	F-UT FS	
Page	569	569	566	567	573	573	571	571
								
v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	
		190 *175*	T S	*190* *175*	**T** **S**	*350* *275*	**Q** **P**
		190 *140*	S **R**	*190* *140*	**S** R	*275* *265*	**P** **O**
		190 *175* *140*	S S **R**	*190* *175* *140*	**S** **S** R	*300* *275* *265*	**Q** **P** **O**
		175 *140*	**R** **Q**	*175* *140*	R Q	*265* *230*	**O** **N**
		210	S	*210*	**S**	*350*	**Q**
		175 *125*	**S** **R**	*175* *125*	S R	*265* *230*	**O** **O**
		190 *175*	**S** **Q**	*190* *175*	S Q	*265* *230*	**O** **N**
		175 *140*	S **Q**	*175* *140*	**S** Q	*275* *265*	**O** **N**
		105	**R**	*105*	R	*155*	**N**
		105	**Q**			*155*	**N**
		90 *75* *70*	R Q **R**	*90* *75* *70*	**R** **Q** R	*190* *155* *155*	**O** **N** **O**
		50	**O**			*60*	**O**
		65	**Q**	*65*	Q	*110*	**M**
		245 *230*	S **R**			*280* *260*	**S** **R**
		200 *175*	S **R**			*230* *200*	**S** **R**
		120	**P**			*110*	**N**
		70 *60*	M **L**	*70*	**M**	*130* *100*	**N** **M**
520	**S**					*1080*	**S**
630	**S**					*1320*	**S**
250 *200*	**Q** **R**			*450* *350*	R S	*500* *400*	**Q** **R**
300	**S**					*500*	**S**
135	**R**			*240*	S	*260*	**S**
130 *105*	**Q** **Q**			*225* *180*	**T** R	*250* *200*	**Q** **Q**
125 *100*	**Q** **P**			*220* *220*	**T** **S**	*250* *200*	**Q** **P**
100 *80*	**P** **O**			*170* *140*	Q P	*200* *170*	**P** **O**
135 *125*	**O** **O**					*275* *200*	**M** **M**
						230 *230*	**M** **L**

Application recommendations for End mills, type F-UT

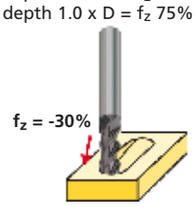
Feed column													
Code-letter		K	L	M	N	O	P	Q	R	S	T	U	Feed f (mm/tooth)
tool-Ø mm	**4.00**	0.011	0.015	0.015	0.016	0.020	0.021	0.020	0.024	0.026	0.028	0.034	
	6.00	0.017	0.024	0.025	0.027	0.031	0.029	0.033	0.039	0.039	0.041	0.047	
	8.00	0.024	0.032	0.032	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.064	
	10.00	0.030	0.038	0.039	0.044	0.050	0.053	0.059	0.065	0.066	0.073	0.080	
	12.50	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.085	0.090	0.100	
	16.00	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.120	
	20.00	0.057	0.066	0.073	0.080	0.090	0.097	0.100	0.110	0.120	0.130	0.140	

For milling cutters with centre cutting, 30% of the stated feed rates apply when plunge feeding: fza = 0.3 x fz

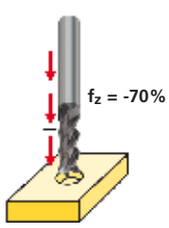
Feed rate codes in bold are the preferred choice for the respective material group.

The new european-wide definitions according to DIN EN for steel and cast are applied for our material examples.

Oblique plunging and slot milling
For oblique plunging the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for drilling depths in excess of 1 x D. This also applies to the transition to radial machining.
slot milling
a_p = cut. depth 0.5 x D = f_z 100%
a_p = cut. depth 1.0 x D = f_z 75%



Drilling
For drilling the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for larger drilling depths in excess of 0.5 x D.

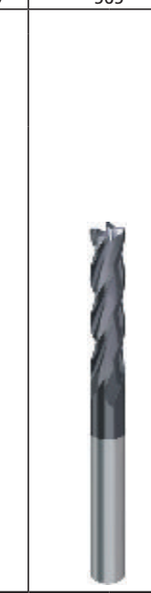


Lubricants:
cutting oil, highly activated ■
soluble oil (emulsion) ■
air only !

Material group	Materials examples, **new designations** (old designation in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm^2)	Hard-ness	Coolant
General purpose steels	**1.0035** S185(St33),**1.0486** P275N(StE285),**1.0345** P235GH(H1),**1.0425** P265GH(H2) **1.0050** E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤500 >500-850		■
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36) **1.0727** 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤850 850-1000		■
Unalloyed tempering steels	**1.0402** C22, **1.1178** C30E (Ck30) **1.0503** C45, **1.1191** C45E (Ck45) **1.0601** C60, **1.1221** C60E (Ck60)	≤ 700 700-850 850-1000		■
Alloyed tempering steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4 **1.5710** 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	850-≤1000 1000-1200		■
Unalloyed case hardened steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤750		■
Alloyed case hardened steels	**1.7043** 38Cr4 **1.5752** 15NiCr13 (15NiCr13), **1.7131** 16MnCr5, **1.7264** 20CrMo5	850-≤1000 1000-1200		■
Nitriding steels	**1.8504** 34CrAl6 **1.8519** 31CrMoV9, **1.8550** 34CrAlNi7	≥850-≤1000 >1000-1200		■ ■
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9 **1.2080** X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤850 >850-1000		■ ■
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≥650-1000		■
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤330 HB	■
Stainless steels, sulphured austenitic martensitic	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9 **1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A) **1.4057** X20CrNi 17 2 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤850 ≤850 ≤850		■
Hardened steels	–		≤40-48 HRC >48-60 HRC	■
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		■
Cast iron	**0.6010** EN-GJL-100(GG10), **0.6020** EN-GJL-200(GG20) **0.6025** EN-GJL-250(GG25), **0.6035** EN-GJL-350(GG35)		≤240 HB <300 HB	■ ! ■ !
Spheroidal graphit iron and maleable cast iron	**0.7050** EN-GJS-500-7(GGG50), **0.8035** EN-GJMW-350-4(GTW35) **0.7070** EN-GJS-700-2(GGG70), **0.8170** EN-GJMB-700-2(GTS70)		≤240 HB <300 HB	■ ■
Chilled cast iron	–		≤350 HB	■
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2 **3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 >850-1200		■ ■
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		■
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤450		■
Al cast alloys ≤ 10 % Si > 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9 **3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		■ ■
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤450		!
Copper, low alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤400		■
Brass, short-chipping long-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2 **2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600 ≤600		■ ■
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn **2.0790** CuNi18Zn19Pb	≤600 >600-850		■ ■ ■
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10 **2.0980** CuAl11Ni, **2.1247** CuBe2	≤850 >850-1000		■ ■
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren		–	!
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon		–	■ !
Kevlar Glass/carbon-concentr. plastics	Kevlar GFK/CFK		– –	!

Fine finishing

Roughing

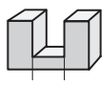
Catalogue no.	64550	64551 54551	64567	64557 54556	74555	74554	54552	64550	64551 54551	64567	64557 54556	74555	74554	54552
Tool mat.	Carbide		Carbide		Carbide		Carbide	Carbide		Carbide		Carbide		Carbide
Std.	6527 K	6527 L	6527 L		6527 L		Stock std.	6527 K	6527 L	6527 L		6527 L		Stock std.
Type	F-UT N		F-UT VA-IK	F-UT VA	F-UT AL		F-UT N	F-UT N		F-UT VA-IK	F-UT VA	F-UT AL		F-UT N
Page	566	567	573	573	569	569	565	566	567	573	573	569	569	565
														
v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.
300	**P**	*230*	P			*155*	**O**	*280*	**R**	*190*	R			*120*	**R**
235	**O**	*210*	O			*140*	**N**	*230*	**Q**	*175*	Q			*110*	**Q**
235	**O**	*210*	O			*155*	**N**	*225*	**Q**	*190*	Q			*122*	**Q**
230	**N**	*175*	N			*120*	**M**	*215*	**P**	*140*	P			*90*	**P**
260	**P**	*230*	P			*155*	**N**	*245*	**R**	*190*	R			*120*	**Q**
235	**O**	*210*	O			*140*	**N**	*220*	**Q**	*170*	Q			*110*	**Q**
230	**N**	*175*	N			*110*	**M**	*215*	**P**	*140*	P			*90*	**P**
230	**N**	*205*	N			*135*	**M**	*215*	**P**	*170*	P			*110*	**P**
190	**M**	*175*	M			*115*	**L**	*185*	**O**	*140*	O			*90*	**O**
300	**P**	*260*	P			*150*	**N**	*280*	**R**	*210*	R			*140*	**Q**
230	**N**	*205*	N			*135*	**N**	*215*	**P**	*170*	P			*110*	**Q**
190	**M**	*155*	M			*100*	**M**	*185*	**O**	*125*	O			*80*	**P**
230	N	*230*	**N**			*155*	**N**	*190*	P	*190*	**P**			*120*	**Q**
190	M	*210*	**M**			*135*	L	*170*	O	*170*	**O**			*110*	O
200	N	*205*	**N**			*135*	**N**	*170*	P	*180*	**P**			*110*	**Q**
175	M	*175*	**M**			*115*	L	*140*	O	*160*	**O**			*90*	**O**
135	M	*135*	**M**			*85*	M	*105*	O	*105*	**O**			*65*	P
135	M	*135*	**M**					*105*	O	*105*	**O**				
135	N	*135*	**N**			*80*	O	*105*	P	*105*	**P**			*70*	P
115	M	*115*	**M**			*70*	N	*90*	O	*90*	**O**			*65*	O
105	N	*105*	**N**			*65*	**O**	*85*	P	*85*	**P**			*60*	P
50	**N**							*50*	**N**						
90	L	*55*	**L**					*65*	N	*65*	**N**				
240	**R**	*240*	R			*200*	N	*245*	**S**	*160*	S	*105*	S	*160*	Q
220	**Q**	*220*	Q			*180*	M	*225*	**R**	*145*	R	*95*	R	*150*	P
195	**R**	*195*	R			*170*	N	*205*	**S**	*135*	S	*85*	S	*130*	Q
170	**Q**	*170*	Q			*145*	M	*175*	**R**	*115*	R	*75*	R	*120*	P
90	**M**							*120*	**O**					*75*	N
90	M	*90*	**M**	*70*	M	*85*	L	*105*	**O**	*105*	**O**	*60*	**O**	*70*	O
70	L	*70*	**L**	*50*	L	*70*	K	*85*	N	*85*	**N**	*50*	**N**	*55*	N
				690	**R**	*250*	Q			*910*	**T**	*530*	**T**	*340*	R
				650	**R**	*275*	P			*1120*	**T**	*650*	**T**	*400*	R
450	**P**	*450*	**P**	*335*	**P**	*250*	O	*400*	**R**	*400*	**R**	*260*	**R**	*170*	P
360	**Q**	*360*	**Q**	*275*	**Q**	*220*	P	*325*	**S**	*325*	**S**	*205*	**S**	*130*	Q
450	R	*450*	**R**	*390*	**R**	*235*	Q	*400*	T	*400*	**T**	*300*	**T**	*190*	R
230	R	*230*	**R**	*180*	**R**	*115*	P	*205*	S	*205*	**T**	*140*	**T**	*90*	Q
220	**P**	*220*	**P**	*160*	**P**	*110*	O	*200*	**R**	*200*	**R**	*130*	**R**	*85*	P
160	P	*160*	**P**	*130*	**P**	*100*	O	*145*	R	*145*	**R**	*105*	**R**	*65*	P
220	**P**	*220*	**P**	*160*	**P**	*110*	O	*200*	**R**	*200*	**R**	*130*	**R**	*85*	P
160	**O**	*160*	**O**	*120*	**O**			*145*	**Q**	*145*	**Q**	*100*	**Q**	*65*	O
160	O	*160*	**O**	*120*	**O**			*145*	Q	*145*	**Q**	*100*	**Q**		
140	N	*140*	**N**	*105*	**N**			*125*	P	*125*	**P**	*80*	**P**		
240	L	*240*	**L**	*180*	**L**			*215*	N	*215*	**N**	*140*	**N**		
160	**L**	*160*	**L**	*120*	**L**			*115*	**N**	*115*	**N**	*80*	**N**		
190	**L**	*190*	**L**	*140*	**L**			*170*	**N**	*170*	**N**	*120*	**N**		
190	**K**	*190*	**K**	*140*	**K**			*170*	**M**	*170*	**M**	*120*	**M**		

Application recommendations for Carbide Slot Drills

tool-Ø mm	Code-letter	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
	2.00	0.001	0.001	0.001	0.002	0.002	0.004	0.005	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.018	0.020
	3.00	0.002	0.002	0.003	0.003	0.004	0.007	0.010	0.010	0.010	0.015	0.016	0.013	0.019	0.022	0.024	0.030
	5.00	0.005	0.006	0.007	0.009	0.010	0.014	0.020	0.020	0.022	0.025	0.026	0.026	0.028	0.030	0.032	0.038
	6.00	0.006	0.008	0.009	0.011	0.013	0.017	0.024	0.025	0.027	0.031	0.029	0.033	0.039	0.036	0.041	0.047
	8.00	0.010	0.012	0.014	0.016	0.019	0.024	0.032	0.032	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.064
	10.00	0.013	0.015	0.018	0.021	0.025	0.030	0.038	0.039	0.044	0.050	0.053	0.059	0.065	0.066	0.073	0.080
	12.00	0.010	0.018	0.022	0.026	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.085	0.090	0.100
	16.00	0.020	0.023	0.027	0.032	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.120
	20.00	0.023	0.028	0.033	0.038	0.045	0.057	0.066	0.073	0.080	0.090	0.097	0.100	0.110	0.120	0.130	0.140
	25.00	0.030	0.035	0.040	0.045	0.055	0.065	0.075	0.100	0.120	0.130	0.140	0.150	0.165	0.170	0.180	0.190

Feed column — Feed f (mm/tooth)

a_e = Width of cut
a_p = Cutting depth

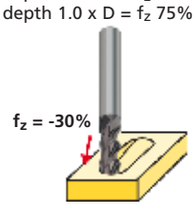


a_e = 1.0 x D

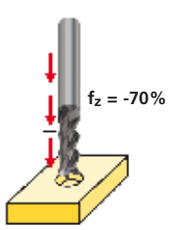
Feed rate codes in bold are the preferred choice for the respective material group.

The new european-wide definitions according to DIN EN for steel and cast are applied for our material examples.

Oblique plunging and slot milling
For oblique plunging the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for drilling depths in excess of 1 x D. This also applies to the transition to radial machining.
slot milling
a_p = cut. depth 0.5 x D = f_z 100%
a_p = cut. depth 1.0 x D = f_z 75%



Drilling
For drilling the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for larger drilling depths in excess of 0.5 x D.



Lubricants:
cutting oil, highly activated ■
soluble oil (emulsion) ■
air only !

Material group	Materials examples, **new designations** (old designation in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm²)	Hard-ness	Coolant
General purpose steels	**1.0035** S185(St33),**1.0486** P275N(StE285),**1.0345** P235GH(H1),**1.0425** P265GH(H2) **1.0050** E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤500 >500-850		■
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36) **1.0727** 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤850 850-1000		■
Unalloyed tempering steels	**1.0402** C22, **1.1178** C30E (Ck30) **1.0503** C45, **1.1191** C45E (Ck45) **1.0601** C60, **1.1221** C60E (Ck60)	≤ 700 700-850 850-1000		■
Alloyed tempering steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4 **1.5710** 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	850-≤1000 1000-1200		■
Unalloyed case hardened steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤750		■
Alloyed case hardened steels	**1.7043** 38Cr4 **1.5752** 15NiCr13 (15NiCr13), **1.7131** 16MnCr5, **1.7264** 20CrMo5	850-≤1000 1000-1200		■
Nitriding steels	**1.8504** 34CrAl6 **1.8519** 31CrMoV9, **1.8550** 34CrAlNi7	≥850-≤1000 >1000-1200		■ ■
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9 **1.2080** X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤850 >850-1000		■ ■
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≥650-1000		■
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤330 HB	■
Stainless steels, sulphured austenitic martensitic	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9 **1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A) **1.4057** X20CrNi 17 2 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤850 ≤850 ≤850		■
Hardened steels	–		≤40-48 HRC >48-60 HRC	■
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		■
Cast iron	**0.6010** EN-GJL-100(GG10), **0.6020** EN-GJL-200(GG20) **0.6025** EN-GJL-250(GG25), **0.6035** EN-GJL-350(GG35)		≤240 HB <300 HB	■ ! ■ !
Spheroidal graphit iron and maleable cast iron	**0.7050** EN-GJS-500-7(GGG50), **0.8035** EN-GJMW-350-4(GTW35) **0.7070** EN-GJS-700-2(GGG70), **0.8170** EN-GJMB-700-2(GTS70)		≤240 HB <300 HB	■
Chilled cast iron	–		≤350 HB	■
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2 **3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 >850-1200		■
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		■
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤450		■
Al cast alloys ≤ 10 % Si > 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9 **3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		■
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤450		!
Copper, low alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤400		■
Brass, short-chipping long-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2 **2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600 ≤600		■
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn **2.0790** CuNi18Zn19Pb	≤600 >600-850		■ ■ ■
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10 **2.0980** CuAl11Ni, **2.1247** CuBe2	≤850 >850-1000		■
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren		–	!
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon		–	■ !
Kevlar Glass/carbon-concentr. plastics	Kevlar GFK/CFK		– –	!

Slot drilling

Catalogue no.	74204	74202	74479		74520	74522	54520 54522	64522	74521	74523	74478	74471
Tool mat.	Carbide		Carbide		Carbide		Carbide		Carbide		Carbide	
Std.	6527 K	6527 L	Stock std.		6527 K		6527 K		6527 L		6527 L	
Type	W		W		N		N		N		NH	
Page	594	594	589		575	583	575, 608	583	579	585	600	602
												
v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	
				73	**O**	*120*	**O**	*63*	**N**	*63*	**N**
				69	**M**	*115*	**N**	*60*	**L**	*60*	**L**
				73	**M**	*120*	**N**	*63*	**L**	*63*	**L**
				53	**N**	*90*	**O**	*47*	**M**	*47*	**M**
				73	**M**	*120*	**N**	*63*	**L**	*63*	**L**
				65	**M**	*108*	**N**	*57*	**L**	*57*	**L**
				53	**N**	*90*	**O**	*47*	**M**	*47*	**M**
				65	**N**	*108*	**O**	*57*	**M**	*57*	**M**
				53	**N**	*90*	**O**	*47*	**M**	*47*	**M**
				76	**M**	*127*	**N**	*66*	**L**	*66*	**L**
				65	**M**	*108*	**N**	*57*	**L**	*57*	**L**
				46	**N**	*76*	**O**	*40*	**M**	*40*	**M**
				73	**M**	*120*	**N**	*63*	**L**	*63*	**L**
				65	**L**	*108*	**M**	*57*	**L**	*57*	**L**
				65	**M**	*108*	**N**	*57*	**L**	*57*	**L**
				53	**L**	*90*	**M**	*47*	**L**	*47*	**L**
				39	**N**	*64*	**O**	*33*	**M**	*33*	**M**
						64	**M**				
				39	**N**	*64*	**O**	*33*	**M**	*33*	**M**
				35	**L**	*58*	**M**	*30*	**L**	*30*	**L**
				31	**M**	*51*	**N**	*27*	**L**	*27*	**L**
						64	**M**				
						39	**M**				
				92	**M**	*152*	**N**	*80*	**L**	*80*	**L**
				84	**L**	*140*	**M**	*73*	**L**	*73*	**L**
				76	**M**	*127*	**N**	*66*	**L**	*66*	**L**
				69	**L**	*115*	**M**	*60*	**L**	*60*	**L**
				46	**L**	*76*	**M**	*40*	**L**	*40*	**L**
				39	**L**	*64*	**M**	*33*	**L**	*33*	**L**
				31	**L**	*51*	**M**	*27*	**L**	*27*	**L**
363	**R**	*436*	**T**	*343*	O	*570*	P	*297*	N	*297*	N
440	**R**	*528*	**T**	*418*	O	*697*	P	*363*	N	*363*	N
176	**Q**	*212*	**S**	*168*	N	*279*	O	*146*	M	*146*	M
143	**R**	*172*	**T**	*137*	O	*228*	P	*119*	N	*119*	N
209	**S**	*251*	**T**	*191*	P	*317*	Q	*165*	O	*165*	O
99	**R**	*119*	**T**	*92*	O	*152*	P	*80*	N	*80*	N
88	**R**	*106*	**T**	*76*	O	*127*	P	*66*	N	*66*	N
83	**Q**	*99*	**S**	*69*	N	*115*	O	*60*	M	*60*	M
88	**Q**	*106*	**S**	*76*	N	*127*	O	*66*	M	*66*	M
77	P	*93*	**S**	*61*	M	*102*	N	*53*	L	*53*	L
77	Q	*93*	**S**	*61*	N	*102*	O	*53*	M	*53*	M
66	O	*80*	**R**	*53*	L	*90*	M	*47*	L	*47*	L
99	O	*119*	**R**	*92*	L	*152*	M	*80*	L	*80*	L
88	O	*106*	**R**	*84*	L	*140*	M	*73*	L	*73*	L

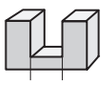
Application recommendations for Carbide Slot Drills

Feed column

tool-Ø mm	Code-letter	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
	2.00	0.001	0.001	0.001	0.002	0.002	0.004	0.005	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.018	0.020
	3.00	0.002	0.002	0.003	0.003	0.004	0.007	0.010	0.010	0.010	0.015	0.016	0.013	0.019	0.022	0.024	0.030
	5.00	0.005	0.006	0.007	0.009	0.010	0.014	0.020	0.020	0.022	0.025	0.026	0.026	0.028	0.030	0.032	0.038
	6.00	0.006	0.008	0.009	0.011	0.013	0.017	0.024	0.025	0.027	0.031	0.029	0.033	0.039	0.036	0.041	0.047
	8.00	0.010	0.012	0.014	0.016	0.019	0.024	0.032	0.032	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.064
	10.00	0.013	0.015	0.018	0.021	0.025	0.030	0.038	0.039	0.044	0.050	0.053	0.059	0.065	0.066	0.073	0.080
	12.00	0.010	0.018	0.022	0.026	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.085	0.090	0.100
	16.00	0.020	0.023	0.027	0.032	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.120
	20.00	0.023	0.028	0.033	0.038	0.045	0.057	0.066	0.073	0.080	0.090	0.097	0.100	0.110	0.120	0.130	0.140
	25.00	0.030	0.035	0.040	0.045	0.055	0.065	0.075	0.100	0.120	0.130	0.140	0.150	0.165	0.170	0.180	0.190

Feed f (mm/tooth)

a_e = Width of cut
a_p = Cutting depth

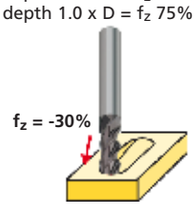


a_e = 1.0 x D

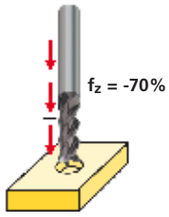
Feed rate codes in bold are the preferred choice for the respective material group.

The new european-wide definitions according to DIN EN for steel and cast are applied for our material examples.

Oblique plunging and slot milling
For oblique plunging the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for drilling depths in excess of 1 x D. This also applies to the transition to radial machining.
slot milling
a_p = cut. depth 0.5 x D = f_z 100%
a_p = cut. depth 1.0 x D = f_z 75%



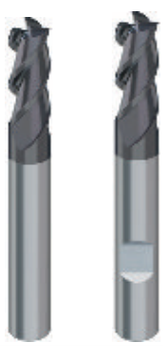
Drilling
For drilling the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for larger drilling depths in excess of 0.5 x D.



Lubricants:
cutting oil, highly activated ■
soluble oil (emulsion) ■
air only !

Material group	Materials examples, **new designations** (old designation in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm^2)	Hard-ness	Coolant
General purpose steels	**1.0035** S185(St33),**1.0486** P275N(StE285),**1.0345** P235GH(H1),**1.0425** P265GH(H2) **1.0050** E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤500 >500-850		■
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36) **1.0727** 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤850 850-1000		■
Unalloyed tempering steels	**1.0402** C22, **1.1178** C30E (Ck30) **1.0503** C45, **1.1191** C45E (Ck45) **1.0601** C60, **1.1221** C60E (Ck60)	≤ 700 700-850 850-1000		■
Alloyed tempering steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4 **1.5710** 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	850-≤1000 1000-1200		■
Unalloyed case hardened steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤750		■
Alloyed case hardened steels	**1.7043** 38Cr4 **1.5752** 15NiCr13 (15NiCr13), **1.7131** 16MnCr5, **1.7264** 20CrMo5	850-≤1000 1000-1200		■
Nitriding steels	**1.8504** 34CrAl6 **1.8519** 31CrMoV9, **1.8550** 34CrAlNi7	≥850-≤1000 >1000-1200		■ ■
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9 **1.2080** X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤850 >850-1000		■ ■
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≥650-1000		■
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤330 HB	■
Stainless steels, sulphured austenitic martensitic	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9 **1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A) **1.4057** X20CrNi 17 2 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤850 ≤850 ≤850		■
Hardened steels	–		≤40-48 HRC >48-60 HRC	■
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		■
Cast iron	**0.6010** EN-GJL-100(GG10), **0.6020** EN-GJL-200(GG20) **0.6025** EN-GJL-250(GG25), **0.6035** EN-GJL-350(GG35)		≤240 HB <300 HB	■ ! ■ !
Spheroidal graphit iron and maleable cast iron	**0.7050** EN-GJS-500-7(GGG50), **0.8035** EN-GJMW-350-4(GTW35) **0.7070** EN-GJS-700-2(GGG70), **0.8170** EN-GJMB-700-2(GTS70)		≤240 HB <300 HB	■
Chilled cast iron	–		≤350 HB	■
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2 **3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 >850-1200		■
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		■
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤450		■
Al cast alloys ≤ 10 % Si > 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9 **3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		■
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤450		!
Copper, low alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤400		■
Brass, short-chipping long-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2 **2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600 ≤600		■
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn **2.0790** CuNi18Zn19Pb	≤600 >600-850		■ ■ ■
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10 **2.0980** CuAl11Ni, **2.1247** CuBe2	≤850 >850-1000		■
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren		–	!
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon		–	■ !
Kevlar Glass/carbon-concentr. plastics	Kevlar GFK/CFK		– –	!

Slot drilling

Catalogue no.	54523 54521 54519	64523	64478	64570 64571	74404	74424	54404	54424	64080		64180	
Tool mat.	Carbide		Carbide		Carbide		Carbide		Carbide		Carbide	
Std.	6527 L		6527 L		Stock std.		Stock std.		Stock std.		Stock std.	
Type	N		NH		N		N		N		NH	
Page	585,579,577	,585	600	598,602	581	587	581	587	591		591	
												
v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.
105	**N**	*105*	**N**	*50*	J	*80*	J	*95*	**M**	*105*	**N**
99	**M**	*99*	**M**	*45*	H	*75*	I	*90*	**L**	*100*	**M**
105	**M**	*105*	**M**	*50*	H	*80*	I	*95*	**L**	*105*	**M**
77	**N**	*77*	**N**	*35*	I	*60*	J	*70*	M	*75*	N
105	**M**	*105*	**M**	*50*	H	*80*	I	*95*	**L**	*105*	**M**
94	**M**	*94*	**M**	*40*	H	*70*	I	*85*	**L**	*95*	**M**
77	**N**	*77*	**N**	*35*	I	*60*	J	*70*	M	*75*	N
94	**N**	*94*	**N**	*40*	I	*70*	J	*85*	M	*95*	N
77	**N**	*77*	**N**	*35*	I	*60*	J				
110	**M**	*110*	**M**	*45*	H	*75*	I	*100*	**L**	*110*	**M**
94	**M**	*94*	**M**	*40*	H	*70*	I	*85*	L	*95*	M
66	**N**	*66*	**N**	*30*	I	*50*	J				
105	**M**	*105*	**M**	*50*	H	*80*	I	*95*	L	*105*	M
94	**L**	*94*	**L**	*40*	H	*70*	H				
94	**M**	*94*	**M**	*40*	H	*70*	I	*85*	**L**	*95*	**M**
77	**L**	*77*	**L**	*35*	H	*60*	H	*70*	K	*75*	L
55	**N**	*55*	**N**	*38*	I	*45*	J	*50*	M	*55*	N
55	**L**	*55*	**L**								
55	**N**	*55*	**N**					*50*	**M**	*55*	**N**
50	**L**	*50*	**L**					*45*	**K**	*50*	**L**
44	**M**	*44*	**M**					*40*	L	*45*	M
55	**L**	*55*	**L**								
33	**L**	*33*	**L**							*35*	**L**
132	**M**	*132*	**M**	*60*	H	*105*	I	*120*	**L**	*130*	**M**
121	**L**	*121*	**L**	*55*	H	*95*	H	*110*	**K**	*120*	**L**
110	**M**	*110*	**M**	*55*	H	*90*	I	*100*	**L**	*110*	**M**
99	**L**	*99*	**L**	*45*	H	*75*	H	*90*	**K**	*100*	**L**
66	**L**	*66*	**L**					*60*	**K**	*65*	**L**
55	**L**	*55*	**L**	*40*	H	*65*	H	*50*	**K**	*55*	**L**
44	**L**	*44*	**L**	*20*	H	*35*	H	*40*	**K**	*45*	**L**
495	O	*495*	O					*330*	**Q**	*330*	**Q**
605	O	*605*	O					*400*	**Q**	*400*	**Q**
242	N	*242*	N					*160*	P	*245*	N
198	O	*198*	O					*130*	Q	*200*	O
275	P	*275*	P					*185*	**R**	*185*	**R**
132	O	*132*	O					*90*	Q	*130*	O
110	O	*110*	O					*80*	Q	*110*	O
99	N	*99*	N					*70*	**P**	*75*	**P**
110	N	*110*	N					*80*	P	*110*	N
88	M	*88*	M					*70*	O	*90*	M
88	N	*88*	N					*70*	**P**	*70*	**P**
77	L	*77*	L					*60*	**N**	*60*	**N**
132	L	*132*	L					*90*	**N**	*90*	**N**
121	L	*121*	L					*80*	**N**	*80*	**N**

Application recommendations for Carbide Slot Drills and End Mills

Feed column

tool-Ø mm	Code-letter	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
	2.00	0.001	0.001	0.001	0.002	0.002	0.004	0.005	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.018	0.020
	3.00	0.002	0.002	0.003	0.003	0.004	0.007	0.010	0.010	0.010	0.015	0.016	0.013	0.019	0.022	0.024	0.030
	5.00	0.005	0.006	0.007	0.009	0.010	0.014	0.020	0.020	0.022	0.025	0.026	0.026	0.028	0.030	0.032	0.038
	6.00	0.006	0.008	0.009	0.011	0.013	0.017	0.024	0.025	0.027	0.031	0.029	0.033	0.039	0.036	0.041	0.047
	8.00	0.010	0.012	0.014	0.016	0.019	0.024	0.032	0.032	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.064
	10.00	0.013	0.015	0.018	0.021	0.025	0.030	0.038	0.039	0.044	0.050	0.053	0.059	0.065	0.066	0.073	0.080
	12.00	0.010	0.018	0.022	0.026	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.085	0.090	0.100
	16.00	0.020	0.023	0.027	0.032	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.120
	20.00	0.023	0.028	0.033	0.038	0.045	0.057	0.066	0.073	0.080	0.090	0.097	0.100	0.110	0.120	0.130	0.140
	25.00	0.030	0.035	0.040	0.045	0.055	0.065	0.075	0.100	0.120	0.130	0.140	0.150	0.165	0.170	0.180	0.190

Feed f (mm/tooth)

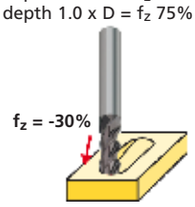
a_e = Width of cut
a_p = Cutting depth

a_e = 0.1 x D

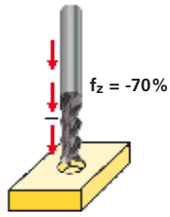
Feed rate codes in bold are the preferred choice for the respective material group.

The new european-wide definitions according to DIN EN for steel and cast are applied for our material examples.

Oblique plunging and slot milling
For oblique plunging the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for drilling depths in excess of 1 x D. This also applies to the transition to radial machining.
slot milling
a_p = cut. depth 0.5 x D = f_z 100%
a_p = cut. depth 1.0 x D = f_z 75%



Drilling
For drilling the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for larger drilling depths in excess of 0.5 x D.

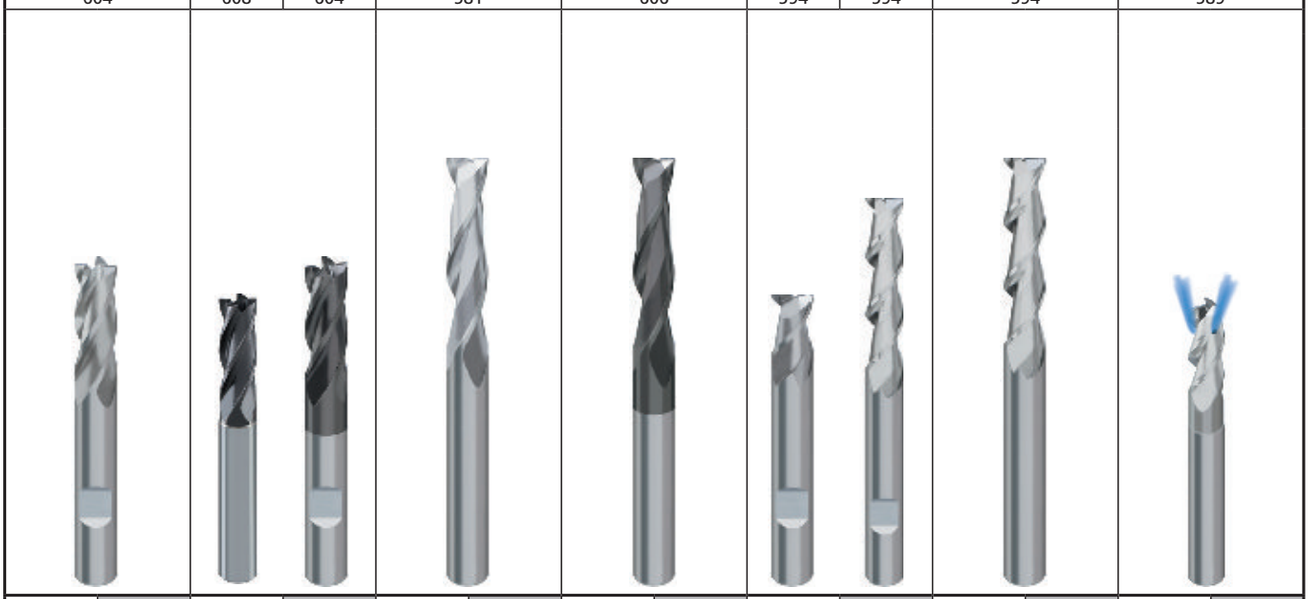


Lubricants:
cutting oil, highly activated ■
soluble oil (emulsion) ■
air only ⚠

Material group	Materials examples, **new designations** (old designation in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm^2)	Hard-ness	Coolant
General purpose steels	**1.0035** S185(St33),**1.0486** P275N(StE285),**1.0345** P235GH(H1),**1.0425** P265GH(H2) **1.0050** E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤500 >500-850		■
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36) **1.0727** 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤850 850-1000		■
Unalloyed tempering steels	**1.0402** C22, **1.1178** C30E (Ck30) **1.0503** C45, **1.1191** C45E (Ck45) **1.0601** C60, **1.1221** C60E (Ck60)	≤ 700 700-850 850-1000		■
Alloyed tempering steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4 **1.5710** 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	850-≤1000 1000-1200		■
Unalloyed case hardened steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤750		■
Alloyed case hardened steels	**1.7043** 38Cr4 **1.5752** 15NiCr13 (15NiCr13), **1.7131** 16MnCr5, **1.7264** 20CrMo5	850-≤1000 1000-1200		■
Nitriding steels	**1.8504** 34CrAl6 **1.8519** 31CrMoV9, **1.8550** 34CrAlNi7	≥850-≤1000 >1000-1200		■ ■
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9 **1.2080** X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤850 >850-1000		■ ■
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≥650-1000		■
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤330 HB	■
Stainless steels, sulphured austenitic martensitic	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9 **1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A) **1.4057** X20CrNi 17 2 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤850 ≤850 ≤850		■
Hardened steels	–		≤40-48 HRC >48-60 HRC	■
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		■
Cast iron	**0.6010** EN-GJL-100(GG10), **0.6020** EN-GJL-200(GG20) **0.6025** EN-GJL-250(GG25), **0.6035** EN-GJL-350(GG35)		≤240 HB <300 HB	■ ⚠
Spheroidal graphit iron and maleable cast iron	**0.7050** EN-GJS-500-7(GGG50), **0.8035** EN-GJMW-350-4(GTW35) **0.7070** EN-GJS-700-2(GGG70), **0.8170** EN-GJMB-700-2(GTS70)		≤240 HB <300 HB	■
Chilled cast iron	–		≤350 HB	■
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2 **3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 >850-1200		■
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		■
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤450		■
Al cast alloys ≤ 10 % Si > 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9 **3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		■
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤450		⚠
Copper, low alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤400		■
Brass, short-chipping long-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2 **2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600 ≤600		■
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn **2.0790** CuNi18Zn19Pb	≤600 >600-850		■ ■ ■
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10 **2.0980** CuAl11Ni, **2.1247** CuBe2	≤850 >850-1000		■
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren		–	⚠
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon		–	■ ⚠
Kevlar Glass/carbon-concentr. plastics	Kevlar GFK/CFK		– –	⚠

Fine finishing

Catalogue no.	74525	54526	64525 54524	74404	54444	74204	74202	74206	74479
Tool mat.	Carbide	Carbide		Carbide	Carbide	Carbide		Carbide	Carbide
Std.	6527 L	6527 L		Stock std.	Stock std.	6527 K	6527 L	Stock std.	Stock std.
Type	N	N		N	N	W		W	W
Page	604	608	604	581	606	594	594	594	589



v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.
116	**S**	*193*	**S**	*76*	**N**	*127*	**O**						
106	**R**	*176*	**S**	*70*	**M**	*116*	**N**						
116	**R**	*193*	**S**	*76*	**M**	*127*	**N**						
86	**Q**	*143*	**R**	*60*	**L**	*99*	**M**						
116	**R**	*193*	**S**	*76*	**M**	*127*	**N**						
106	**R**	*176*	**S**	*66*	**M**	*110*	**N**						
86	**Q**	*143*	**R**	*57*	**L**	*94*	**M**						
103	**Q**	*171*	**R**	*66*	**L**	*110*	**M**						
86	**P**	*143*	**Q**	*57*	**L**	*94*	**L**						
129	**R**	*215*	**S**	*73*	**M**	*121*	**N**						
103	**R**	*171*	**S**	*66*	**M**	*110*	**N**						
76	**Q**	*127*	**R**	*50*	**L**	*83*	**M**						
116	**R**	*193*	**S**	*76*	**M**	*127*	**N**						
106	**P**	*176*	**Q**	*66*	L	*110*	L						
103	**R**	*171*	**S**	*66*	**M**	*110*	**N**						
86	**P**	*143*	**Q**	*57*	L	*94*	L						
66	**Q**	*110*	**R**	*43*	L	*72*	M						
66	**P**	*110*	**Q**										
66	**Q**	*110*	**R**										
57	**P**	*94*	**Q**										
53	**Q**	*88*	**R**										
39	**N**	*55*	**O**										
40	**P**	*66*	**Q**										
139	**R**	*231*	**S**	*99*	M	*165*	N						
139	**Q**	*231*	**R**	*90*	L	*149*	M						
126	**R**	*209*	**S**	*83*	M	*138*	N						
106	**Q**	*176*	**R**	*70*	L	*116*	M						
73	**O**	*121*	**P**										
66	**P**	*110*	**Q**	*43*	L	*72*	L						
53	**O**	*88*	**P**	*33*	K	*55*	L						
561	**T**	*935*	**T**	*330*	P	*550*	Q	*418*	**U**	*330*	**P**	*523*	**U**
528	S	*880*	T	*396*	O	*660*	P	*506*	**T**	*396*	**O**	*633*	**T**
274	S	*457*	S	*165*	N	*275*	O	*203*	**T**	*165*	**N**	*253*	**T**
225	S	*374*	T	*132*	O	*220*	P	*165*	**T**	*132*	**P**	*207*	**T**
317	T	*528*	T	*198*	P	*330*	Q	*241*	**U**	*198*	**U**	*302*	**U**
146	S	*242*	T	*99*	O	*165*	P	*115*	**T**	*99*	**P**	*143*	**T**
132	S	*220*	S	*80*	N	*132*	O	*102*	**T**	*80*	**N**	*127*	**T**
106	S	*176*	S	*66*	N	*110*	O	*95*	**T**	*66*	**N**	*119*	**T**
132	S	*220*	S	*80*	N	*132*	O	*102*	**T**	*80*	**N**	*127*	**T**
99	R	*165*	S					*90*	**S**			*112*	**S**
99	R	*165*	S					*90*	**S**			*112*	**S**
86	Q	*143*	R					*76*	**S**			*95*	**S**
146	Q	*242*	R					*115*	**S**			*143*	**S**
132	Q	*220*	R					*102*	**S**			*127*	**S**

Application recommendations for Carbide Slot Drills and End Mills

Feed column

tool-Ø mm	Code-letter	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
	2.00	0.001	0.001	0.001	0.002	0.002	0.004	0.005	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.018	0.020
	3.00	0.002	0.002	0.003	0.003	0.004	0.007	0.010	0.010	0.010	0.015	0.016	0.013	0.019	0.022	0.024	0.030
	5.00	0.005	0.006	0.007	0.009	0.010	0.014	0.020	0.020	0.022	0.025	0.026	0.026	0.028	0.030	0.032	0.038
	6.00	0.006	0.008	0.009	0.011	0.013	0.017	0.024	0.025	0.027	0.031	0.029	0.033	0.039	0.036	0.041	0.047
	8.00	0.010	0.012	0.014	0.016	0.019	0.024	0.032	0.032	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.064
	10.00	0.013	0.015	0.018	0.021	0.025	0.030	0.038	0.039	0.044	0.050	0.053	0.059	0.065	0.066	0.073	0.080
	12.00	0.010	0.018	0.022	0.026	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.085	0.090	0.100
	16.00	0.020	0.023	0.027	0.032	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.120
	20.00	0.023	0.028	0.033	0.038	0.045	0.057	0.066	0.073	0.080	0.090	0.097	0.100	0.110	0.120	0.130	0.140
	25.00	0.030	0.035	0.040	0.045	0.055	0.065	0.075	0.100	0.120	0.130	0.140	0.150	0.165	0.170	0.180	0.190

Feed f (mm/tooth)

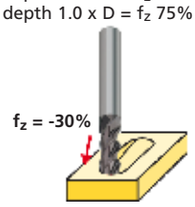
a_e = Width of cut
a_p = Cutting depth

a_e = 0.5 x D

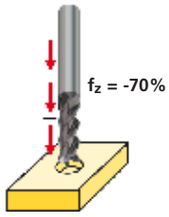
Feed rate codes in bold are the preferred choice for the respective material group.

The new european-wide definitions according to DIN EN for steel and cast are applied for our material examples.

Oblique plunging and slot milling
For oblique plunging the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for drilling depths in excess of 1 x D. This also applies to the transition to radial machining.
slot milling
a_p = cut. depth 0.5 x D = f_z 100%
a_p = cut. depth 1.0 x D = f_z 75%



Drilling
For drilling the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for larger drilling depths in excess of 0.5 x D.



Lubricants:
cutting oil, highly activated ■
soluble oil (emulsion) ■
air only ⚠

Material group	Materials examples, **new designations** (old designation in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm²)	Hard-ness	Coolant
General purpose steels	**1.0035** S185(St33),**1.0486** P275N(StE285),**1.0345** P235GH(H1),**1.0425** P265GH(H2) **1.0050** E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤500 >500-850		■
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36) **1.0727** 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤850 850-1000		■
Unalloyed tempering steels	**1.0402** C22, **1.1178** C30E (Ck30) **1.0503** C45, **1.1191** C45E (Ck45) **1.0601** C60, **1.1221** C60E (Ck60)	≤ 700 700-850 850-1000		■
Alloyed tempering steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4 **1.5710** 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	850-≤1000 1000-1200		■
Unalloyed case hardened steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤750		■
Alloyed case hardened steels	**1.7043** 38Cr4 **1.5752** 15NiCr13 (15NiCr13), **1.7131** 16MnCr5, **1.7264** 20CrMo5	850-≤1000 1000-1200		■
Nitriding steels	**1.8504** 34CrAl6 **1.8519** 31CrMoV9, **1.8550** 34CrAlNi7	≥850-≤1000 >1000-1200		■ ■
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9 **1.2080** X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤850 >850-1000		■ ■
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≥650-1000		■
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤330 HB	■
Stainless steels, sulphured austenitic martensitic	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9 **1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A) **1.4057** X20CrNi 17 2 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤850 ≤850 ≤850		■
Hardened steels	–		≤40-48 HRC >48-60 HRC	■
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		■
Cast iron	**0.6010** EN-GJL-100(GG10), **0.6020** EN-GJL-200(GG20) **0.6025** EN-GJL-250(GG25), **0.6035** EN-GJL-350(GG35)		≤240 HB <300 HB	■ ⚠
Spheroidal graphit iron and maleable cast iron	**0.7050** EN-GJS-500-7(GGG50), **0.8035** EN-GJMW-350-4(GTW35) **0.7070** EN-GJS-700-2(GGG70), **0.8170** EN-GJMB-700-2(GTS70)		≤240 HB <300 HB	■
Chilled cast iron	–		≤350 HB	■
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2 **3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 >850-1200		■
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		■
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤450		■
Al cast alloys ≤ 10 % Si > 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9 **3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		■
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤450		⚠
Copper, low alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤400		■
Brass, short-chipping long-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2 **2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600 ≤600		■
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn **2.0790** CuNi18Zn19Pb	≤600 >600-850		■ ■ ■
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10 **2.0980** CuAl11Ni, **2.1247** CuBe2	≤850 >850-1000		■
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren		–	⚠
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon		–	■ ⚠
Kevlar Glass/carbon-concentr. plastics	Kevlar GFK/CFK		– –	⚠

Roughing

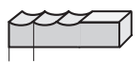
Catalogue no.	74478	74471	64478	64570 64571	74204	74202	74479		74203	74303	54496	54497	64495	64595	64497
Tool mat.	Carbide		Carbide		Carbide		Carbide		Carbide		Carbide		Carbide		Carb.-UF
Std.	6527 L		6527 L		6527 K	6527 L	Stock std.		6527 L		6527 L		6527 L		6527 L
Type	NH		NH		W		W		WR		NF		NRf		HR
Page	600	602	600	598,602	594	594	589		623	623	620	620	625	625	628
															
v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	Feed col.
90	**S**	*149*	**T**							*110*	**N**	*119*	**T**	
83	**S**	*138*	**S**							*100*	**M**	*110*	**S**	
90	**S**	*149*	**S**							*110*	**M**	*119*	**S**	
66	**R**	*110*	**S**							*80*	**L**	*88*	**S**	
90	**S**	*149*	**S**							*110*	**M**	*119*	**S**	
80	**S**	*132*	**S**							*95*	**M**	*106*	**S**	
66	**R**	*110*	**S**							*80*	**L**	*88*	**S**	
80	**R**	*132*	**S**							*95*	**L**	*106*	**S**	
66	**Q**	*110*	**R**							*80*	K	*88*	**R**	R
99	**S**	*165*	**S**							*120*	**M**	*132*	**S**	
80	**S**	*132*	**S**							*95*	**M**	*106*	**S**	S
60	**R**	*99*	**S**							*70*	L	*80*	**S**	S
90	**S**	*149*	**S**							*110*	**M**	*119*	**S**	S
80	**Q**	*132*	**R**							*95*	K	*106*	**R**	R
80	**S**	*132*	**S**							*95*	**M**	*106*	**S**	S
66	Q	*110*	R							*80*	**K**	*88*	**R**	R
50	**R**	*83*	**S**									*66*		S
		83	**R**									*66*		R
50	**R**	*83*	**S**							*60*	**L**	*66*	**S**	S
43	**Q**	*72*	**R**							*50*	**K**	*58*	**R**	R
40	**R**	*66*	**S**							*50*	L	*53*	**S**	S
24	**O**	*39*	**Q**							*30*	I	*31*	**P**	**P**
												22	M	**M**
		50	R							*35*	M	*40*	R	**R**
116	**S**	*193*	**S**							*140*	**O**	*154*	**S**	S
106	**R**	*176*	**S**							*130*	N	*141*	S	**S**
96	**S**	*160*	**S**							*115*	**O**	*128*	**S**	S
83	**R**	*138*	**S**							*100*	N	*110*	S	**S**
57	P	*94*	Q									*75*		**Q**
50	Q	*83*	R							*60*	**L**	*66*	**R**	
40	P	*66*	Q							*50*	**K**	*53*	**Q**	
				363	**R**	*455*	**T**	*550*	**S**					
				440	**R**	*550*	**T**	*638*	**S**					
				176	**P**	*220*	**S**	*264*	**R**					
				143	**Q**	*180*	**S**	*209*	**S**					
				209	**R**	*262*	**T**	*297*	**S**					
				99	**Q**	*125*	**S**	*143*	**S**					
				88	**P**	*110*	**S**	*132*	**R**	*130*	**O**			
				83	**P**	*104*	**S**	*121*	**R**	*105*	**O**			
				88	**P**	*110*	**S**	*127*	**R**	*130*	**O**			
				77	**O**	*97*	**R**	*110*	**Q**	*95*	**N**			
				77	**O**	*97*	**R**	*110*	**Q**	*95*	**N**			
				66	**N**	*83*	**Q**	*99*	**P**	*80*	**M**			
				99	**N**	*125*	**Q**	*138*	**P**					
				88	**N**	*110*	**Q**	*127*	**P**					

Application recommend. for Carb. Slot Drills, End Mills, Ball Nose End Mills

tool-Ø mm	Feed column Code-letter H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	Feed f (mm/tooth)
2.00	0.001	0.001	0.001	0.002	0.002	0.004	0.005	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.018	0.020	
3.00	0.002	0.002	0.003	0.003	0.004	0.007	0.010	0.010	0.010	0.015	0.016	0.013	0.019	0.022	0.024	0.030	
5.00	0.005	0.006	0.007	0.009	0.010	0.014	0.020	0.020	0.022	0.025	0.026	0.026	0.028	0.030	0.032	0.038	
6.00	0.006	0.008	0.009	0.011	0.013	0.017	0.024	0.025	0.027	0.031	0.029	0.033	0.039	0.036	0.041	0.047	
8.00	0.010	0.012	0.014	0.016	0.019	0.024	0.032	0.032	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.064	
10.00	0.013	0.015	0.018	0.021	0.025	0.030	0.038	0.039	0.044	0.050	0.053	0.059	0.065	0.066	0.073	0.080	
12.00	0.010	0.018	0.022	0.026	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.085	0.090	0.100	
16.00	0.020	0.023	0.027	0.032	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.120	
20.00	0.023	0.028	0.033	0.038	0.045	0.057	0.066	0.073	0.080	0.090	0.097	0.100	0.110	0.120	0.130	0.140	
25.00	0.030	0.035	0.040	0.045	0.055	0.065	0.075	0.100	0.120	0.130	0.140	0.150	0.165	0.170	0.180	0.190	

a_e = Width of cut
a_p = Cutting depth

a_e = 0.02 - 0.05 x D

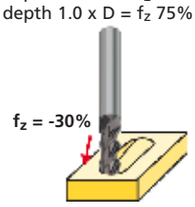


a_e = 0.02 - 0.05 x D

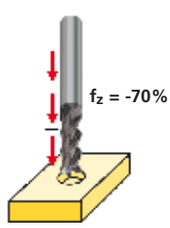
Feed rate codes in bold are the preferred choice for the respective material group.

The new european-wide definitions according to DIN EN for steel and cast are applied for our material examples.

Oblique plunging and slot milling
For oblique plunging the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for drilling depths in excess of 1 x D. This also applies to the transition to radial machining.
slot milling
a_p = cut. depth 0.5 x D = f_z 100%
a_p = cut. depth 1.0 x D = f_z 75%



Drilling
For drilling the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for larger drilling depths in excess of 0.5 x D.



Lubricants:
cutting oil, highly activated ■
soluble oil (emulsion) ■
air only [!]

Material group	Materials examples, **new designations** (old designation in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm^2)	Hard-ness	Coolant
General purpose steels	**1.0035** S185(St33),**1.0486** P275N(StE285),**1.0345** P235GH(H1),**1.0425** P265GH(H2) **1.0050** E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤500 >500-850		■
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36) **1.0727** 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤850 850-1000		■
Unalloyed tempering steels	**1.0402** C22, **1.1178** C30E (Ck30) **1.0503** C45, **1.1191** C45E (Ck45) **1.0601** C60, **1.1221** C60E (Ck60)	≤ 700 700-850 850-1000		■
Alloyed tempering steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4 **1.5710** 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	850-≤1000 1000-1200		■
Unalloyed case hardened steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤750		■
Alloyed case hardened steels	**1.7043** 38Cr4 **1.5752** 15NiCr13 (15NiCr13), **1.7131** 16MnCr5, **1.7264** 20CrMo5	850-≤1000 1000-1200		■
Nitriding steels	**1.8504** 34CrAl6 **1.8519** 31CrMoV9, **1.8550** 34CrAlNi7	≥850-≤1000 >1000-1200		■ ■
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9 **1.2080** X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤850 >850-1000		■ ■
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≥650-1000		■
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤330 HB	■
Stainless steels, sulphured austenitic martensitic	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9 **1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A) **1.4057** X20CrNi 17 2 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤850 ≤850 ≤850		■
Hardened steels	–		≤40-48 HRC >48-60 HRC	■
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		■
Cast iron	**0.6010** EN-GJL-100(GG10), **0.6020** EN-GJL-200(GG20) **0.6025** EN-GJL-250(GG25), **0.6035** EN-GJL-350(GG35)		≤240 HB <300 HB	■ [!]
Spheroidal graphit iron and maleable cast iron	**0.7050** EN-GJS-500-7(GGG50), **0.8035** EN-GJMW-350-4(GTW35) **0.7070** EN-GJS-700-2(GGG70), **0.8170** EN-GJMB-700-2(GTS70)		≤240 HB <300 HB	■
Chilled cast iron	–		≤350 HB	■
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2 **3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 >850-1200		■
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		■
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤450		■
Al cast alloys ≤ 10 % Si > 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9 **3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		■
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤450		[!]
Copper, low alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤400		■
Brass, short-chipping long-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2 **2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600 ≤600		■
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn **2.0790** CuNi18Zn19Pb	≤600 >600-850		■ ■ ■
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10 **2.0980** CuAl11Ni, **2.1247** CuBe2	≤850 >850-1000		■
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren		–	[!]
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon		–	■ [!]
Kevlar Glass/carbon-concentr. plastics	Kevlar GFK/CFK		– –	[!]

Super finishing

Copy milling

Catalogue no.	54205	54201 54206	54225	54221	54207		54227		74543	74531	64542 54541	64532 54531	74545		64545	64535
Tool mat.	Carbide		Carbide		Carbide		Carbide		Carbide		Carbide		Carbide		Carbide	
Std.	Stock std.		Stock std.		Stock std.		Stock std.		6527 L	6528	6527 L		Stock std.		Stock std.	
Type	NH		N		H		H		N		N		N		N	
Page	612	612,608	616	616	614		618		630	634	630	636,634	632		632	638
																
v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	
209	**S**	*209*	**S**					*113*	**S**	*187*	**S**	*79*	**O**	*131*	**P**	
193	**S**	*193*	**S**					*106*	**R**	*176*	**S**	*74*	**N**	*124*	**O**	
209	**S**	*209*	**S**					*113*	**R**	*187*	**S**	*79*	**N**	*131*	**O**	
154	**R**	*154*	**R**					*113*	**Q**	*187*	**R**	*79*	**M**	*131*	**N**	
209	**S**	*209*	**S**					*99*	**R**	*165*	**S**	*70*	**N**	*116*	**O**	
187	**S**	*187*	**S**					*99*	**R**	*165*	**S**	*70*	**N**	*116*	**O**	
154	**R**	*154*	**R**					*86*	**Q**	*143*	**R**	*61*	**M**	*101*	**N**	
187	**R**	*187*	**R**					*93*	**Q**	*154*	**R**	*65*	**M**	*108*	**N**	
154	**Q**	*154*	**Q**					*113*	**P**	*187*	**Q**	*79*	**L**	*131*	**M**	
231	**S**	*231*	**S**					*146*	**R**	*242*	**S**	*102*	**N**	*170*	**O**	
187	**S**	*187*	**S**					*126*	**R**	*209*	**S**	*88*	**N**	*147*	**O**	
143	**R**	*143*	**R**					*80*	**Q**	*132*	**R**	*55*	**M**	*93*	**N**	
209	**S**	*209*	**S**					*106*	**R**	*176*	**S**	*74*	**N**	*124*	**O**	
187	**Q**	*187*	**Q**					*99*	**P**	*165*	**Q**	*70*	**L**	*116*	**M**	
187	**S**	*187*	**S**					*99*	**R**	*165*	**S**	*70*	**N**	*116*	**O**	
154	**Q**	*154*	**Q**	*154*	R	*154*	Q	*86*	**P**	*143*	**Q**	*61*	**L**	*101*	**M**	
116	**R**	*116*	**R**	*116*	S	*116*	R	*63*	**Q**	*105*	**R**	*44*	**N**	*74*	**N**	
116	Q	*116*	Q	*116*	**R**	*116*	**Q**			*105*	**Q**	*44*	**L**	*74*	**M**	
116	**R**	*116*	**R**					*63*	**Q**	*105*	**R**	*44*	**M**	*74*	**N**	
99	**Q**	*99*	**Q**					*57*	**P**	*94*	**Q**	*40*	**L**	*66*	**M**	
94	**R**	*94*	**R**					*50*	**Q**	*83*	**R**	*36*	**M**	*59*	**N**	
61	**O**	*61*	**O**	*61*	P	*61*	O			*61*	**P**	*26*	**L**	*43*	**L**	
				50	**M**	*50*	**L**									
66	**Q**	*66*	**Q**					*37*	P	*61*	Q	*26*	L	*43*	M	
270	**S**	*270*	**S**	*270*	S	*270*	S	*146*	**R**	*242*	**S**	*102*	**N**	*170*	**O**	
248	**R**	*248*	**R**	*248*	S	*248*	R			*231*	**R**	*97*	**M**	*162*	**N**	
220	**S**	*220*	**S**	*220*	S	*220*	S	*126*	**R**	*209*	**S**	*88*	**N**	*147*	**O**	
193	**R**	*193*	**R**	*193*	S	*193*	R	*106*	**Q**	*176*	**R**	*74*	**M**	*124*	**N**	
				121	**Q**	*121*	**P**			*121*	P	*51*	L	*85*	L	
116	**Q**	*116*	**Q**													
94	**P**	*94*	**P**													
990	T	*990*	T					*528*	T	*880*	T	*370*	Q	*616*	R	
880	T	*880*	T					*627*	T	*1045*	T	*439*	Q	*732*	R	
495	S	*495*	S					*251*	S	*418*	S	*176*	O	*293*	P	
396	T	*396*	T					*212*	S	*352*	T	*148*	P	*247*	Q	
550	T	*550*	T					*297*	T	*495*	T	*208*	Q	*347*	R	
264	T	*264*	T					*132*	S	*220*	T	*93*	P	*154*	Q	
242	S	*242*	S					*126*	S	*209*	S	*88*	O	*147*	P	
198	S	*198*	S					*119*	S	*198*	S	*84*	O	*139*	P	
242	S	*242*	S					*132*	S	*220*	S	*93*	O	*154*	P	
187	S	*187*	S					*126*	R	*209*	S	*88*	N	*147*	O	
187	S	*187*	S					*146*	R	*242*	S	*102*	N	*170*	O	
154	R	*154*	R					*139*	Q	*231*	R	*97*	M	*162*	N	
264	R	*264*	R													
242	R	*242*	R													

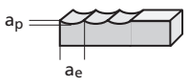
Application recommendations for Carbide Trace End Mills

Feed column

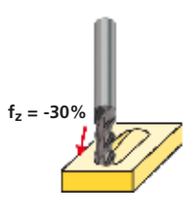
tool-Ø mm	Code-letter	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
	2.00	0.001	0.001	0.001	0.002	0.002	0.004	0.005	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.018	0.020
	3.00	0.002	0.002	0.003	0.003	0.004	0.007	0.010	0.010	0.010	0.015	0.016	0.013	0.019	0.022	0.024	0.030
	5.00	0.005	0.006	0.007	0.009	0.010	0.014	0.020	0.020	0.022	0.025	0.026	0.026	0.028	0.030	0.032	0.038
	6.00	0.006	0.008	0.009	0.011	0.013	0.017	0.024	0.025	0.027	0.031	0.029	0.033	0.039	0.036	0.041	0.047
	8.00	0.010	0.012	0.014	0.016	0.019	0.024	0.032	0.032	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.064
	10.00	0.013	0.015	0.018	0.021	0.025	0.030	0.038	0.039	0.044	0.050	0.053	0.059	0.065	0.066	0.073	0.080
	12.00	0.010	0.018	0.022	0.026	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.085	0.090	0.100
	16.00	0.020	0.023	0.027	0.032	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.120
	20.00	0.023	0.028	0.033	0.038	0.045	0.057	0.066	0.073	0.080	0.090	0.097	0.100	0.110	0.120	0.130	0.140
	25.00	0.030	0.035	0.040	0.045	0.055	0.065	0.075	0.100	0.120	0.130	0.140	0.150	0.165	0.170	0.180	0.190

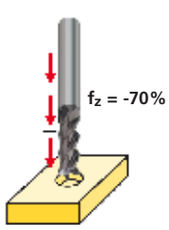
Feed f (mm/tooth)

a_e = Width of cut
a_p = Cutting depth



The new european-wide definitions according to DIN EN for steel and cast are applied for our material examples.





Lubricants:
cutting oil, highly activated ■
soluble oil (emulsion) ■
air only !

Material group	Materials examples, **new designations** (old designation in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm^2)	Hard-ness	Coolant
General purpose steels	**1.0035** S185(St33),**1.0486** P275N(StE285),**1.0345** P235GH(H1),**1.0425** P265GH(H2) **1.0050** E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤500 >500-850		■
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36) **1.0727** 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤850 850-1000		■
Unalloyed tempering steels	**1.0402** C22, **1.1178** C30E (Ck30) **1.0503** C45, **1.1191** C45E (Ck45) **1.0601** C60, **1.1221** C60E (Ck60)	≤ 700 700-850 850-1000		■
Alloyed tempering steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4 **1.5710** 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	850-≤1000 1000-1200		■
Unalloyed case hardened steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤750		■
Alloyed case hardened steels	**1.7043** 38Cr4 **1.5752** 15NiCr13 (15NiCr13), **1.7131** 16MnCr5, **1.7264** 20CrMo5	850-≤1000 1000-1200		■
Nitriding steels	**1.8504** 34CrAl6 **1.8519** 31CrMoV9, **1.8550** 34CrAlNi7	≥850-≤1000 >1000-1200		■ ■
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9 **1.2080** X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤850 >850-1000		■ ■
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≥650-1000		■
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤330 HB	■
Stainless steels, sulphured austenitic martensitic	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9 **1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A) **1.4057** X20CrNi 17 2 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤850 ≤850 ≤850		■
Hardened steels	–		≤40-48 HRC >48-60 HRC	■
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		■
Cast iron	**0.6010** EN-GJL-100(GG10), **0.6020** EN-GJL-200(GG20) **0.6025** EN-GJL-250(GG25), **0.6035** EN-GJL-350(GG35)		≤240 HB <300 HB	■ ! ■ !
Spheroidal graphit iron and maleable cast iron	**0.7050** EN-GJS-500-7(GGG50), **0.8035** EN-GJMW-350-4(GTW35) **0.7070** EN-GJS-700-2(GGG70), **0.8170** EN-GJMB-700-2(GTS70)		≤240 HB <300 HB	■
Chilled cast iron	–		≤350 HB	■
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2 **3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 >850-1200		■
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		■
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤450		■
Al cast alloys ≤ 10 % Si > 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9 **3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		■
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤450		!
Copper, low alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤400		■
Brass, short-chipping long-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2 **2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600 ≤600		■
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn **2.0790** CuNi18Zn19Pb	≤600 >600-850		■ ■ ■
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10 **2.0980** CuAl11Ni, **2.1247** CuBe2	≤850 >850-1000		■
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren		–	!
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon		–	■ !
Kevlar Glass/carbon-concentr. plastics	Kevlar GFK/CFK		– –	!

High Speed Cutting

Catalogue no.	54300 54301						54302 54303					
Tool mat.	Solid carbide						Solid carbide					
Std.	Stock std.						Stock std.					
Type	N						N					
Page	649						643					
												
	Ø	2/3	4	6	8	10	12	Ø	4	6	8	10	12
	Roughing							Roughing					
	eff. Ø *	-	1.74	2.99	4.21	5.27	6.63	eff. Ø *	-	-	-	-	-
	a_p mm	0.10	0.20	0.40	0.60	0.75	1.00	a_p mm	0.20	0.40	0.60	0.75	1.00
	a_e mm	0.15	0.30	0.50	0.75	1.00	1.50	a_e mm	0.30	0.50	0.75	1.00	1.50
	Fine finishing							Fine finishing					
	eff. Ø *	-	1.25	1.81	2.24	2.66	3.07	eff. Ø *	-	-	-	-	-
	a_p mm	0.07	0.10	0.14	0.16	0.18	0.20	a_p mm	0.10	0.14	0.16	0.18	0.20
	a_e mm	0.05	0.07	0.10	0.15	0.20	0.25	a_e mm	0.07	0.10	0.15	0.20	0.25
v_c m/min	v_c m/min	fz (mm)	fz (mm)	fz (mm)	fz (mm)	fz (mm)	fz (mm)	v_c m/min	v_c m/min	fz (mm)	fz (mm)	fz (mm)	fz (mm)	fz (mm)
225	310	0.03	0.03	0.05	0.06	0.08	0.1	225	310	0.03	0.05	0.06	0.08	0.1
170	240	0.02	0.02	0.04	0.05	0.08	0.1	170	240	0.02	0.04	0.05	0.08	0.1
170	240	0.02	0.02	0.04	0.05	0.08	0.1	170	240	0.02	0.04	0.05	0.08	0.1
150	190	0.02	0.02	0.04	0.05	0.08	0.1	150	190	0.02	0.04	0.05	0.08	0.1
190	240	0.02	0.02	0.04	0.05	0.08	0.1	190	240	0.02	0.04	0.05	0.08	0.1
190	240	0.02	0.02	0.04	0.05	0.08	0.1	190	240	0.02	0.04	0.05	0.08	0.1
150	190	0.02	0.02	0.04	0.05	0.08	0.1	150	190	0.02	0.04	0.05	0.08	0.1
150	190	0.02	0.02	0.04	0.05	0.08	0.1	150	190	0.02	0.04	0.05	0.08	0.1
105	140	0.02	0.02	0.04	0.05	0.08	0.1	105	140	0.02	0.04	0.05	0.08	0.1
225	310	0.03	0.03	0.05	0.06	0.08	0.1	225	310	0.03	0.05	0.06	0.08	0.1
150	190	0.02	0.02	0.04	0.05	0.08	0.1	150	190	0.02	0.04	0.05	0.08	0.1
105	140	0.02	0.02	0.04	0.05	0.08	0.1	105	140	0.02	0.04	0.05	0.08	0.1
150	190	0.02	0.02	0.04	0.05	0.08	0.1	150	190	0.02	0.04	0.05	0.08	0.1
105	140	0.02	0.02	0.04	0.05	0.08	0.1	105	140	0.02	0.04	0.05	0.08	0.1
150	190	0.02	0.02	0.04	0.05	0.08	0.1	150	190	0.02	0.04	0.05	0.08	0.1
105	140	0.02	0.02	0.04	0.05	0.08	0.1	105	140	0.02	0.04	0.05	0.08	0.1
80	125	0.02	0.02	0.04	0.05	0.06	0.08	80	125					
80	125	0.02	0.02	0.04	0.05	0.06	0.08	80	125					
225	310	0.03	0.03	0.05	0.06	0.08	0.1	225	310	0.03	0.05	0.06	0.08	0.1
105	140	0.02	0.02	0.04	0.05	0.08	0.1	105	140	0.02	0.04	0.05	0.08	0.1
80	125	0.02	0.02	0.04	0.05	0.06	0.08	80	125	0.02	0.04	0.05	0.06	0.08
300	450	0.04	0.04	0.06	0.08	0.1	0.13	300	450	0.04	0.06	0.08	0.1	0.13
65	80	0.02	0.02	0.04	0.05	0.06	0.08	65	80	0.02	0.04	0.05	0.06	0.08
300	400	0.06	0.06	0.1	0.15	0.2	0.25	300	400	0.06	0.1	0.15	0.2	0.25
300	400	0.05	0.05	0.08	0.1	0.15	0.2	300	400	0.05	0.08	0.1	0.15	0.2
225	325	0.05	0.05	0.08	0.1	0.12	0.15	225	325	0.05	0.08	0.1	0.12	0.15
225	275	0.04	0.04	0.06	0.08	0.1	0.12	225	275	0.04	0.06	0.08	0.1	0.12
80	125	0.02	0.02	0.04	0.05	0.08	0.1	80	125	0.02	0.04	0.05	0.08	0.1
75	100	0.02	0.02	0.04	0.05	0.06	0.08	75	100	0.02	0.04	0.05	0.06	0.08
375	500	0.04	0.04	0.06	0.08	0.1	0.15	375	500	0.04	0.06	0.08	0.1	0.15
500	900	0.04	0.04	0.06	0.08	0.1	0.15	500	900	0.04	0.06	0.08	0.1	0.15
300	450	0.04	0.04	0.06	0.08	0.1	0.13	300	450	0.04	0.06	0.08	0.1	0.13
225	310	0.03	0.03	0.05	0.06	0.08	0.1	225	310	0.03	0.05	0.06	0.08	0.1
225	310	0.03	0.03	0.05	0.06	0.08	0.1	225	310	0.03	0.05	0.06	0.08	0.1
300	350	0.05	0.05	0.08	0.12	0.15	0.2	300	350	0.05	0.08	0.12	0.15	0.2
225	300	0.04	0.04	0.06	0.1	0.12	0.15	225	300	0.04	0.06	0.1	0.12	0.15
225	325	0.05	0.05	0.08	0.1	0.12	0.15	225	325	0.05	0.08	0.1	0.12	0.15
225	275	0.04	0.04	0.06	0.08	0.1	0.12	225	275	0.04	0.06	0.08	0.1	0.12
225	275	0.04	0.04	0.06	0.08	0.1	0.12	225	275	0.04	0.06	0.08	0.1	0.12
150	225	0.03	0.03	0.05	0.08	0.1	0.12	150	225	0.03	0.05	0.08	0.1	0.12

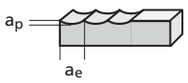
Application recommendations for Carbide Trace End Mills

Feed column

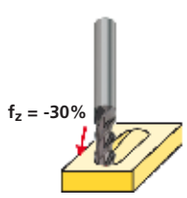
tool-Ø mm	Code-letter	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
	2.00	0.001	0.001	0.001	0.002	0.002	0.004	0.005	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.018	0.020
	3.00	0.002	0.002	0.003	0.003	0.004	0.007	0.010	0.010	0.010	0.015	0.016	0.013	0.019	0.022	0.024	0.030
	5.00	0.005	0.006	0.007	0.009	0.010	0.014	0.020	0.020	0.022	0.025	0.026	0.026	0.028	0.030	0.032	0.038
	6.00	0.006	0.008	0.009	0.011	0.013	0.017	0.024	0.025	0.027	0.031	0.029	0.033	0.039	0.036	0.041	0.047
	8.00	0.010	0.012	0.014	0.016	0.019	0.024	0.032	0.032	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.064
	10.00	0.013	0.015	0.018	0.021	0.025	0.030	0.038	0.039	0.044	0.050	0.053	0.059	0.065	0.066	0.073	0.080
	12.00	0.010	0.018	0.022	0.026	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.085	0.090	0.100
	16.00	0.020	0.023	0.027	0.032	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.120
	20.00	0.023	0.028	0.033	0.038	0.045	0.057	0.066	0.073	0.080	0.090	0.097	0.100	0.110	0.120	0.130	0.140
	25.00	0.030	0.035	0.040	0.045	0.055	0.065	0.075	0.100	0.120	0.130	0.140	0.150	0.165	0.170	0.180	0.190

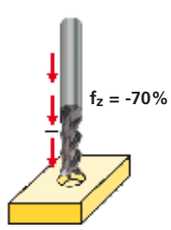
Feed f (mm/tooth)

a_e = Width of cut
a_p = Cutting depth



The new european-wide definitions according to DIN EN for steel and cast are applied for our material examples.





Lubricants:
cutting oil, highly activated ■
soluble oil (emulsion) ■
air only ⚠

Material group	Materials examples, **new designations** (old designation in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm²)	Hard-ness	Coolant
General purpose steels	**1.0035** S185(St33),**1.0486** P275N(StE285),**1.0345** P235GH(H1),**1.0425** P265GH(H2) **1.0050** E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤500 >500-850		■
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36) **1.0727** 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤850 850-1000		■
Unalloyed tempering steels	**1.0402** C22, **1.1178** C30E (Ck30) **1.0503** C45, **1.1191** C45E (Ck45) **1.0601** C60, **1.1221** C60E (Ck60)	≤ 700 700-850 850-1000		■
Alloyed tempering steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4 **1.5710** 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	850-≤1000 1000-1200		■
Unalloyed case hardened steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤750		■
Alloyed case hardened steels	**1.7043** 38Cr4 **1.5752** 15NiCr13 (15NiCr13), **1.7131** 16MnCr5, **1.7264** 20CrMo5	850-≤1000 1000-1200		■
Nitriding steels	**1.8504** 34CrAl6 **1.8519** 31CrMoV9, **1.8550** 34CrAlNi7	≥850-≤1000 >1000-1200		■ ■
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9 **1.2080** X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤850 >850-1000		■ ■
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≥650-1000		■
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤330 HB	■
Stainless steels, sulphured austenitic martensitic	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9 **1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A) **1.4057** X20CrNi 17 2 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤850 ≤850 ≤850		■
Hardened steels	–		≤40-48 HRC >48-60 HRC	■
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		■
Cast iron	**0.6010** EN-GJL-100(GG10), **0.6020** EN-GJL-200(GG20) **0.6025** EN-GJL-250(GG25), **0.6035** EN-GJL-350(GG35)		≤240 HB <300 HB	■ ⚠
Spheroidal graphit iron and maleable cast iron	**0.7050** EN-GJS-500-7(GGG50), **0.8035** EN-GJMW-350-4(GTW35) **0.7070** EN-GJS-700-2(GGG70), **0.8170** EN-GJMB-700-2(GTS70)		≤240 HB <300 HB	■
Chilled cast iron	–		≤350 HB	■
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2 **3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 >850-1200		■
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		■
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤450		■
Al cast alloys ≤ 10 % Si > 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9 **3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		■
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤450		⚠
Copper, low alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤400		■
Brass, short-chipping long-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2 **2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600 ≤600		■
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn **2.0790** CuNi18Zn19Pb	≤600 >600-850		■ ■ ■
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10 **2.0980** CuAl11Ni, **2.1247** CuBe2	≤850 >850-1000		■
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren		–	⚠
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon		–	■ ⚠
Kevlar Glass/carbon-concentr. plastics	Kevlar GFK/CFK		– –	⚠

High Speed Cutting

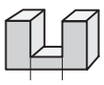
Catalogue no.	54306 54307						54304 54305					
Tool mat.	Solid carbide						Solid carbide					
Std.	Stock std.						Stock std.					
Type	N						N					
Page	646						640					
												
	Ø	2/3	4	6	8	10	12	Ø	4	6	8	10	12
	Roughing							**Roughing**					
	eff. Ø *	1.74	2.99	4.21	5.27	6.63	9.33	eff. Ø *	-	-	-	-	-
	a_p mm	0.20	0.40	0.60	0.75	1.00	1.50	a_p mm	0.40	0.60	0.75	1.00	1.50
	a_e mm	0.30	0.50	0.75	1.00	1.50	2.50	a_e mm	3.50	5.50	6.50	8.50	11.50
	Fine finishing							**Fine finishing**					
	eff. Ø *	1.25	1.81	2.24	2.66	3.07	3.97	eff. Ø *	-	-	-	-	-
	a_p mm	0.10	0.14	0.16	0.18	0.20	0.25	a_p mm	0.15	0.20	0.30	0.40	0.50
	a_e mm	0.07	0.10	0.15	0.20	0.25	0.30	a_e mm	0.20	0.30	0.40	0.60	1.00
v_c m/min	v_c m/min	fz (mm)	fz (mm)	fz (mm)	fz (mm)	fz (mm)	fz (mm)	v_c m/min	v_c m/min	fz (mm)	fz (mm)	fz (mm)	fz (mm)	fz (mm)
								200	*230*	**0.05**	**0.06**	**0.07**	**0.08**	**0.1**
								200	*230*	**0.05**	**0.06**	**0.07**	**0.08**	**0.1**
								200	*230*	**0.05**	**0.06**	**0.07**	**0.08**	**0.1**
300	*350*	**0.04**	**0.06**	**0.08**	**0.1**	**0.15**	**0.2**	*200*	*230*	**0.05**	**0.06**	**0.07**	**0.08**	**0.1**
200	*300*	**0.04**	**0.06**	**0.08**	**0.1**	**0.13**	**0.15**	*160*	*190*	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**
150	*250*	**0.03**	**0.05**	**0.06**	**0.08**	**0.1**	**0.12**	*105*	*125*	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**
200 *150*	*300* *180*	**0.04** **0.02**	**0.06** **0.04**	**0.08** **0.05**	**0.1** **0.08**	**0.13** **0.1**	**0.15** **0.12**	*150* *75*	*175* *95*	**0.05** **0.02**	**0.06** **0.03**	**0.07** **0.04**	**0.08** **0.05**	**0.1** **0.06**
300 *300*	*400* *400*	**0.06** **0.05**	**0.1** **0.08**	**0.15** **0.1**	**0.2** **0.15**	**0.25** **0.2**	**0.3** **0.25**	*300* *300*	*400* *400*	**0.06** **0.06**	**0.08** **0.08**	**0.1** **0.1**	**0.12** **0.12**	**0.15** **0.15**
250 *250*	*325* *275*	**0.05** **0.04**	**0.08** **0.06**	**0.1** **0.08**	**0.12** **0.1**	**0.15** **0.12**	**0.2** **0.15**	*250* *225*	*325* *275*	**0.05** **0.04**	**0.06** **0.05**	**0.07** **0.06**	**0.08** **0.07**	**0.1** **0.08**
150	*225*	**0.03**	**0.05**	**0.08**	**0.1**	**0.12**	**0.15**	*150*	*225*	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**
400	*475*	**0.06**	**0.1**	**0.15**	**0.2**	**0.25**	**0.3**	*400*	*475*	**0.06**	**0.08**	**0.1**	**0.12**	**0.15**
300 *275*	*350* *300*	**0.05** **0.04**	**0.08** **0.06**	**0.12** **0.1**	**0.15** **0.12**	**0.2** **0.15**	**0.3** **0.2**	*300* *275*	*350* *300*	**0.06** **0.05**	**0.08** **0.06**	**0.1** **0.07**	**0.12** **0.08**	**0.15** **0.1**

Application recommendations for slot drilling

tool-Ø mm	Code-letter	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
		Feed column															
	2.00	0.001	0.001	0.001	0.002	0.002	0.004	0.005	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.018	0.020
	3.00	0.002	0.002	0.003	0.003	0.004	0.007	0.010	0.010	0.010	0.015	0.016	0.013	0.019	0.022	0.024	0.030
	5.00	0.005	0.006	0.007	0.009	0.010	0.014	0.020	0.020	0.022	0.025	0.026	0.026	0.028	0.030	0.032	0.038
	6.00	0.006	0.008	0.009	0.011	0.013	0.017	0.024	0.025	0.027	0.031	0.029	0.033	0.039	0.036	0.041	0.047
	8.00	0.010	0.012	0.014	0.016	0.019	0.024	0.032	0.032	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.064
	10.00	0.013	0.015	0.018	0.021	0.025	0.030	0.038	0.039	0.044	0.050	0.053	0.059	0.065	0.066	0.073	0.080
	12.00	0.010	0.018	0.022	0.026	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.085	0.090	0.100
	16.00	0.020	0.023	0.027	0.032	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.120
	20.00	0.023	0.028	0.033	0.038	0.045	0.057	0.066	0.073	0.080	0.090	0.097	0.100	0.110	0.120	0.130	0.140
	25.00	0.030	0.035	0.040	0.045	0.055	0.065	0.075	0.100	0.120	0.130	0.140	0.150	0.165	0.170	0.180	0.190

Feed f (mm/tooth)

a_e = Width of cut
a_p = Cutting depth

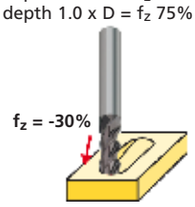


a_e = 1.0 x D

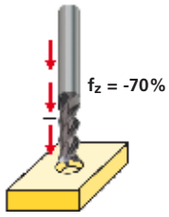
Feed rate codes in bold are the preferred choice for the respective material group.

The new european-wide definitions according to DIN EN for steel and cast are applied for our material examples.

Oblique plunging and slot milling
For oblique plunging the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for drilling depths in excess of 1 x D. This also applies to the transition to radial machining.
slot milling
a_p = cut. depth 0.5 x D = f_z 100%
a_p = cut. depth 1.0 x D = f_z 75%



Drilling
For drilling the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for larger drilling depths in excess of 0.5 x D.

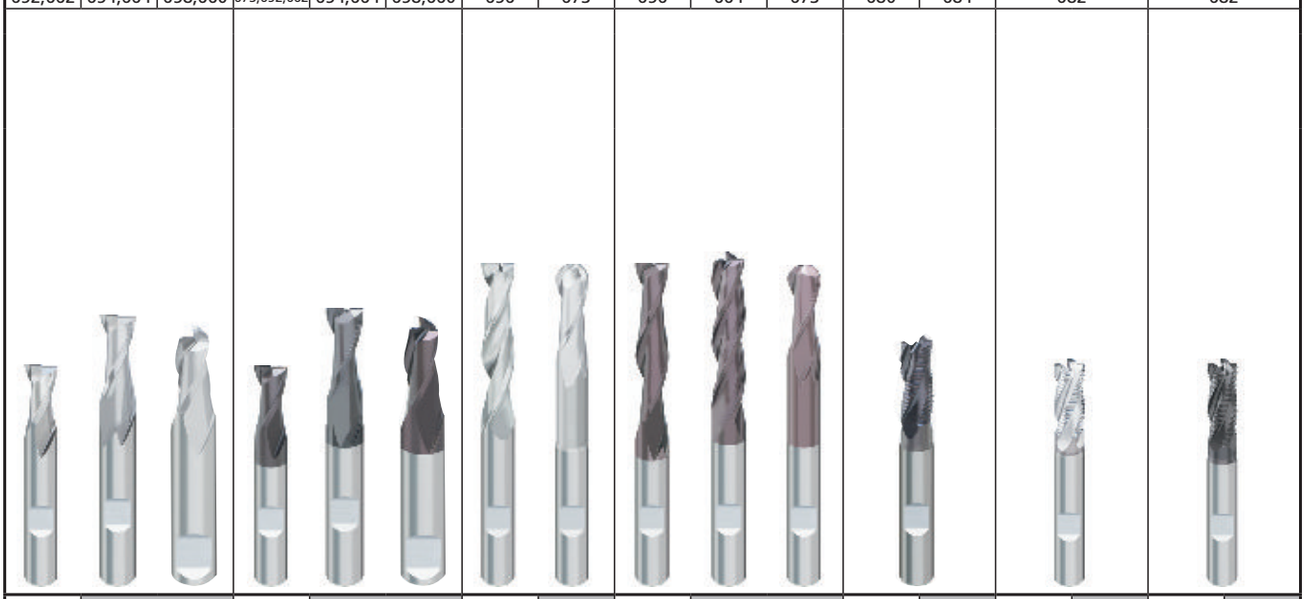


Lubricants:
cutting oil, highly activated ■
soluble oil (emulsion) ■
air only !

Material group	Materials examples, **new designations** (old designation in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm^2)	Hard-ness	Coolant
General purpose steels	**1.0035** S185(St33),**1.0486** P275N(StE285),**1.0345** P235GH(H1),**1.0425** P265GH(H2) **1.0050** E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤500 >500-850		■
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36) **1.0727** 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤850 850-1000		■
Unalloyed tempering steels	**1.0402** C22, **1.1178** C30E (Ck30) **1.0503** C45, **1.1191** C45E (Ck45) **1.0601** C60, **1.1221** C60E (Ck60)	≤ 700 700-850 850-1000		■
Alloyed tempering steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4 **1.5710** 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	850-≤1000 1000-1200		■
Unalloyed case hardened steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤750		■
Alloyed case hardened steels	**1.7043** 38Cr4 **1.5752** 15NiCr13 (15NiCr13), **1.7131** 16MnCr5, **1.7264** 20CrMo5	850-≤1000 1000-1200		■
Nitriding steels	**1.8504** 34CrAl6 **1.8519** 31CrMoV9, **1.8550** 34CrAlNi7	≥850-≤1000 >1000-1200		■ ■
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9 **1.2080** X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤850 >850-1000		■ ■
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≥650-1000		■
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤330 HB	■
Stainless steels, sulphured austenitic martensitic	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9 **1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A) **1.4057** X20CrNi 17 2 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤850 ≤850 ≤850		■
Hardened steels	–		≤40-48 HRC >48-60 HRC	■
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		■
Cast iron	**0.6010** EN-GJL-100(GG10), **0.6020** EN-GJL-200(GG20) **0.6025** EN-GJL-250(GG25), **0.6035** EN-GJL-350(GG35)		≤240 HB <300 HB	■ !
Spheroidal graphit iron and maleable cast iron	**0.7050** EN-GJS-500-7(GGG50), **0.8035** EN-GJMW-350-4(GTW35) **0.7070** EN-GJS-700-2(GGG70), **0.8170** EN-GJMB-700-2(GTS70)		≤240 HB <300 HB	■
Chilled cast iron	–		≤350 HB	■
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2 **3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 >850-1200		■
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		■
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤450		■
Al cast alloys ≤ 10 % Si > 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9 **3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		■
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤450		!
Copper, low alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤400		■
Brass, short-chipping long-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2 **2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600 ≤600		■
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn **2.0790** CuNi18Zn19Pb	≤600 >600-850		■ ■ ■
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10 **2.0980** CuAl11Ni, **2.1247** CuBe2	≤850 >850-1000		■
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren		–	!
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon		–	■ !
Kevlar Glass/carbon-concentr. plastics	Kevlar GFK/CFK		– –	!

Slot drilling

Catalogue no.	74231 74280	74243 74282	74080 74180	54275 64640 64604	64670 64641	54080 54180	74244	74276	64671	54294	54276	54825	54845	74816	54816
Tool mat.	M42			M42			M42		M42			HSS-E-PM		M42	M42
Std.	327 D	844 K	Stock	327 D	844 K	Stock	844 L		844 L		Stock	844 K		844 K	844 K
Type	N			N			N		N			NRf		NR	NR
Page	652,662	654,664	658,660	673,652,662	654,664	658,660	656	673	656	664	673	680	684	682	682



v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.
28	M	61	M	22	K	49	K	90	O	34	M	61	N
25	L	55	L	20	K	44	K	80	N	30	K	55	L
25	L	55	L	20	K	44	K	80	N	30	K	55	L
22	M	50	M	18	K	40	K	75	M	28	J	50	K
28	L	61	L	22	K	49	K	90	N	34	K	61	L
26	L	55	L	21	K	44	K	80	N	30	K	55	L
22	M	50	M	18	K	40	K	75	M	28	J	50	K
22	M	50	M	18	K	40	K	75	M	28	J	50	K
17	M	39	M	14	K	31	K	60	L	22	I	39	J
28	L	61	L	22	K	49	K	90	N	34	K	61	L
22	L	50	L	18	K	40	K	75	N	28	K	50	L
17	M	39	M	14	K	31	K	60	M	22	J	39	K
22	L	50	L	18	K	40	K	75	N	28	K	50	L
17	L	39	L	14	K	31	K	60	L	22	I	39	J
28	L	61	L	22	K	49	K	90	N	34	K	61	L
11	L	28	L	9	K	22	K	40	L	15	I	28	J
11	M	28	M	9	K	22	K	40	M	15	J	28	K
11	L	22	L					33	L			22	J
18	M	42	M					65	M	23	J	42	K
14	L	39	L					60	L	21	I	39	J
14	L	39	L					60	M	21	J	39	K
5	L	9	L					14	L			9	J
20	L	50	L	16	K	40	K	75	N	28	K	50	L
14	L	42	L	11	K	34	K	65	M			42	K
20	L	50	L	16	K	40	K	75	N	28	K	50	L
14	L	42	L	11	K	34	K	65	M			42	K
11	L	31	L					45	K			31	I
11	L	25	L					36	L	13	I	25	J
7	L	11	L					17	K			11	I
154	N	220	N										
110	N	198	N										
88	M	132	M										
44	N	121	N										
66	O	143	O										
61	N	99	N										
61	N	99	N										
39	M	94	M										
39	M	94	M										
33	L	72	L										
33	M	72	M										
17	L	44	L										

Application recommendations for HSS Milling Cutters

Feed column

tool-Ø mm	Code-letter H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
2.00	0.001	0.001	0.001	0.002	0.002	0.004	0.005	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.018	0.020
3.00	0.002	0.002	0.003	0.003	0.004	0.007	0.010	0.010	0.010	0.015	0.016	0.013	0.019	0.022	0.024	0.030
5.00	0.005	0.006	0.007	0.009	0.010	0.014	0.020	0.020	0.022	0.025	0.026	0.026	0.028	0.030	0.032	0.038
6.00	0.006	0.008	0.009	0.011	0.013	0.017	0.024	0.025	0.027	0.031	0.029	0.033	0.039	0.036	0.041	0.047
8.00	0.010	0.012	0.014	0.016	0.019	0.024	0.032	0.032	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.064
10.00	0.013	0.015	0.018	0.021	0.025	0.030	0.038	0.039	0.044	0.050	0.053	0.059	0.065	0.066	0.073	0.080
12.00	0.010	0.018	0.022	0.026	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.085	0.090	0.100
16.00	0.020	0.023	0.027	0.032	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.120
20.00	0.023	0.028	0.033	0.038	0.045	0.057	0.066	0.073	0.080	0.090	0.097	0.100	0.110	0.120	0.130	0.140
25.00	0.030	0.035	0.040	0.045	0.055	0.065	0.075	0.100	0.120	0.130	0.140	0.150	0.165	0.170	0.180	0.190

Feed f (mm/tooth)

a_e = Width of cut
a_p = Cutting depth

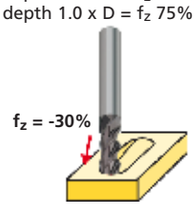
a_e = 0.5 x D

a_e = 1.0 x D

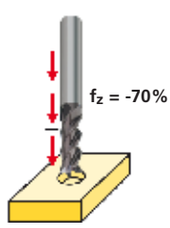
Feed rate codes in bold are the preferred choice for the respective material group.

The new european-wide definitions according to DIN EN for steel and cast are applied for our material examples.

Oblique plunging and slot milling
For oblique plunging the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for drilling depths in excess of 1 x D. This also applies to the transition to radial machining.
slot milling
a_p = cut. depth 0.5 x D = f_z 100%
a_p = cut. depth 1.0 x D = f_z 75%



Drilling
For drilling the feed rate (v_f = mm/min) should be reduced as illustrated.
In addition, chip evacuation is required for larger drilling depths in excess of 0.5 x D.



Lubricants:
cutting oil, highly activated ■
soluble oil (emulsion) ■
air only !

Material group	Materials examples, **new designations** (old designation in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm^2)	Hard-ness	Coolant
General purpose steels	**1.0035** S185(St33),**1.0486** P275N(StE285),**1.0345** P235GH(H1),**1.0425** P265GH(H2) **1.0050** E295 (St50-2), **1.0070** E360 (St70-2), **1.8937** P500NH (WStE500)	≤500 >500-850		■
Free-cutting steels	**1.0718** 11SMnPb30 (9SMnPb28), **1.0736** 11SMn37 (9SMn36) **1.0727** 46S20 (45S20), **1.0728** (60S20), **1.0757** 46SPb20 (45SPb20)	≤850 850-1000		■
Unalloyed tempering steels	**1.0402** C22, **1.1178** C30E (Ck30) **1.0503** C45, **1.1191** C45E (Ck45) **1.0601** C60, **1.1221** C60E (Ck60)	≤ 700 700-850 850-1000		■
Alloyed tempering steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4 **1.5710** 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	850-≤1000 1000-1200		■
Unalloyed case hardened steels	**1.0301** (C10), **1.1121** C10E (Ck10)	≤750		■
Alloyed case hardened steels	**1.7043** 38Cr4 **1.5752** 15NiCr13 (15NiCr13), **1.7131** 16MnCr5, **1.7264** 20CrMo5	850-≤1000 1000-1200		■
Nitriding steels	**1.8504** 34CrAl6 **1.8519** 31CrMoV9, **1.8550** 34CrAlNi7	≥850-≤1000 >1000-1200		■ ■
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9 **1.2080** X210Cr12, **1.2083** X42Cr13, **1.2419** 105WCr6, **1.2767** X45NiCrMo4	≤850 >850-1000		■ ■
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≥650-1000		■
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4 (51CrV4)		≤330 HB	■
Stainless steels, sulphured austenitic martensitic	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105** X6CrMoS17, **1.4305** X8CrNiS18-9 **1.4301** X5CrNi18-10 (V2A), **1.4541** X6CrNiTi18-10, **1.4571** X6CrNiMoTi 17-12-2 (V4A) **1.4057** X20CrNi 17 2 (X17CrNi16-2), **1.4122** X39CrMo17-1, **1.4521** X2CrMoTi18-2	≤850 ≤850 ≤850		■
Hardened steels	–		≤40-48 HRC >48-60 HRC	■
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		■
Cast iron	**0.6010** EN-GJL-100(GG10), **0.6020** EN-GJL-200(GG20) **0.6025** EN-GJL-250(GG25), **0.6035** EN-GJL-350(GG35)		≤240 HB <300 HB	■ ! ■ !
Spheroidal graphit iron and maleable cast iron	**0.7050** EN-GJS-500-7(GGG50), **0.8035** EN-GJMW-350-4(GTW35) **0.7070** EN-GJS-700-2(GGG70), **0.8170** EN-GJMB-700-2(GTS70)		≤240 HB <300 HB	■
Chilled cast iron	–		≤350 HB	■
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2 **3.7154** TiAl6Zr5, **3.7165** TiAl6V4, **3.7184** TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 >850-1200		■
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400		■
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245** AlMg3Si, **3.4365** AlZnMgCu1,5	≤450		■
Al cast alloys ≤ 10 % Si > 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9 **3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		■
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05** G-MgAl6Zn1	≤450		!
Copper, low alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤400		■
Brass, short-chipping long-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410** CuZn43Pb2 **2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600 ≤600		■
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176** CuPb10Sn **2.0790** CuNi18Zn19Pb	≤600 >600-850		■ ■ ■
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10 **2.0980** CuAl11Ni, **2.1247** CuBe2	≤850 >850-1000		■
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren		–	!
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon		–	■ !
Kevlar Glass/carbon-concentr. plastics	Kevlar GFK/CFK		– –	!

Finishing

Roughing

Catalogue no.	74617		74847		64667	54847	74800		74825	74845	54825	54845	74816 74836	74815 74835	54816 54836	54815 54835
Tool mat.	M42		M42		M42		M42		HSS-E-PM		HSS-E-PM		M42		M42	
Std.	844K		844 L		844 K	844 L	Stock std.		844 K		844 K		844 K L	844 K L	844 K L	844 K L
Type	N		N		N		N		NRf		NRf		NR	NF	NF	
Page	667		669		667	669	671		680	684	680	684	682,686	676,678	682,686	676,678
																
v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	v_c m/min	Feed col.	
28	**M**	*31*	**N**	*68*	**O**	*19*	**L**	*57*	**O**	*102*	**P**	*38*	**N**	*68*	**O**	
24	**L**	*27*	**M**	*61*	**N**	*16*	**K**	*51*	**N**	*92*	**O**	*33*	**L**	*61*	**M**	
24	**L**	*27*	**M**	*61*	**N**	*16*	**K**	*51*	**N**	*92*	**O**	*33*	**L**	*61*	**M**	
22	**K**	*25*	**L**	*55*	**M**	*15*	**K**	*46*	**M**	*83*	**N**	*31*	**L**	*55*	**L**	
28	**L**	*31*	**M**	*68*	**N**	*19*	**K**	*57*	**N**	*102*	**O**	*38*	**L**	*68*	**M**	
25	**L**	*28*	**M**	*61*	**N**	*17*	**K**	*51*	**N**	*92*	**O**	*33*	**L**	*61*	**M**	
22	**K**	*25*	**L**	*55*	**M**	*15*	**K**	*46*	**M**	*83*	**N**	*31*	**L**	*55*	**L**	
22	**K**	*25*	**L**	*55*	**M**	*15*	**K**	*46*	**M**	*83*	**N**	*31*	**L**	*55*	**L**	
17	**J**	*19*	**L**	*43*	**L**	*11*	**K**	*36*	**L**	*65*	**M**	*24*	**K**	*43*	**L**	
28	**L**	*31*	**M**	*68*	**N**	*19*	**K**	*57*	**N**	*102*	**O**	*38*	**L**	*68*	**M**	
22	**L**	*25*	**M**	*55*	**N**	*15*	**K**	*46*	**N**	*83*	**O**	*31*	**L**	*55*	**M**	
17	**K**	*19*	**L**	*43*	**M**	*11*	**K**	*36*	**M**	*65*	**N**	*24*	**L**	*43*	**L**	
22	**L**	*25*	**M**	*55*	**N**	*15*	**K**	*46*	**N**	*83*	**O**	*31*	**L**	*55*	**M**	
17	**J**	*19*	**L**	*43*	**L**	*11*	**K**	*36*	**L**	*65*	**M**	*24*	**K**	*43*	**L**	
28	**L**	*31*	**M**	*68*	**N**	*19*	**K**	*57*	**N**	*102*	**O**	*38*	**L**	*68*	**M**	
11	J	*13*	L	*31*	L	*8*	K	*26*	**L**	*47*	**M**	*17*	**K**	*31*	**L**	
11	K	*13*	L	*31*	M	*8*	K	*26*	**M**	*47*	**N**	*17*	**L**	*31*	**L**	
		13	**L**	*25*	**L**			*20*	**L**	*37*	**M**	*14*	**K**	*25*	**L**	
18	**K**	*20*	**L**	*47*	**M**	*13*	**K**	*39*	**M**	*70*	**N**	*26*	**L**	*47*	**L**	
13	**J**	*15*	**L**	*43*	**L**	*9*	**K**	*36*	**L**	*65*	**M**	*24*	**K**	*43*	**L**	
13	**K**	*15*	**L**	*43*	**M**	*9*	**K**	*36*	**M**	*65*	**N**	*24*	**L**	*43*	**L**	
		5	L	*10*	L			*9*	**L**	*16*	**M**	*6*	K	*10*	L	
20	**L**	*22*	**M**	*55*	**N**			*46*	**N**	*83*	**O**	*31*	**L**	*55*	**M**	
		15	**L**	*47*	**M**			*39*	**M**	*70*	**N**	*26*	**L**	*47*	**L**	
20	**L**	*22*	**M**	*55*	**N**			*46*	**N**	*83*	**O**	*31*	**L**	*55*	**M**	
		15	**L**	*47*	**M**			*39*	**M**	*70*	**N**	*26*	**L**	*47*	**L**	
11	I	*13*	K	*35*	L			*29*	**L**	*52*	**L**	*19*	K	*35*	K	
11	J	*13*	L	*27*	L			*22*	**L**	*40*	**M**	*15*	K	*27*	L	
		8	K	*13*	L			*10*	**L**	*19*	**L**	*7*	K	*13*	K	
155	O	*170*	P	*242*	Q											
110	N	*121*	O	*218*	P											
90	M	*97*	N	*146*	O											
40	N	*49*	O	*134*	P											
65	O	*73*	P	*158*	Q											
62	N	*68*	O	*109*	P											
62	M	*68*	N	*109*	O											
40	M	*43*	N	*104*	O											
40	M	*43*	N	*104*	O											
33	L	*37*	M	*80*	N											
33	L	*37*	M	*80*	N											
17	K	*19*	L	*49*	M											

End Mills, type F-UT N

DIN 6527 K

Catalogue no. 64550

Suitable for milling steel, cast iron, chilled cast iron, malleable cast iron, CrNi steels, bronze, brass, copper, aluminium with a high silicon contentand abrasive materials. Especially suitable for less rigid machines. Unequal helix angle achieves smooth and vibration-free operation, giving excellent surface finish.

Tool material	Solid carbide
Surface	FIRE
Type	*F-UT N*
Flute form	35°/38°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

End Mills, type F-UT N

DIN 6527 L

Catalogue no. 54551

Suitable for milling steel, cast iron, chilled cast iron, malleable cast iron, CrNi steels, bronze, brass, copper, aluminium with a high silicon contentand abrasive materials. Especially suitable for less rigid machines. Unequal helix angle achieves smooth and vibration-free operation, giving excellent surface finish.

Tool material	Solid carbide
Surface	FIRE
Type	*F-UT N*
Flute form	35°/38°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

End Mills, type F-UT N

DIN 6527 L

Catalogue no. 64551

Suitable for milling steel, cast iron, chilled cast iron, malleable cast iron, CrNi steels, bronze, brass, copper, aluminium with a high silicon contentand abrasive materials. Especially suitable for less rigid machines. Unequal helix angle achieves smooth and vibration-free operation, giving excellent surface finish.

Tool material	Solid carbide
Surface	FIRE
Type	*F-UT N*
Flute form	35°/38°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

End Mills, type F-UT N

Catalogue no. **54552**

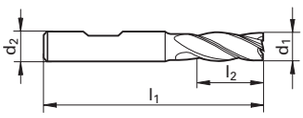
Extra long version, suitable for milling steel, cast iron,chilled cast iron, malleable cast iron, CrNi steels, bronze, brass, copper,aluminium with a high silicon contentand abrasive materials. Especially suitable for less rigid machines. Unequal helix angle achieves smooth and vibration-free operation, giving excellent surface finish.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*F-UT N*
Flute form	35°/38°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

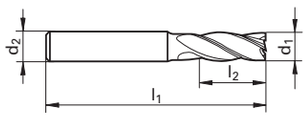
End Mills, type F-UT N



Catalogue no.	64550
Tool material	Solid carbide
Type	F-UT N
Discount group	106
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
6.000	6.000	54.00	7.00	4	●
8.000	8.000	58.00	9.00	4	●
10.000	10.000	66.00	11.00	4	●
12.000	12.000	73.00	12.00	4	●
14.000	14.000	75.00	14.00	4	●
16.000	16.000	82.00	16.00	4	●
18.000	18.000	84.00	18.00	4	●
20.000	20.000	92.00	20.00	4	●

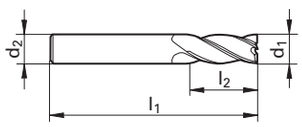
End Mills, type F-UT N



Catalogue no.	54551	64551
Tool material	Solid carbide	
Type	F-UT N	
Discount group	106	106
Surface	FIRE	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
4.000	6.000	57.00	11.00	4	●	●
5.000	6.000	57.00	13.00	4	●	●
6.000	6.000	57.00	13.00	4	●	●
8.000	8.000	63.00	19.00	4	●	●
10.000	10.000	72.00	22.00	4	●	●
12.000	12.000	83.00	26.00	4	●	●
14.000	14.000	83.00	26.00	4	●	●
16.000	16.000	92.00	32.00	4	●	●
18.000	18.000	92.00	32.00	4	●	●
20.000	20.000	104.00	38.00	4	●	●

End Mills, type F-UT N



Catalogue no.	54552
Tool material	Solid carbide
Type	F-UT N
Discount group	106
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
10.000	10.000	100.00	40.00	4	●
12.000	12.000	150.00	45.00	4	●
14.000	14.000	150.00	45.00	4	●
16.000	16.000	150.00	65.00	4	●
18.000	18.000	150.00	65.00	4	●
20.000	20.000	150.00	65.00	4	●
25.000	25.000	150.00	75.00	4	●

End Mills, type F-UT Al

DIN 6527 L

Catalogue no. **74554**

Suitable for milling aluminium and aluminium alloys, plastics, copper alloys and non-ferrous metals. Especially suitable for less rigid machines. Unequal helix angle achieves smooth and vibration-free operation, giving excellent surface finish.

Tool material	Solid carbide
Surface	bright
Type	*F-UT AL*
Flute form	40°/42°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

End Mills, type F-UT Al

DIN 6527 L

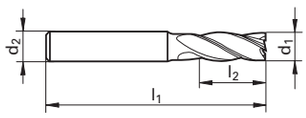
Catalogue no. **74555**

Suitable for milling aluminium and aluminium alloys, plastics, copper alloys and non-ferrous metals. Especially suitable for less rigid machines. Unequal helix angle achieves smooth and vibration-free operation, giving excellent surface finish.

Tool material	Solid carbide
Surface	bright
Type	*F-UT AL*
Flute form	40°/42°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

End Mills, type F-UT Al



Catalogue no.	74554	74555
Tool material	Solid carbide	
Type	F-UT AL	
Discount group	106	106
Surface	bright	bright

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
4.000	6.000	57.00	11.00	4	●	●
5.000	6.000	57.00	13.00	4	●	●
6.000	6.000	57.00	13.00	4	●	●
8.000	8.000	63.00	19.00	4	●	●
10.000	10.000	72.00	22.00	4	●	●
12.000	12.000	83.00	26.00	4	●	●
16.000	16.000	92.00	32.00	4	●	●
20.000	20.000	104.00	38.00	4	●	●

Finishing End Mills, type F-UT FS

DIN 6527 L

Catalogue no. 64558

For super-finishing operations with an outstanding quality of surface finish we dispose of the two long multi-fluted milling cutters type Super F-UT FS. The unequal spiral angle of 44°/45°/46° suits optimal the particular requirements of super-finishing operations. For finishing operations in materials up to 50 HRC.

Tool material	Solid carbide
Surface	FIRE
Type	*F-UT FS*
Flute form	44°/45°/46°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

Finishing End Mills, type F-UT FS

DIN 6527 L

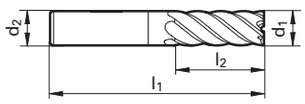
Catalogue no. 64559

For super-finishing operations with an outstanding quality of surface finish we dispose of the two long multi-fluted milling cutters type Super F-UT FS. The unequal spiral angle of 44°/45°/46° suits optimal the particular requirements of super-finishing operations. For finishing operations in materials up to 50 HRC.

Tool material	Solid carbide
Surface	FIRE
Type	*F-UT FS*
Flute form	44°/45°/46°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Finishing End Mills, type F-UT FS



Catalogue no.	64558	64559
Tool material	Solid carbide	
Type	F-UT FS	
Discount group	106	106
Surface	FIRE	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
8.000	8.000	63.00	19.00	6	●	●
10.000	10.000	72.00	22.00	6	●	●
12.000	12.000	83.00	26.00	6	●	●
16.000	16.000	92.00	32.00	6	●	●
20.000	20.000	104.00	38.00	6	●	●

End Mills, type F-UT VA

DIN 6527 L

Catalogue no. **54556**

The Super F-UT VA Milling Cutters are at your disposal suited for long-chipping, tough materials like stainless steel. The milling cutter with an unequal spiral angle of 40°/42° is especially suitable for roughing and finishing operations.

Tool material	Solid carbide
Surface	FIRE
Type	*F-UT VA*
Flute form	40°/42°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

End Mills, type F-UT VA

DIN 6527 L

Catalogue no. **64557**

The Super F-UT VA Milling Cutters are at your disposal suited for long-chipping, tough materials like stainless steel. The milling cutter with an unequal spiral angle of 40°/42° is especially suitable for roughing and finishing operations.

Tool material	Solid carbide
Surface	FIRE
Type	*F-UT VA*
Flute form	40°/42°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

End Mills, type F-UT VA

DIN 6527 L

Catalogue no. **64567**

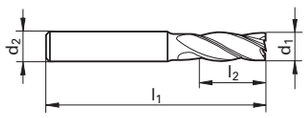
With internal coolant.

The Super F-UT VA Milling Cutters are at your disposal suited for long-chipping, tough materials like stainless steel. The milling cutter with an unequal spiral angle of 40°/42° is especially suitable for roughing and finishing operations.

Tool material	Solid carbide
Surface	FIRE
Type	*F-UT VA*
Flute form	40°/42°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

End Mills, type F-UT VA



Catalogue no.	**54556**	**64557**	**64567**
Tool material	**Solid carbide**		
Type	**F-UT VA**		
Discount group	**106**	**106**	**106**
Surface	**FIRE**	**FIRE**	**FIRE**

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€		
4.000	6.000	57.00	11.00	4	●	●	
5.000	6.000	57.00	13.00	4	●	●	
6.000	6.000	57.00	13.00	4	●	●	●
8.000	8.000	63.00	19.00	4	●	●	●
10.000	10.000	72.00	22.00	4	●	●	●
12.000	12.000	83.00	26.00	4	●	●	●
16.000	16.000	92.00	32.00	4	●	●	●
20.000	20.000	104.00	38.00	4	●	●	●

Solid carbide milling cutters

Slot drills, 2-fluted

DIN 6527 K

Catalogue no. **74520**

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	bright
Type	*N*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 2-fluted

DIN 6527 K

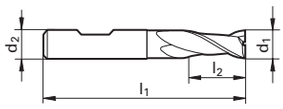
Catalogue no. **54520**

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 2-fluted



Catalogue no.	74520	54520
Tool material	Solid carbide	
Type	N	
Discount group	117	117
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
2.000	6.000	50.00	3.00	2	●	●
2.500	6.000	50.00	3.00	2	❍	
3.000	6.000	50.00	4.00	2	●	●
3.500	6.000	50.00	4.00	2	❍	
4.000	6.000	54.00	5.00	2	●	●
4.500	6.000	54.00	5.00	2	❍	
5.000	6.000	54.00	6.00	2	●	●
5.500	6.000	54.00	7.00	2	❍	
6.000	6.000	54.00	7.00	2	●	●
6.500	8.000	58.00	8.00	2	❍	
7.000	8.000	58.00	8.00	2	❍	
7.500	8.000	58.00	9.00	2	❍	
8.000	8.000	58.00	9.00	2	●	●
8.500	10.000	66.00	10.00	2	❍	
9.000	10.000	66.00	10.00	2	❍	
9.500	10.000	66.00	11.00	2	❍	
10.000	10.000	66.00	11.00	2	●	●
11.000	12.000	73.00	12.00	2	❍	
12.000	12.000	73.00	12.00	2	●	●
13.000	14.000	75.00	14.00	2	❍	
14.000	14.000	75.00	14.00	2	●	●
15.000	16.000	82.00	16.00	2	❍	
16.000	16.000	82.00	16.00	2	●	●
18.000	18.000	84.00	18.00	2	●	●
20.000	20.000	92.00	20.00	2	●	●

Slot drills, 2-fluted

DIN 6527 L

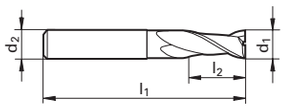
Catalogue no. **54519**

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 2-fluted



Catalogue no.	54519
Tool material	Solid carbide
Type	N
Discount group	117
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
2.000	6.000	57.00	6.00	2	●
2.800	6.000	57.00	7.00	2	●
3.000	6.000	57.00	7.00	2	●
3.800	6.000	57.00	8.00	2	●
4.000	6.000	57.00	8.00	2	●
4.800	6.000	57.00	10.00	2	●
5.000	6.000	57.00	10.00	2	●
5.750	6.000	57.00	10.00	2	●
6.000	6.000	57.00	10.00	2	●
6.750	8.000	63.00	13.00	2	●
7.000	8.000	63.00	13.00	2	●
7.750	8.000	63.00	16.00	2	●
8.000	8.000	63.00	16.00	2	●
8.700	10.000	72.00	16.00	2	●
9.000	10.000	72.00	16.00	2	●
9.700	10.000	72.00	19.00	2	●
10.000	10.000	72.00	19.00	2	●
11.700	12.000	83.00	22.00	2	●
12.000	12.000	83.00	22.00	2	●
14.000	14.000	83.00	22.00	2	●
15.700	16.000	92.00	26.00	2	●
18.000	18.000	92.00	26.00	2	●
20.000	20.000	104.00	32.00	2	●

Solid carbide milling cutters

Slot drills, 2-fluted

DIN 6527 L

Catalogue no. **74521**

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	bright
Type	*N*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 2-fluted

DIN 6527 L

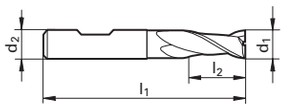
Catalogue no. **54521**

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 2-fluted



Catalogue no.	74521	54521
Tool material	Solid carbide	
Type	N	
Discount group	117	117
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
2.000	6.000	57.00	6.00	2	●	●
2.500	6.000	57.00	7.00	2	●	
2.800	6.000	57.00	7.00	2		●
3.000	6.000	57.00	7.00	2	●	●
3.500	6.000	57.00	7.00	2	●	
3.800	6.000	57.00	8.00	2	●	●
4.000	6.000	57.00	8.00	2	●	●
4.500	6.000	57.00	8.00	2	●	
4.800	6.000	57.00	10.00	2	●	●
5.000	6.000	57.00	10.00	2	●	●
5.750	6.000	57.00	10.00	2		○
6.000	6.000	57.00	10.00	2	●	●
6.750	8.000	63.00	13.00	2	●	○
7.000	8.000	63.00	13.00	2	●	●
7.750	8.000	63.00	16.00	2	●	
8.000	8.000	63.00	16.00	2	●	●
8.700	10.000	72.00	16.00	2	●	●
9.000	10.000	72.00	16.00	2	●	●
9.700	10.000	72.00	19.00	2	●	●
10.000	10.000	72.00	19.00	2	●	●
11.700	12.000	83.00	22.00	2	●	●
12.000	12.000	83.00	22.00	2	●	●
14.000	14.000	83.00	22.00	2	●	●
15.700	16.000	92.00	26.00	2	●	●
16.000	16.000	92.00	26.00	2	●	●
18.000	18.000	92.00	26.00	2	●	○
20.000	20.000	104.00	32.00	2	●	●

Slot drills, 2-fluted

Catalogue no. 74404

Extra long design suitable for milling steel and cast steel with tensile strengths of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Stock std.

Tool material	Solid carbide
Surface	bright
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 2-fluted

Catalogue no. 54404

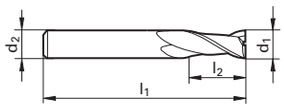
Extra long design suitable for milling steel and cast steel with tensile strengths of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 2-fluted



Catalogue no.	74404	54404
Tool material	Solid carbide	
Type	N	
Discount group	117	117
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	3.000	75.00	20.00	2	●	●
4.000	4.000	75.00	25.00	2	●	●
5.000	5.000	75.00	30.00	2	●	●
6.000	6.000	75.00	30.00	2	●	●
8.000	8.000	100.00	40.00	2	●	●
10.000	10.000	100.00	40.00	2	●	●
12.000	12.000	150.00	45.00	2	●	●
14.000	14.000	150.00	45.00	2	●	●
16.000	16.000	150.00	65.00	2	●	●
18.000	18.000	150.00	65.00	2	●	
20.000	20.000	150.00	65.00	2	●	●

Slot drills, 3-fluted

DIN 6527 K

Catalogue no. 74522

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels,bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	bright
Type	*N*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 3-fluted

DIN 6527 K

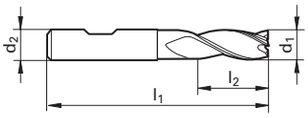
Catalogue no. 64522

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 3-fluted



Catalogue no.	74522	64522
Tool material	Solid carbide	
Type	N	
Discount group	117	117
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
2.000	6.000	50.00	3.00	3	●	●
3.000	6.000	50.00	4.00	3	●	●
4.000	6.000	54.00	5.00	3	●	●
5.000	6.000	54.00	6.00	3	●	●
6.000	6.000	54.00	7.00	3	●	●
7.000	8.000	58.00	8.00	3	●	
8.000	8.000	58.00	9.00	3	●	●
10.000	10.000	66.00	11.00	3	●	●
12.000	12.000	73.00	12.00	3	●	●
14.000	14.000	75.00	14.00	3	●	●
16.000	16.000	82.00	16.00	3	●	●
18.000	18.000	84.00	18.00	3	●	●
20.000	20.000	92.00	20.00	3	●	●

Slot drills, 3-fluted

DIN 6527 L

Catalogue no. 54523

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 3-fluted

DIN 6527 L

Catalogue no. 74523

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	bright
Type	*N*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 3-fluted

DIN 6527 L

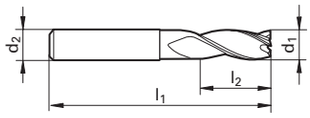
Catalogue no. 64523

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels,bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 3-fluted



Catalogue no.	54523	74523	64523
Tool material	Solid carbide		
Type	N		
Discount group	117	117	117
Surface	FIRE	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€		
2.000	6.000	57.00	6.00	3	●	●	●
2.500	6.000	57.00	7.00	3	●	●	●
3.000	6.000	57.00	7.00	3	●	●	●
3.500	6.000	57.00	7.00	3	●	●	●
4.000	6.000	57.00	8.00	3	●	●	●
4.500	6.000	57.00	8.00	3	●	●	●
5.000	6.000	57.00	10.00	3	●	●	●
6.000	6.000	57.00	10.00	3	●	●	●
8.000	8.000	63.00	16.00	3	●	●	●
10.000	10.000	72.00	19.00	3	●	●	●
12.000	12.000	83.00	22.00	3	●	●	●
14.000	14.000	83.00	22.00	3	●	●	●
16.000	16.000	92.00	26.00	3	●	●	●
18.000	18.000	92.00	26.00	3	●	●	●
20.000	20.000	104.00	32.00	3	●	●	●

Slot drills, 3-fluted

Catalogue no. 74424

Extra long design suitable for milling steel and cast steel with tensile strengths of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Stock std.

Tool material	Solid carbide
Surface	bright
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 3-fluted

Catalogue no. 54424

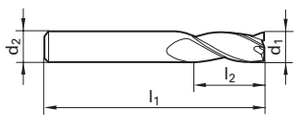
Extra long design suitable for milling steel and cast steel with tensile strengths of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 3-fluted



Catalogue no.	74424	54424
Tool material	Solid carbide	
Type	N	
Discount group	117	117
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	3.000	75.00	20.00	3	●	●
4.000	4.000	75.00	25.00	3	●	●
5.000	5.000	75.00	30.00	3	●	●
6.000	6.000	75.00	30.00	3	●	●
8.000	8.000	100.00	40.00	3	●	●
10.000	10.000	100.00	40.00	3	●	●
12.000	12.000	150.00	45.00	3	●	●
16.000	16.000	150.00	65.00	3	●	●
20.000	20.000	150.00	65.00	3	●	●

Slot drills, 3-fluted

Catalogue no. **74479**

With internal coolant.

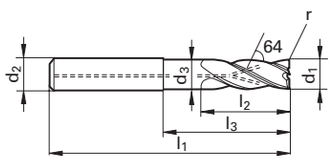
Suitable for milling Al and Al-alloys, brass, bronze, copper, Mg-alloys and plastics.

Stock std.

Tool material	Solid carbide
Surface	bright
Type	*W*
Flute form	45°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 3-fluted



Catalogue no.	**74479**
Tool material	**Solid carbide**
Type	**W**
Discount group	**106**
Surface	**bright**

d1 mm	d2 mm	l1 mm	l2 mm	l3 mm	r mm	Z	Gross price/€
6.000	6.000	57.00	10.00	21.00	1.000	3	●
8.000	8.000	63.00	16.00	27.00	1.000	3	●
10.000	10.000	72.00	19.00	32.00	1.500	3	●
12.000	12.000	83.00	22.00	38.00	1.500	3	●
16.000	16.000	92.00	26.00	44.00	2.000	3	●
20.000	20.000	104.00	32.00	54.00	2.500	3	●

Solid carbide milling cutters

Micro Slot drills, 3-fluted

Catalogue no. **64080**

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Stock std.	
Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	Ø<2 HA/HB
Cutting direction	right-hand
Tolerance	e8

centre cutting

Micro Slot drills, 3-fluted

Catalogue no. **64180**

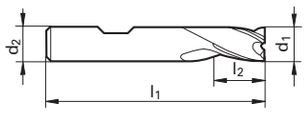
Suitable for milling steel and cast steel with tensile strengths of over 900 N/mm², CrNi steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Stock std.	
Tool material	Solid carbide
Surface	FIRE
Type	*NH*
Flute form	45°
Shank	Ø<2 HA/HB
Cutting direction	right-hand
Tolerance	e8

centre cutting

STOCK

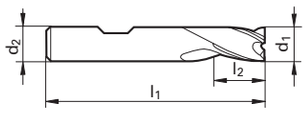
Micro Slot drills, 3-fluted



Catalogue no.	64080
Tool material	Solid carbide
Type	N
Discount group	117
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
0.300	3.000	38.00	1.00	3	●
0.400	3.000	38.00	1.00	3	●
0.500	3.000	38.00	1.50	3	●
0.600	3.000	38.00	1.50	3	●
0.800	3.000	38.00	2.00	3	●
1.000	3.000	38.00	2.00	3	●
1.200	3.000	38.00	2.00	3	●
1.500	3.000	38.00	2.00	3	●
1.800	3.000	38.00	2.00	3	●
2.000	6.000	38.00	4.00	3	●
2.500	6.000	38.00	5.00	3	●
3.000	6.000	38.00	5.00	3	●
3.500	6.000	38.00	6.00	3	●
4.000	6.000	38.00	7.00	3	●
4.500	6.000	38.00	8.00	3	●
5.000	6.000	38.00	8.00	3	●
5.500	6.000	38.00	8.00	3	●
5.750	6.000	38.00	8.00	3	●
6.000	6.000	38.00	8.00	3	●
6.750	8.000	42.00	10.00	3	●
7.000	8.000	42.00	10.00	3	●
7.750	8.000	42.00	10.00	3	●
8.000	8.000	43.00	11.00	3	●
8.700	10.000	48.00	11.00	3	●
9.000	10.000	48.00	11.00	3	●
9.700	10.000	48.00	11.00	3	●
10.000	10.000	50.00	13.00	3	●
12.000	12.000	55.00	15.00	3	●
14.000	14.000	58.00	15.00	3	●
16.000	16.000	62.00	18.00	3	●
18.000	18.000	70.00	20.00	3	●
20.000	20.000	75.00	22.00	3	●

Micro Slot drills, 3-fluted



Catalogue no.	64180
Tool material	Solid carbide
Type	NH
Discount group	106
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
1.000	3.000	38.00	2.00	3	●
1.200	3.000	38.00	2.00	3	●
1.500	3.000	38.00	3.00	3	●
1.800	3.000	38.00	3.00	3	●
2.000	6.000	45.00	4.00	3	●
2.500	6.000	45.00	5.00	3	●
3.000	6.000	45.00	6.00	3	●
3.500	6.000	45.00	6.00	3	●
4.000	6.000	45.00	7.00	3	●
4.500	6.000	45.00	8.00	3	●
5.000	6.000	45.00	8.00	3	●
5.500	6.000	45.00	8.00	3	●
5.750	6.000	45.00	10.00	3	●
6.000	6.000	45.00	10.00	3	●
6.750	8.000	55.00	10.00	3	●
7.000	8.000	55.00	12.00	3	●
7.750	8.000	55.00	12.00	3	●
8.000	8.000	55.00	13.00	3	●
8.700	10.000	55.00	14.00	3	●
9.000	10.000	55.00	14.00	3	●
9.700	10.000	55.00	16.00	3	●
10.000	10.000	55.00	16.00	3	●

Solid carbide milling cutters

Slot drills type W, 2-fluted

DIN 6527 K

Catalogue no. **74204**

Suitable for milling aluminium and aluminium alloys, plastics, copper alloys and non-ferrous metals.

Tool material	Solid carbide
Surface	bright
Type	*W*
Flute form	45°
Shank	HB
Cutting direction	right-hand
Tolerance	e8

centre cutting

Slot drills type W, 2-fluted

DIN 6527 L

Catalogue no. **74202**

Suitable for milling aluminium and aluminium alloys, plastics, copperalloys and non-ferrous metals.

Tool material	Solid carbide
Surface	bright
Type	*W*
Flute form	45°
Shank	HB
Cutting direction	right-hand
Tolerance	e8

centre cutting

Slot drills type W, 2-fluted

Stock std.

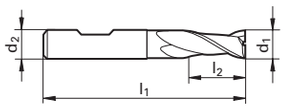
Catalogue no. **74206**

Extra long design, suitable for milling aluminium and aluminium alloys, plastics, copper alloys and non-ferrous metals.

Tool material	Solid carbide
Surface	bright
Type	*W*
Flute form	45°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h10

centre cutting

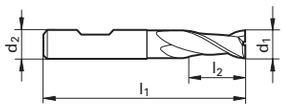
Slot drills type W, 2-fluted



Catalogue no.	74204
Tool material	Solid carbide
Type	W
Discount group	117
Surface	bright

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
4.000	6.000	54.00	5.00	2	❍
5.000	6.000	54.00	6.00	2	❍
6.000	6.000	54.00	7.00	2	❍
8.000	8.000	58.00	9.00	2	❍
10.000	10.000	66.00	11.00	2	❍
12.000	12.000	73.00	12.00	2	❍
14.000	14.000	75.00	14.00	2	❍
16.000	16.000	82.00	16.00	2	❍
18.000	18.000	84.00	18.00	2	❍
20.000	20.000	92.00	20.00	2	❍

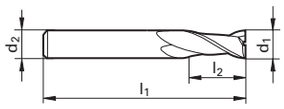
Slot drills type W, 2-fluted



Catalogue no.	74202
Tool material	Solid carbide
Type	W
Discount group	117
Surface	bright

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
3.000	6.000	57.00	7.00	2	●
4.000	6.000	57.00	8.00	2	●
5.000	6.000	57.00	10.00	2	●
6.000	6.000	57.00	10.00	2	●
8.000	8.000	63.00	16.00	2	●
10.000	10.000	72.00	19.00	2	●
12.000	12.000	83.00	22.00	2	●
14.000	14.000	83.00	22.00	2	●
16.000	16.000	92.00	26.00	2	●
18.000	18.000	92.00	26.00	2	●
20.000	20.000	104.00	32.00	2	●

Slot drills type W, 2-fluted



Catalogue no.	74206
Tool material	Solid carbide
Type	W
Discount group	117
Surface	bright

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
5.000	5.000	75.00	30.00	2	●
6.000	6.000	75.00	30.00	2	●
8.000	8.000	100.00	40.00	2	●
10.000	10.000	100.00	40.00	2	●
12.000	12.000	150.00	45.00	2	●
16.000	16.000	150.00	65.00	2	●

Slot drills NH, 3-fluted

DIN 6527 K

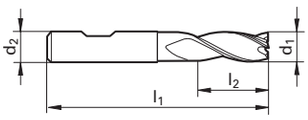
Catalogue no. **64570**

Suitable for milling steel and cast steel with tensile strengths of over 900 N/mm², CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive material. High cutting efficiency and vibration-free operation.

Tool material	Solid carbide
Surface	FIRE
Type	*NH*
Flute form	45°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills NH, 3-fluted



Catalogue no.	64570
Tool material	Solid carbide
Type	NH
Discount group	106
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
3.000	6.000	50.00	4.00	3	●
4.000	6.000	54.00	5.00	3	●
5.000	6.000	54.00	6.00	3	●
6.000	6.000	54.00	7.00	3	●
8.000	8.000	58.00	9.00	3	●
10.000	10.000	66.00	11.00	3	●
12.000	12.000	73.00	12.00	3	●
16.000	16.000	82.00	16.00	3	●
20.000	20.000	92.00	20.00	3	●

Solid carbide milling cutters

Slot drills NH, 3-fluted

DIN 6527 L

Catalogue no. **74478**

Suitable for milling steel and cast steel with tensile strengths of over 900 N/mm² grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive material. High cutting efficiency and vibration-free operation.

Tool material	Solid carbide
Surface	bright
Type	*NH*
Flute form	45°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills NH, 3-fluted

DIN 6527 L

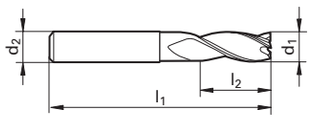
Catalogue no. **64478**

Suitable for milling steel and cast steel with tensile strengths of over 900 N/mm² grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive material. High cutting efficiency and vibration-free operation.

Tool material	Solid carbide
Surface	FIRE
Type	*NH*
Flute form	45°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills NH, 3-fluted



Catalogue no.	74478	64478
Tool material	Solid carbide	
Type	NH	
Discount group	106	106
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
1.000	3.000	38.00	2.00	3		●
1.500	3.000	38.00	3.00	3		●
2.000	6.000	57.00	6.00	3		●
2.500	6.000	57.00	7.00	3		●
3.000	6.000	57.00	7.00	3	●	●
3.500	6.000	57.00	7.00	3	●	●
4.000	6.000	57.00	8.00	3	●	●
4.500	6.000	57.00	8.00	3	●	●
5.000	6.000	57.00	10.00	3	●	●
6.000	6.000	57.00	10.00	3	●	●
8.000	8.000	63.00	16.00	3	●	●
10.000	10.000	72.00	19.00	3	●	●
12.000	12.000	83.00	22.00	3	●	●
14.000	14.000	83.00	22.00	3	●	●
16.000	16.000	92.00	26.00	3	●	●
18.000	18.000	92.00	26.00	3	●	●
20.000	20.000	104.00	32.00	3	●	●

Slot drills NH, 3-fluted

DIN 6527 L

Catalogue no. **74471**

Suitable for milling steel and cast steel with tensile strengths of over 900 N/mm² grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive material. High cutting efficiency and vibration-free operation.

Tool material	Solid carbide
Surface	bright
Type	*NH*
Flute form	45°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills NH, 3-fluted

DIN 6527 L

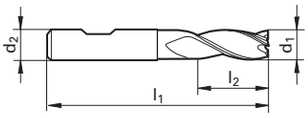
Catalogue no. **64571**

Suitable for milling steel and cast steel with tensile strengths of over 900 N/mm² grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive material. High cutting efficiency and vibration-free operation.

Tool material	Solid carbide
Surface	FIRE
Type	*NH*
Flute form	45°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills NH, 3-fluted



Catalogue no.	74471	64571
Tool material	Solid carbide	
Type	NH	
Discount group	106	106
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	6.000	57.00	7.00	3	❍	
3.500	6.000	57.00	7.00	3	❍	●
4.000	6.000	57.00	8.00	3	❍	●
4.500	6.000	57.00	8.00	3	❍	●
5.000	6.000	57.00	10.00	3	❍	●
6.000	6.000	57.00	10.00	3	❍	●
7.000	8.000	63.00	13.00	3	❍	
8.000	8.000	63.00	16.00	3	❍	●
9.000	10.000	72.00	16.00	3	❍	
10.000	10.000	72.00	19.00	3	❍	●
12.000	12.000	83.00	22.00	3	❍	●
14.000	14.000	83.00	22.00	3	❍	●
16.000	16.000	92.00	26.00	3	❍	●
18.000	18.000	92.00	26.00	3	❍	●
20.000	20.000	104.00	32.00	3	❍	●

End mills, 4-fluted

DIN 6527 L

Catalogue no. 54524

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

End mills, 4-fluted

DIN 6527 L

Catalogue no. 74525

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	bright
Type	*N*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

End mills, 4-fluted

DIN 6527 L

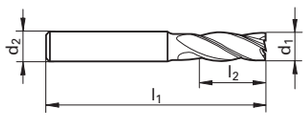
Catalogue no. 64525

Suitable for milling steel and cast steel with tensile strenghts of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

End mills, 4-fluted



	Catalogue no.	54524	74525	64525
	Tool material	Solid carbide		
	Type	N		
	Discount group	117	117	117
	Surface	FIRE	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€		
2.000	6.000	57.00	7.00	4	●	●	●
3.000	6.000	57.00	8.00	4	●	●	●
4.000	6.000	57.00	11.00	4	●	●	●
5.000	6.000	57.00	13.00	4	●	●	●
6.000	6.000	57.00	13.00	4	●	●	●
7.000	8.000	63.00	16.00	4		❍	
8.000	8.000	63.00	19.00	4	●	●	●
10.000	10.000	72.00	22.00	4	●	●	●
12.000	12.000	83.00	26.00	4	●	●	●
14.000	14.000	83.00	26.00	4	●	●	●
16.000	16.000	92.00	32.00	4	●		●
18.000	18.000	92.00	32.00	4	●	●	●
20.000	20.000	104.00	38.00	4	●	●	●

End mills, 4-fluted

Catalogue no. **54444**

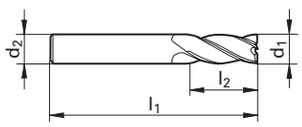
Extra long design suitable for milling steel and cast steel with tensile strengths of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h10

centre cutting

End mills, 4-fluted



Catalogue no.	54444
Tool material	Solid carbide
Type	N
Discount group	117
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
3.000	3.000	75.00	20.00	4	●
4.000	4.000	75.00	25.00	4	●
5.000	5.000	75.00	30.00	4	●
6.000	6.000	75.00	30.00	4	●
8.000	8.000	100.00	40.00	4	●
10.000	10.000	100.00	40.00	4	●
12.000	12.000	150.00	45.00	4	●
14.000	14.000	150.00	45.00	4	●
16.000	16.000	150.00	65.00	4	●
18.000	18.000	150.00	65.00	4	❍
20.000	20.000	150.00	65.00	4	●

Solid carbide milling cutters

End mills with corner radius

DIN 6527 L

Catalogue no. **54522**

2-fluted with corner radius, especially for the mould-industry.

The corner radius achieves a high precision of the form and contour of the workpiece with a minimal wear and therefore a very long tool-life.

Suited for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

End mills with corner radius

DIN 6527 L

Catalogue no. **54526**

4-fluted with corner radius, especially for the mould-industry.

The corner radius achieves a high precision of the form and contour of the workpiece with a minimal wear and therefore a very long tool-life.

Suited for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials. For finishing operations in materials up to 50 HRC.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

End mills with corner radius

DIN 6527 L

Catalogue no. **54206**

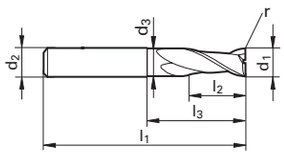
The helix angle of 45° allows a smooth cutting of the milling cutter. Therefore an outstanding quality of the surface finish is achieved.

The corner radius achieves a high precision of the form and contour of the workpiece with a minimal wear and therefore a very long tool-life.

Suited for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials. For finishing operations in materials up to 50 HRC.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	45°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

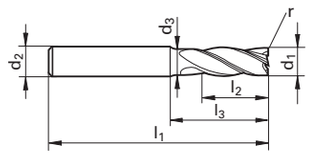
End mills with corner radius



Catalogue no.	**54522**
Tool material	**Solid carbide**
Type	**N**
Discount group	**106**
Surface	**FIRE**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	r mm	Z	Code no.	Gross price/€
6.000	6.000	5.700	57.00	10.00	21.00	0.500	2	6.005	●
6.000	6.000	5.700	57.00	10.00	21.00	1.000	2	6.010	●
8.000	8.000	7.700	63.00	16.00	27.00	0.500	2	8.005	●
8.000	8.000	7.700	63.00	16.00	27.00	1.000	2	8.010	●
8.000	8.000	7.700	63.00	16.00	27.00	1.500	2	8.015	●
10.000	10.000	9.500	72.00	19.00	32.00	0.500	2	10.005	●
10.000	10.000	9.500	72.00	19.00	32.00	1.000	2	10.010	●
10.000	10.000	9.500	72.00	19.00	32.00	1.500	2	10.015	●
10.000	10.000	9.500	72.00	19.00	32.00	2.000	2	10.020	●
12.000	12.000	11.500	83.00	22.00	38.00	0.500	2	12.005	●
12.000	12.000	11.500	83.00	22.00	38.00	1.000	2	12.010	●
12.000	12.000	11.500	83.00	22.00	38.00	2.000	2	12.020	●
16.000	16.000	15.500	92.00	26.00	44.00	1.000	2	16.010	●
16.000	16.000	15.500	92.00	26.00	44.00	2.000	2	16.020	●

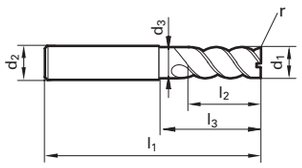
End mills with corner radius



Catalogue no.	**54526**
Tool material	**Solid carbide**
Type	**N**
Discount group	**106**
Surface	**FIRE**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	r mm	Z	Code no.	Gross price/€
6.000	6.000	5.700	57.00	13.00	21.00	0.500	4	6.005	●
6.000	6.000	5.700	57.00	13.00	21.00	1.000	4	6.010	●
8.000	8.000	7.700	63.00	19.00	27.00	0.500	4	8.005	●
8.000	8.000	7.700	63.00	19.00	27.00	1.000	4	8.010	●
8.000	8.000	7.700	63.00	19.00	27.00	1.500	4	8.015	●
8.000	8.000	7.700	63.00	19.00	27.00	2.000	4	8.020	●
10.000	10.000	9.500	72.00	22.00	32.00	0.500	4	10.005	●
10.000	10.000	9.500	72.00	22.00	32.00	0.800	4	10.008	●
10.000	10.000	9.500	72.00	22.00	32.00	1.000	4	10.010	●
10.000	10.000	9.500	72.00	22.00	32.00	1.500	4	10.015	●
10.000	10.000	9.500	72.00	22.00	32.00	2.000	4	10.020	●
12.000	12.000	11.500	83.00	26.00	38.00	0.500	4	12.005	●
12.000	12.000	11.500	83.00	26.00	38.00	0.800	4	12.008	●
12.000	12.000	11.500	83.00	26.00	38.00	1.000	4	12.010	●
12.000	12.000	11.500	83.00	26.00	38.00	1.500	4	12.015	●
12.000	12.000	11.500	83.00	26.00	38.00	2.000	4	12.020	●
16.000	16.000	15.500	92.00	32.00	44.00	1.000	4	16.010	●
16.000	16.000	15.500	92.00	32.00	44.00	2.000	4	16.020	●
20.000	20.000	19.500	104.00	38.00	54.00	1.000	4	20.010	●
20.000	20.000	19.500	104.00	38.00	54.00	2.000	4	20.020	●

End mills with corner radius



Catalogue no.	**54206**
Tool material	**Solid carbide**
Type	**N**
Discount group	**106**
Surface	**FIRE**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	r mm	Z	Code no.	Gross price/€
6.000	6.000	5.700	57.00	13.00	21.00	0.500	6	6.005	●
6.000	6.000	5.700	57.00	13.00	21.00	1.000	6	6.010	●
8.000	8.000	7.700	63.00	19.00	27.00	0.500	6	8.005	●
8.000	8.000	7.700	63.00	19.00	27.00	1.000	6	8.010	●
8.000	8.000	7.700	63.00	19.00	27.00	1.500	6	8.015	●
8.000	8.000	7.700	63.00	19.00	27.00	2.000	6	8.020	●
10.000	10.000	9.500	72.00	22.00	32.00	0.500	6	10.005	●
10.000	10.000	9.500	72.00	22.00	32.00	1.000	6	10.010	●
10.000	10.000	9.500	72.00	22.00	32.00	1.500	6	10.015	●
10.000	10.000	9.500	72.00	22.00	32.00	2.000	6	10.020	●
12.000	12.000	11.500	83.00	26.00	38.00	0.500	6	12.005	●
12.000	12.000	11.500	83.00	26.00	38.00	1.000	6	12.010	●
12.000	12.000	11.500	83.00	26.00	38.00	1.500	6	12.015	●
12.000	12.000	11.500	83.00	26.00	38.00	2.000	6	12.020	●
16.000	16.000	15.500	92.00	32.00	44.00	1.000	6	16.010	●
16.000	16.000	15.500	92.00	32.00	44.00	2.000	6	16.020	●
20.000	20.000	19.500	104.00	38.00	54.00	1.000	8	20.010	●
20.000	20.000	19.500	104.00	38.00	54.00	2.000	8	20.020	●

Solid carbide milling cutters

Finishing End Mills, multiple fluted

Catalogue no. **54205**

The helix angle of 45° allows a smooth cutting of the milling cutter. Therefore an outstanding quality of the surface finish is achieved. Suited for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials. For finishing operations in materials up to 50 HRC.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*NH*
Flute form	45°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

Finishing End Mills, multiple fluted

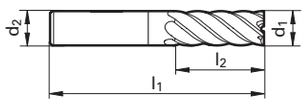
Catalogue no. **54201**

The helix angle of 45° allows a smooth cutting of the milling cutter. Therefore an outstanding quality of the surface finish is achieved. Suited for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials. For finishing operations in materials up to 50 HRC.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*NH*
Flute form	45°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

Finishing End Mills, multiple fluted



Catalogue no.	54205	54201
Tool material	Solid carbide	
Type	NH	
Discount group	106	106
Surface	FIRE	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	6.000	57.00	8.00	6	●	
4.000	6.000	57.00	11.00	6	●	
5.000	6.000	57.00	13.00	6	●	
6.000	6.000	57.00	13.00	6	●	●
8.000	8.000	63.00	19.00	6	●	●
10.000	10.000	72.00	22.00	6	●	●
12.000	12.000	83.00	26.00	6	●	●
14.000	14.000	83.00	26.00	6	●	●
16.000	16.000	92.00	32.00	6	●	●
18.000	18.000	92.00	32.00	8	●	●
20.000	20.000	104.00	38.00	8	●	●

Finishing End Mills, multiple fluted

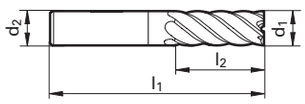
Catalogue no. **54207**

Short design. Suitable for finishing hardened materials up to 62 HRC.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*H*
Flute form	55°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

Finishing End Mills, multiple fluted



Catalogue no.	54207
Tool material	Solid carbide
Type	H
Discount group	106
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
3.000	6.000	57.00	8.00	6	●
4.000	6.000	57.00	11.00	6	●
5.000	6.000	57.00	13.00	6	●
6.000	6.000	57.00	13.00	6	●
8.000	8.000	63.00	19.00	6	●
10.000	10.000	72.00	22.00	6	●
12.000	12.000	83.00	26.00	6	●
14.000	14.000	83.00	26.00	6	●
16.000	16.000	92.00	32.00	6	●
18.000	18.000	92.00	32.00	8	●
20.000	20.000	104.00	38.00	8	●

Finishing End Mills, multiple fluted

Catalogue no. **54225**

The helix angle of 45° allows a smooth cutting of the milling cutter. Therefore an outstanding quality of the surface finish is achieved. Suited for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass,copper, aluminium with a high silicon content and abrasive materials. For finishing operations in materials up to 50 HRC.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*NH*
Flute form	45°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

Finishing End Mills, multiple fluted

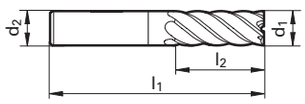
Catalogue no. **54221**

The helix angle of 45° allows a smooth cutting of the milling cutter. Therefore an outstanding quality of the surface finish is achieved. Suited for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials. For finishing operations in materials up to 50 HRC.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*NH*
Flute form	45°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

Finishing End Mills, multiple fluted



Catalogue no.	54225	54221
Tool material	Solid carbide	
Type	NH	
Discount group	106	106
Surface	FIRE	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
6.000	6.000	75.00	30.00	6	●	❍
8.000	8.000	100.00	40.00	6	●	
10.000	10.000	100.00	40.00	6	●	❍
12.000	12.000	150.00	45.00	6	●	❍
16.000	16.000	150.00	65.00	6	●	❍
20.000	20.000	150.00	65.00	8	●	❍

Finishing End Mills, multiple fluted

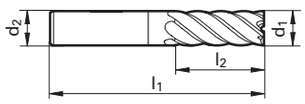
Catalogue no. **54227**

Long design. Suitable for finishing hardened materials up to 62 HRC.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*H*
Flute form	55°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

Finishing End Mills, multiple fluted



Catalogue no.	54227
Tool material	Solid carbide
Type	H
Discount group	106
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
6.000	6.000	75.00	30.00	6	●
8.000	8.000	100.00	40.00	6	●
10.000	10.000	100.00	40.00	6	●
12.000	12.000	150.00	45.00	6	●
16.000	16.000	150.00	65.00	6	●
20.000	20.000	150.00	65.00	8	●

Solid carbide milling cutters

Roughing end mills

DIN 6527 L

Catalogue no. **54496**

High-performance roughing end mill with a new profile, which reduces the wear at the face due to the special design. Especially suitable for roughing operations in general steels.

Tool material	Solid carbide
Surface	FIRE
Type	*NF*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Roughing end mills

DIN 6527 L

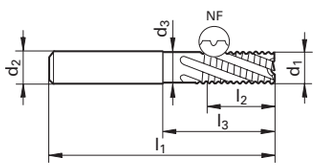
Catalogue no. **54497**

High-performance roughing end mill with a new profile, which reduces the wear at the face due to the special design. Especially suitable for roughing and finishing-operations in general steels and tough materials.

Tool material	Solid carbide
Surface	FIRE
Type	*NF*
Flute form	45°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

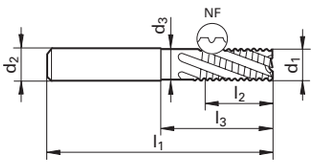
Roughing end mills



Catalogue no.	**54496**
Tool material	**Solid carbide**
Type	**NF**
Discount group	**106**
Surface	**FIRE**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	Z	Gross price/€
6.000	6.000	5.700	57.00	13.00	21.00	4	●
8.000	8.000	7.700	63.00	19.00	27.00	4	●
10.000	10.000	9.500	72.00	22.00	32.00	4	●
12.000	12.000	11.500	83.00	26.00	38.00	4	●
16.000	16.000	15.500	92.00	32.00	44.00	4	●
20.000	20.000	19.500	104.00	38.00	54.00	4	●
25.000	25.000	24.000	121.00	45.00	65.00	5	●

Roughing end mills



Catalogue no.	**54497**
Tool material	**Solid carbide**
Type	**NF**
Discount group	**106**
Surface	**FIRE**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	Z	Gross price/€
6.000	6.000	5.700	57.00	13.00	21.00	5	●
8.000	8.000	7.700	63.00	19.00	27.00	5	●
10.000	10.000	9.500	72.00	22.00	32.00	5	●
12.000	12.000	11.500	83.00	26.00	38.00	5	●
16.000	16.000	15.500	92.00	32.00	44.00	6	●
20.000	20.000	19.500	104.00	38.00	54.00	6	●
25.000	25.000	24.000	121.00	45.00	65.00	6	●

Solid carbide milling cutters

Roughing end mills

DIN 6527 L

Catalogue no. **74203**

Extra coarse tooth roughing profile.
Particularly suited for high outputs in aluminium and non-ferrous metals through roughing profile.

Tool material	Solid carbide
Surface	bright
Type	*WR*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Roughing end mills

DIN 6527 L

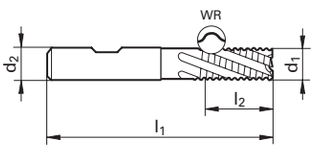
Catalogue no. **74303**

With internal coolant.
Particularly suited for high outputs in aluminium and non-ferrous metals through roughing profile.

Tool material	Solid carbide
Surface	bright
Type	*WR*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Roughing end mills



Catalogue no.	74203	74303
Tool material	Solid carbide	
Type	WR	
Discount group	106	106
Surface	bright	bright

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
6.000	6.000	57.00	10.00	3	●	●
8.000	8.000	63.00	16.00	3	●	●
10.000	10.000	72.00	19.00	3	●	●
12.000	12.000	83.00	22.00	3	●	●
14.000	14.000	83.00	22.00	3	●	
16.000	16.000	92.00	26.00	3	●	●
18.000	18.000	92.00	26.00	3	●	
20.000	20.000	104.00	32.00	3	●	●

Solid carbide milling cutters

Roughing end mills

DIN 6527 L

Catalogue no. **64495**

Fine tooth roughing profile.

Suitable for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*NRf*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	js16

centre cutting

Roughing end mills

DIN 6527 L

Catalogue no. **64595**

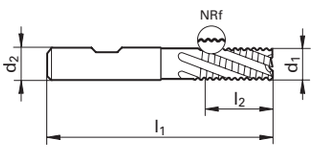
With internal coolant and fine tooth roughing profile.

Suitable for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*NRf*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

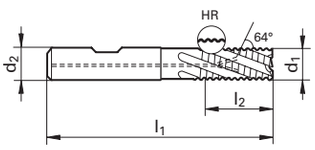
Roughing end mills



Catalogue no.	64495
Tool material	Solid carbide
Type	NRf
Discount group	106
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
6.000	6.000	57.00	10.00	4	●
8.000	8.000	63.00	16.00	4	●
10.000	10.000	72.00	19.00	4	●
12.000	12.000	83.00	22.00	4	●
14.000	14.000	83.00	22.00	4	●
16.000	16.000	92.00	26.00	4	●
18.000	18.000	92.00	26.00	4	●
20.000	20.000	104.00	32.00	4	●

Roughing end mills



Catalogue no.	64595
Tool material	Solid carbide
Type	NRf
Discount group	106
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
6.000	6.000	57.00	13.00	4	●
8.000	8.000	63.00	19.00	4	●
10.000	10.000	72.00	22.00	4	●
12.000	12.000	83.00	26.00	4	●
16.000	16.000	92.00	32.00	4	●
20.000	20.000	104.00	38.00	4	●

Roughing end mills

DIN 6527 L

Catalogue no. **64497**

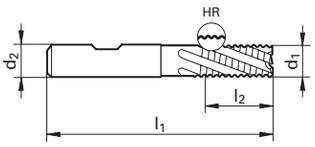
Fine tooth roughing profile.

Especially suited for milling steel with high tensile strengths, cast steel, grey cast iron and hardened steel up to 56 HRC

Tool material	Solid carbide
Surface	FIRE
Type	*HR*
Flute form	20°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Roughing end mills



Catalogue no.	64497
Tool material	Solid carbide
Type	HR
Discount group	106
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
6.000	6.000	57.00	13.00	4	●
8.000	8.000	63.00	19.00	4	●
10.000	10.000	72.00	22.00	4	●
12.000	12.000	83.00	26.00	4	●
16.000	16.000	92.00	32.00	4	●
20.000	20.000	104.00	38.00	4	●

Solid carbide milling cutters

Ball nose end mills

DIN 6527 L

Catalogue no. **74543**

Particularly suitable for milling flutes and producing deep, high slots in steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	bright
Type	*N*
Flute form	30°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

Ball nose end mills

DIN 6527 L

Catalogue no. **54541**

Particularly suitable for milling flutes and producing deep, high slots in steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HA
Cutting direction	right-hand
Tolerance	h10

centre cutting

Ball nose end mills

DIN 6527 L

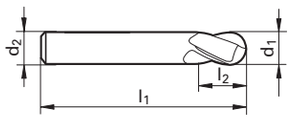
Catalogue no. **64542**

Particularly suitable for milling flutes and producing deep, high slots in steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Ball nose end mills



	Catalogue no.	74543	54541	64542
	Tool material	Solid carbide		
	Type	N		
	Discount group	106	106	106
	Surface	bright	FIRE	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€		
0.500	3.000	38.00	1.00	2		●	●
0.800	3.000	38.00	1.00	2		●	●
1.000	3.000	38.00	2.00	2		●	●
1.500	3.000	38.00	3.00	2		●	●
2.000	6.000	57.00	6.00	2		●	●
3.000	6.000	57.00	7.00	2	●	●	●
4.000	6.000	57.00	8.00	2	●	●	●
5.000	6.000	57.00	10.00	2	●	●	●
6.000	6.000	57.00	10.00	2	●	●	●
8.000	8.000	63.00	16.00	2	●	●	●
10.000	10.000	72.00	19.00	2	●	●	●
12.000	12.000	83.00	22.00	2	●	●	●
14.000	14.000	83.00	22.00	2	●	●	●
16.000	16.000	92.00	26.00	2	●	●	●
18.000	18.000	92.00	26.00	2	●	●	●
20.000	20.000	104.00	32.00	2	●	●	●

Solid carbide milling cutters

Ball nose end mills

Catalogue no. **74545**

Extra long design suitable for milling steel and cast steel with tensile strengths of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Stock std.

Tool material	Solid carbide
Surface	bright
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h10

centre cutting

Ball nose end mills

Catalogue no. **64545**

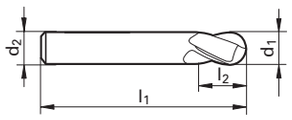
Extra long design suitable for milling steel and cast steel with tensile strengths of over 900 N/mm², grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with a high silicon content and abrasive materials.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h10

centre cutting

Ball nose end mills



Catalogue no.	74545	64545
Tool material	Solid carbide	
Type	N	
Discount group	106	106
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	3.000	75.00	20.00	2	●	●
4.000	4.000	75.00	25.00	2	●	●
5.000	5.000	75.00	30.00	2	●	●
6.000	6.000	75.00	30.00	2	●	●
8.000	8.000	100.00	40.00	2	●	●
10.000	10.000	100.00	40.00	2	●	●
12.000	12.000	150.00	45.00	2	●	●

Solid carbide milling cutters

Ball nose end mills

DIN 6528

Catalogue no. **74531**

Suitable for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	bright
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h11

centre cutting

Ball nose end mills

DIN 6528

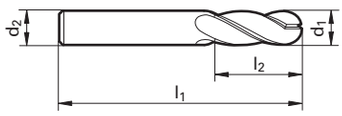
Catalogue no. **54531**

Suitable for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h10

centre cutting

Ball nose end mills



Catalogue no.	74531	54531
Tool material	Solid carbide	
Type	N	
Discount group	106	106
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
4.000	4.000	50.00	11.00	4	●	●
5.000	5.000	50.00	13.00	4	●	●
6.000	6.000	57.00	13.00	4	●	●
8.000	8.000	63.00	19.00	4	●	●
10.000	10.000	72.00	22.00	4	●	●
12.000	12.000	83.00	26.00	4	●	●
14.000	14.000	83.00	26.00	4	●	●
16.000	16.000	92.00	32.00	4	●	●
18.000	18.000	92.00	32.00	4	●	●
20.000	20.000	104.00	38.00	4	●	●

Ball nose end mills

DIN 6527 L

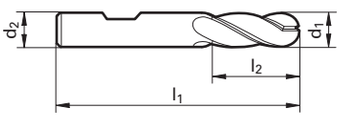
Catalogue no. **64532**

Suitable for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with high silicon content and abrasive materials.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	HB
Cutting direction	right-hand
Tolerance	h10

centre cutting

Ball nose end mills



Catalogue no.	64532
Tool material	Solid carbide
Type	N
Discount group	106
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
3.000	6.000	57.00	8.00	4	●
4.000	6.000	57.00	11.00	4	●
5.000	6.000	57.00	13.00	4	●
6.000	6.000	57.00	13.00	4	●
8.000	8.000	63.00	19.00	4	●
10.000	10.000	72.00	22.00	4	●
12.000	12.000	83.00	26.00	4	●
14.000	14.000	83.00	26.00	4	●
16.000	16.000	92.00	32.00	4	●
18.000	18.000	92.00	32.00	4	●
20.000	20.000	104.00	38.00	4	●

Ball nose end mills

Catalogue no. **64535**

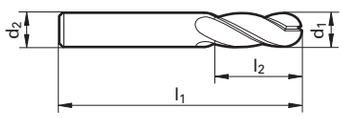
Suitable for milling steel, cast steel, grey cast iron, chilled cast iron, malleable cast iron, CrNi-steels, bronze, brass, copper, aluminium with high silicon content and abrasive materials.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h10

centre cutting

Ball nose end mills



Catalogue no.	64535
Tool material	Solid carbide
Type	N
Discount group	106
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
3.000	3.000	75.00	20.00	4	●
4.000	4.000	75.00	25.00	4	●
5.000	5.000	75.00	30.00	4	●
6.000	6.000	75.00	30.00	4	●
8.000	8.000	100.00	40.00	4	●
10.000	10.000	100.00	40.00	4	●
12.000	12.000	150.00	45.00	4	●

Trace End Mills with Torus form

Catalogue no. **54304**

Particulary suitable for the moulding-industry with a high accuracy of form and contour, minimal wear and a high tool life. Especially to be used in cast iron and for hardened steels upto HRC62. Made out of DK500UF material, short version.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*H*
Flute form	30°
Shank	HA
Cutting direction	right-hand
Tolerance	h8

Trace End Mills with Torus form

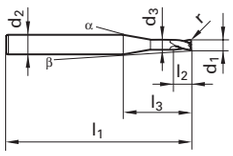
Catalogue no. **54305**

Particulary suitable for the moulding-industry with a high accuracy of form and contour, minimal wear and a high tool life. Especially to be used in cast iron and for hardened steels upto HRC62. Made out of DK500UF material, long version.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*H*
Flute form	30°
Shank	HA
Cutting direction	right-hand
Tolerance	h8

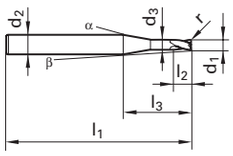
Trace End Mills with Torus form



Catalogue no.	**54304**
Tool material	**Solid carbide**
Type	**H**
Discount group	**106**
Surface	**FIRE**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	r mm	Z	Code no.	Gross price/€
3.000	6.000	2.700	57.00	5.00	21.00	0.500	4	3.000	●
4.000	6.000	3.700	57.00	6.00	21.00	0.500	4	4.000	●
5.000	6.000	4.700	57.00	8.00	21.00	0.500	4	5.000	●
6.000	6.000	5.700	57.00	9.00	21.00	1.000	4	6.000	●
8.000	8.000	7.700	63.00	12.00	27.00	1.000	4	8.000	●
10.000	10.000	9.500	72.00	15.00	32.00	1.500	4	10.000	●
12.000	12.000	11.500	83.00	18.00	38.00	1.500	4	12.000	●
16.000	16.000	15.500	92.00	24.00	44.00	2.000	4	16.000	●

Trace End Mills with Torus form



Catalogue no.	**54305**
Tool material	**Solid carbide**
Type	**H**
Discount group	**106**
Surface	**FIRE**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	r mm	Z	Code no.	Gross price/€
6.000	6.000	5.700	75.00	9.00	39.00	1.000	4	6.000	●
8.000	8.000	7.700	100.00	12.00	64.00	1.000	4	8.000	●
10.000	10.000	9.500	100.00	15.00	60.00	1.500	4	10.000	●
12.000	12.000	11.500	150.00	18.00	105.00	1.500	4	12.000	●
16.000	16.000	15.500	150.00	24.00	102.00	2.000	4	16.000	●

Trace End Mills with Torus form

Catalogue no. **54302**

Particulary designed for roughing, finishing and super-finishing under HSC-conditions in the die- and mould-industry. Suitable for steel, high alloyed steels, hardened materials upto 40-54 HRC. Short version.

Stock std.

Tool material	Solid carbide
Surface	TiAlN
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h8

Trace End Mills with Torus form

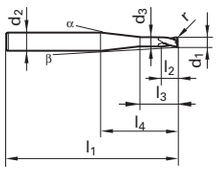
Catalogue no. **54303**

Particulary designed for roughing, finishing and super-finishing under HSC-conditions in the die- and mould-industry. Suitable for steel, high alloyed steels, hardened materials upto 40-54 HRC. Long version.

Stock std.

Tool material	Solid carbide
Surface	TiAlN
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h8

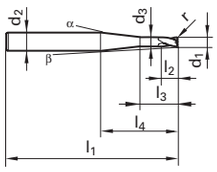
Trace End Mills with Torus form



Catalogue no.	**54302**
Tool material	**Solid carbide**
Type	**N**
Discount group	**106**
Surface	**TiAlN**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	r mm	Z	Code no.	Gross price/€
2.000	6.000	1.800	57.00	3.00	20.00	0.500	2	2.000	●
3.000	6.000	2.800	57.00	3.50	20.00	0.500	2	3.000	●
4.000	6.000	3.800	57.00	4.00	20.00	1.000	2	4.000	●
6.000	6.000	5.600	57.00	6.00	20.00	2.000	2	6.000	●
8.000	8.000	7.600	63.00	7.00	26.00	2.000	2	8.000	●
10.000	10.000	9.600	72.00	8.00	30.00	3.000	2	10.000	●
12.000	12.000	11.500	83.00	10.00	35.00	4.000	2	12.000	●

Trace End Mills with Torus form



Catalogue no.	**54303**
Tool material	**Solid carbide**
Type	**N**
Discount group	**106**
Surface	**TiAlN**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	r mm	Z	Code no.	Gross price/€
2.000	6.000	1.800	80.00	3.00	40.00	0.500	2	2.000	●
3.000	6.000	2.800	80.00	3.50	40.00	0.500	2	3.000	●
4.000	6.000	3.800	80.00	4.00	40.00	1.000	2	4.000	●
6.000	8.000	5.600	100.00	6.00	60.00	2.000	2	6.000	●
8.000	10.000	7.600	120.00	7.00	75.00	2.000	2	8.000	●
10.000	12.000	9.600	120.00	8.00	70.00	3.000	2	10.000	●
12.000	16.000	11.500	150.00	10.00	100.00	4.000	2	12.000	●

Trace End Mills with Ball Nose

Catalogue no. **54306**

Particulary suitable for the moulding-industry with a high accuracy of form and contour, minimal wear and a high tool life. Especially to be used in cast iron and for hardened steels upto HRC62. Made out of DK500UF material, short version.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*H*
Flute form	30°
Shank	HA
Cutting direction	right-hand
Tolerance	h8

Trace End Mills with Ball Nose

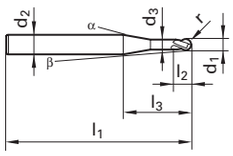
Catalogue no. **54307**

Particulary suitable for the moulding-industry with a high accuracy of form and contour, minimal wear and a high tool life. Especially to be used in cast iron and for hardened steels upto HRC62. Made out of DK500UF material, long version.

Stock std.

Tool material	Solid carbide
Surface	FIRE
Type	*H*
Flute form	30°
Shank	HA
Cutting direction	right-hand
Tolerance	h8

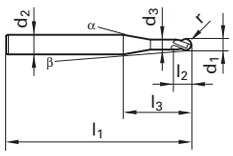
Trace End Mills with Ball Nose



Catalogue no.	**54306**
Tool material	**Solid carbide**
Type	**H**
Discount group	**106**
Surface	**FIRE**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	r mm	Z	Code no.	Gross price/€
0.500	3.000	0.400	38.00	0.75	10.00	0.250	2	0.500	●
0.800	3.000	0.700	38.00	1.20	10.00	0.400	2	0.800	●
1.000	3.000	0.900	38.00	1.50	10.00	0.500	2	1.000	●
1.500	3.000	1.400	38.00	2.25	10.00	0.750	2	1.500	●
2.000	6.000	1.900	57.00	3.00	21.00	1.000	2	2.000	●
3.000	6.000	2.700	57.00	5.00	21.00	1.500	2	3.000	●
4.000	6.000	3.700	57.00	6.00	21.00	2.000	2	4.000	●
5.000	6.000	4.700	57.00	8.00	21.00	2.500	2	5.000	●
6.000	6.000	5.700	57.00	9.00	21.00	3.000	2	6.000	●
8.000	8.000	7.700	63.00	12.00	27.00	4.000	2	8.000	●
10.000	10.000	9.500	72.00	15.00	32.00	5.000	2	10.000	●
12.000	12.000	11.500	83.00	18.00	38.00	6.000	2	12.000	●
16.000	16.000	15.500	92.00	24.00	44.00	8.000	2	16.000	●

Trace End Mills with Ball Nose



Catalogue no.	**54307**
Tool material	**Solid carbide**
Type	**H**
Discount group	**106**
Surface	**FIRE**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	r mm	Z	Code no.	Gross price/€
3.000	6.000	2.700	75.00	5.00	39.00	1.500	2	3.000	●
4.000	6.000	3.700	75.00	6.00	39.00	2.000	2	4.000	●
5.000	6.000	4.700	75.00	8.00	39.00	2.500	2	5.000	●
6.000	6.000	5.700	75.00	9.00	39.00	3.000	2	6.000	●
8.000	8.000	7.700	100.00	12.00	64.00	4.000	2	8.000	●
10.000	10.000	9.500	100.00	15.00	60.00	5.000	2	10.000	●
12.000	12.000	11.500	150.00	18.00	105.00	6.000	2	12.000	●
16.000	16.000	15.500	150.00	24.00	102.00	8.000	2	16.000	●

Trace End Mills with Ball Nose

Catalogue no. **54300**

Particulary designed for the moulding-industry with a high accuracy of form and contour, minimal wear and a high tool life. To be used in cast iron and hardened materials upto 54 HRC. Short version.

Stock std.

Tool material	Solid carbide
Surface	TiAlN
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h8

Trace End Mills with Ball Nose

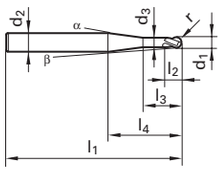
Catalogue no. **54301**

Particulary designed for the moulding-industry with a high accuracy of form and contour, minimal wear and a high tool life. To be used in steel, high-alloyed steels and hardened materials upto 54 HRC. Long version.

Stock std.

Tool material	Solid carbide
Surface	TiAlN
Type	*N*
Flute form	30°
Shank	cyl.
Cutting direction	right-hand
Tolerance	h8

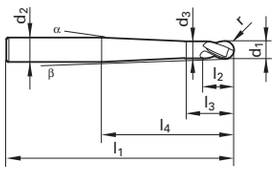
Trace End Mills with Ball Nose



Catalogue no.	**54300**
Tool material	**Solid carbide**
Type	**N**
Discount group	**106**
Surface	**TiAlN**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	r mm	Z	Code no.	Gross price/€
2.000	6.000	1.800	57.00	3.00	20.00	1.000	2	2.000	●
3.000	6.000	2.800	57.00	3.50	20.00	1.500	2	3.000	●
4.000	6.000	3.800	57.00	4.00	20.00	2.000	2	4.000	●
6.000	6.000	5.600	57.00	6.00	20.00	3.000	2	6.000	●
8.000	8.000	7.600	63.00	7.00	26.00	4.000	2	8.000	●
10.000	10.000	9.600	72.00	8.00	30.00	5.000	2	10.000	●
12.000	12.000	11.500	83.00	10.00	35.00	6.000	2	12.000	●

Trace End Mills with Ball Nose



Catalogue no.	**54301**
Tool material	**Solid carbide**
Type	**N**
Discount group	**106**
Surface	**TiAlN**

d1 mm	d2 mm	d3 mm	l1 mm	l2 mm	l3 mm	r mm	Z	Code no.	Gross price/€
2.000	6.000	1.800	80.00	3.00	40.00	1.000	2	2.000	●
3.000	6.000	2.800	80.00	3.50	40.00	1.500	2	3.000	●
4.000	6.000	3.800	80.00	4.00	40.00	2.000	2	4.000	●
6.000	8.000	5.600	100.00	6.00	60.00	3.000	2	6.000	●
8.000	10.000	7.600	120.00	7.00	75.00	4.000	2	8.000	●
10.000	12.000	9.600	120.00	8.00	70.00	5.000	2	10.000	●
12.000	16.000	11.500	150.00	10.00	100.00	6.000	2	12.000	●

Slot drills, 2-fluted

DIN 327 D

Catalogue no. 74231

Suitable for milling materials with tensile strengths of up to approx. 1200N/mm². For producing deep, high-precision keyways/slots (P9).

Tool material	M42
Surface	bright
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8/h10

centre cutting

Slot drills, 2-fluted

DIN 327 D

Catalogue no. 64640

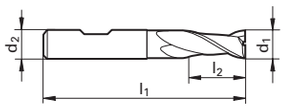
Suitable for milling materials with tensile strengths of up to approx. 1200N/mm². For producing deep, high-precision keyways/slots (P9).

Tool material	M42
Surface	FIRE
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8/h10

centre cutting

STOCK

Slot drills, 2-fluted



Catalogue no.	74231	64640
Tool material	M42	
Type	N	
Discount group	112	112
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
1.000	6.000	47.00	2.00	2	●	●
1.500	6.000	47.00	3.00	2	●	●
2.000	6.000	48.00	4.00	2	●	●
2.500	6.000	49.00	5.00	2	●	●
3.000	6.000	49.00	5.00	2	●	●
3.500	6.000	50.00	6.00	2		●
4.000	6.000	51.00	7.00	2	●	●
4.500	6.000	51.00	7.00	2		●
5.000	6.000	52.00	8.00	2	●	●
5.500	6.000	52.00	8.00	2		●
6.000	6.000	52.00	8.00	2	●	●
7.000	10.000	60.00	10.00	2	●	●
8.000	10.000	61.00	11.00	2	●	●
9.000	10.000	61.00	11.00	2		●
10.000	10.000	63.00	13.00	2	●	●
12.000	12.000	73.00	16.00	2	●	●
14.000	12.000	73.00	16.00	2	●	●
16.000	16.000	79.00	19.00	2	●	●
18.000	16.000	79.00	19.00	2		●
20.000	20.000	88.00	22.00	2	●	●

Slot drills, 2-fluted

DIN 844 K

Catalogue no. **74243**

Suitable for milling materials with low to medium tensile strengths of up to approx. 1200 N/mm². For producing deep, high-precision keyways/slots.

Tool material	M42
Surface	bright
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8/h10

centre cutting

Slot drills, 2-fluted

DIN 844 K

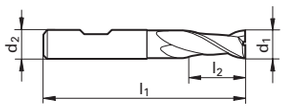
Catalogue no. **64670**

Suitable for milling materials with low to medium tensile strengths of up to approx. 1200 N/mm². For producing deep, high-precision keyways/slots.

Tool material	M42
Surface	FIRE
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8/h10

centre cutting

Slot drills, 2-fluted



Catalogue no.	74243	64670
Tool material	M42	
Type	N	
Discount group	112	112
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	6.000	52.00	8.00	2	●	❍
3.500	6.000	54.00	10.00	2	❍	
4.000	6.000	55.00	11.00	2	●	●
4.500	6.000	55.00	11.00	2	❍	
5.000	6.000	57.00	13.00	2	●	●
5.500	6.000	57.00	13.00	2	❍	❍
6.000	6.000	57.00	13.00	2	●	❍
7.000	10.000	66.00	16.00	2	❍	❍
8.000	10.000	69.00	19.00	2	●	●
10.000	10.000	72.00	22.00	2	●	●
12.000	12.000	83.00	26.00	2	●	❍
14.000	12.000	83.00	26.00	2	●	❍
16.000	16.000	92.00	32.00	2	●	❍
18.000	16.000	92.00	32.00	2	❍	
20.000	20.000	104.00	38.00	2	●	●

Slot drills, 2-fluted

DIN 844 L

Catalogue no. 74244

Suitable for milling materials with low to medium tensile strengths of up to approx. 1000 N/mm². For producing deep, high-precision keyways/slots.

Tool material	M42
Surface	bright
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 2-fluted

DIN 844 L

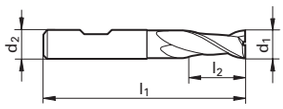
Catalogue no. 64671

Suitable for milling materials with low to medium tensile strengths of up to approx. 1000 N/mm². For producing deep, high-precision keyways/slots.

Tool material	M42
Surface	FIRE
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	h10

centre cutting

Slot drills, 2-fluted



Catalogue no.	74244	64671
Tool material	M42	
Type	N	
Discount group	112	112
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	6.000	56.00	12.00	2	❍	
4.000	6.000	63.00	19.00	2	❍	❍
5.000	6.000	68.00	24.00	2	❍	❍
6.000	6.000	68.00	24.00	2	❍	❍
8.000	10.000	88.00	38.00	2	❍	❍
10.000	10.000	95.00	45.00	2	❍	❍
12.000	12.000	110.00	53.00	2	❍	❍
14.000	12.000	110.00	53.00	2	❍	❍
16.000	16.000	123.00	63.00	2	❍	❍
18.000	16.000	123.00	63.00	2	❍	❍
20.000	20.000	141.00	75.00	2	❍	❍

Micro Slot drills, 3-fluted

Catalogue no. **74080**

Short design.

Especially suitable for milling materials with medium to high tensile strengths of up to approx. 1200 N/mm².

Stock std.

Tool material	M42
Surface	bright
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8

centre cutting

Micro Slot drills, 3-fluted

Catalogue no. **54080**

Short design.

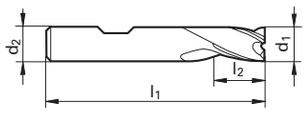
Especially suitable for milling materials with medium to high tensile strengths of up to approx. 1200 N/mm².

Stock std.

Tool material	M42
Surface	FIRE
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8

centre cutting

Micro Slot drills, 3-fluted



Catalogue no.	**74080**	**54080**
Tool material	**M42**	
Type	**N**	
Discount group	**112**	**112**
Surface	**bright**	**FIRE**

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	6.000	36.00	5.00	3	❍	●
4.000	6.000	38.00	7.00	3	❍	●
5.000	6.000	39.00	8.00	3	❍	●
6.000	6.000	39.00	8.00	3	❍	●
8.000	8.000	43.00	11.00	3	❍	●
10.000	10.000	50.00	13.00	3	❍	●

Micro Slot drills, 3-fluted

Catalogue no. **74180**

Long design.

Especially suitable for milling materials with medium to high tensile strengths of up to approx. 1200 N/mm².

Stock std.

Tool material	M42
Surface	bright
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8

centre cutting

Micro Slot drills, 3-fluted

Catalogue no. **54180**

Long design.

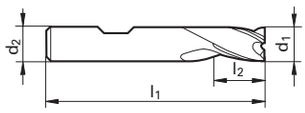
Especially suitable for milling materials with medium to high tensile strengths of up to approx. 1200 N/mm².

Stock std.

Tool material	M42
Surface	FIRE
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8

centre cutting

Micro Slot drills, 3-fluted



Catalogue no.	**74180**	**54180**
Tool material	**M42**	
Type	**N**	
Discount group	**112**	**112**
Surface	**bright**	**FIRE**

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	6.000	39.00	8.00	3	❍	●
4.000	6.000	42.00	11.00	3	❍	●
5.000	6.000	44.00	13.00	3	❍	●
6.000	6.000	44.00	13.00	3	❍	●
8.000	8.000	51.00	19.00	3	❍	●
10.000	10.000	59.00	22.00	3	❍	●

High speed steel milling cutters

Slot drills, 3-fluted

DIN 327 D

Catalogue no. **74280**

Suitable for milling materials with low and medium tensile strengths of up to approx. 1200 N/mm². For producing deep, high-precision keyways/slots (P 9). Also suitable for face and contour milling. High cutting performance, very smooth operation giving excellent surface finish.

Tool material	M42
Surface	bright
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8/h10

centre cutting

Slot drills, 3-fluted

DIN 327 D

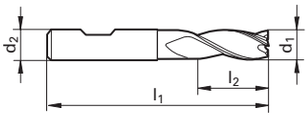
Catalogue no. **64604**

Suitable for milling materials with low and medium tensile strengths of up to approx. 1200 N/mm². For producing deep, high-precision keyways/slots (P 9). Also suitable for face and contour milling. High cutting performance, very smooth operation giving excellent surface finish.

Tool material	M42
Surface	FIRE
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8/h10

centre cutting

Slot drills, 3-fluted



Catalogue no.	74280	64604
Tool material	M42	
Type	N	
Discount group	112	112
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
2.800	6.000	49.00	5.00	3	●	●
3.000	6.000	49.00	5.00	3	●	●
3.800	6.000	51.00	7.00	3	●	●
4.000	6.000	51.00	7.00	3	●	●
4.800	6.000	52.00	8.00	3	●	●
5.000	6.000	52.00	8.00	3	●	●
5.750	6.000	52.00	8.00	3	●	●
6.000	6.000	52.00	8.00	3	●	●
7.000	10.000	60.00	10.00	3	●	●
7.750	10.000	61.00	11.00	3	●	●
8.000	10.000	61.00	11.00	3	●	●
9.700	10.000	63.00	13.00	3	●	●
10.000	10.000	63.00	13.00	3	●	●
11.700	12.000	70.00	13.00	3	●	●
12.000	12.000	73.00	16.00	3	●	●
14.000	12.000	73.00	16.00	3	●	●
16.000	16.000	79.00	19.00	3	●	●
18.000	16.000	79.00	19.00	3	●	●
20.000	20.000	88.00	22.00	3	●	●
25.000	25.000	102.00	26.00	3	●	●

High speed steel milling cutters

Slot drills, 3-fluted

DIN 844 K

Catalogue no. 74282

Suitable for milling materials with low and medium tensile strengths of up to approx. 1200 N/mm². For producing deep, high-precision keyways/slots (P 9). Also suitable for face and contour milling. High cutting performance, very smooth operation giving excellent surface finish.

Tool material	M42
Surface	bright
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8

centre cutting

Slot drills, 3-fluted

DIN 844 K

Catalogue no. 64641

Suitable for milling materials with low and medium tensile strengths of up to approx. 1200 N/mm². For producing deep, high-precision keyways/slots (P 9). Also suitable for face and contour milling. High cutting performance, very smooth operation giving excellent surface finish.

Tool material	M42
Surface	FIRE
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8

centre cutting

Slot drills, 3-fluted

DIN 844 L

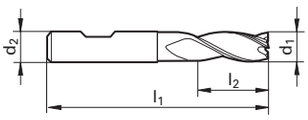
Catalogue no. 54294

Suitable for milling materials with low and medium tensile strengths of up to approx. 1000 N/mm². For producing deep, high-precision keyways/slots (P 9). Also suitable for face and contour milling. High cutting performance, very smooth operation giving excellent surface finish.

Tool material	M42
Surface	FIRE
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8

centre cutting

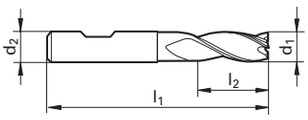
Slot drills, 3-fluted



Catalogue no.	74282	64641
Tool material	M42	
Type	N	
Discount group	112	112
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	6.000	52.00	8.00	3		●
4.000	6.000	55.00	11.00	3	○	●
4.800	6.000	57.00	13.00	3	○	
5.000	6.000	57.00	13.00	3	○	
5.750	6.000	57.00	13.00	3	○	
6.000	6.000	57.00	13.00	3	○	○
8.000	10.000	69.00	19.00	3	○	●
10.000	10.000	72.00	22.00	3	○	●
12.000	12.000	83.00	26.00	3	○	
13.700	12.000	83.00	26.00	3	○	
14.000	12.000	83.00	26.00	3		●
16.000	16.000	92.00	32.00	3	○	●
18.000	16.000	92.00	32.00	3	○	○
20.000	20.000	104.00	38.00	3	○	●

Slot drills, 3-fluted



Catalogue no.	**54294**
Tool material	**M42**
Type	**N**
Discount group	**112**
Surface	**FIRE**

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
4.000	6.000	63.00	19.00	3	❍
5.000	6.000	68.00	24.00	3	❍
6.000	6.000	68.00	24.00	3	❍
8.000	10.000	88.00	38.00	3	❍
10.000	10.000	95.00	45.00	3	❍
12.000	12.000	110.00	53.00	3	❍
14.000	12.000	110.00	53.00	3	❍
16.000	16.000	123.00	63.00	3	❍
18.000	16.000	123.00	63.00	3	❍
20.000	20.000	141.00	75.00	3	❍

End mills, multiple fluted

DIN 844 K

Catalogue no. 74617

Suitable for milling materials with tensile strengths of up to 1200 N/mm², Titanium and Ti-alloys, non-ferrous metals and spheroidal graphite iron.

Tool material	M42
Surface	bright
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k10

centre cutting

End mills, multiple fluted

DIN 844 K

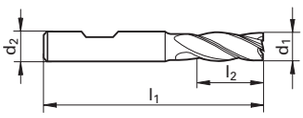
Catalogue no. 64667

Suitable for milling materials with tensile strengths of up to 1200 N/mm², Titanium and Ti-alloys, non-ferrous metals and spheroidal graphite iron.

Tool material	M42
Surface	FIRE
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k10

centre cutting

End mills, multiple fluted



Catalogue no.	74617	64667
Tool material	M42	
Type	N	
Discount group	112	112
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	6.000	52.00	8.00	4	●	●
4.000	6.000	55.00	11.00	4	●	●
5.000	6.000	57.00	13.00	4	●	●
6.000	6.000	57.00	13.00	4	●	●
8.000	10.000	69.00	19.00	4	●	●
10.000	10.000	72.00	22.00	4	●	●
12.000	12.000	83.00	26.00	4	●	●
14.000	12.000	83.00	26.00	4	●	●
16.000	16.000	92.00	32.00	4	●	●
18.000	16.000	92.00	32.00	4	●	●
20.000	20.000	104.00	38.00	4	●	●
25.000	25.000	121.00	45.00	6	●	●

End mills, multiple fluted

DIN 844 L

Catalogue no. **74847**

Suitable for milling materials with tensile strengths of up to 1000 N/mm², Titanium and Ti-alloys, non-ferrous metals and spheroidal graphite iron (GGG).

Tool material	M42
Surface	bright
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k10

centre cutting

End mills, multiple fluted

DIN 844 L

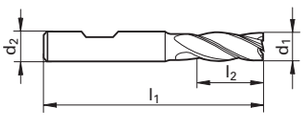
Catalogue no. **54847**

Suitable for milling materials with tensile strengths of up to 1000 N/mm², Titanium and Ti-alloys, non-ferrous metals and spheroidal graphite iron (GGG).

Tool material	M42
Surface	FIRE
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k10

centre cutting

End mills, multiple fluted



Catalogue no.	74847	54847
Tool material	M42	
Type	N	
Discount group	112	112
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	6.000	56.00	12.00	4	●	●
4.000	6.000	63.00	19.00	4	●	●
5.000	6.000	68.00	24.00	4	●	●
6.000	6.000	68.00	24.00	4	●	●
7.000	10.000	80.00	30.00	4	●	●
8.000	10.000	88.00	38.00	4	●	●
9.000	10.000	88.00	38.00	4	●	●
10.000	10.000	95.00	45.00	4	●	●
11.000	12.000	102.00	45.00	4	❍	
12.000	12.000	110.00	53.00	4	●	●
14.000	12.000	110.00	53.00	4	●	●
15.000	12.000	110.00	53.00	4	❍	❍
16.000	16.000	123.00	63.00	4	●	●
18.000	16.000	123.00	63.00	4	●	●
20.000	20.000	141.00	75.00	4	●	●
25.000	25.000	166.00	90.00	6	●	●
32.000	32.000	186.00	106.00	6	●	●

End mills, multiple fluted

Catalogue no. **74800**

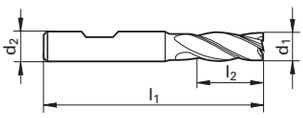
Suitable for milling materials with tensile strengths of up to 1000 N/mm², Titanium and Ti-alloys, non-ferrous metals and spheroidal graphite iron (GGG).

Stock std.

Tool material	M42
Surface	bright
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k10

centre cutting

End mills, multiple fluted



Catalogue no.	74800
Tool material	M42
Type	N
Discount group	112
Surface	bright

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
6.000	6.000	79.00	40.00	4	●
8.000	10.000	105.00	56.00	4	●
10.000	10.000	112.00	63.00	4	●
12.000	12.000	125.00	71.00	4	●
14.000	12.000	125.00	71.00	4	●
16.000	16.000	141.00	80.00	4	●
18.000	16.000	141.00	80.00	4	●
20.000	20.000	163.00	100.00	4	●

High speed steel milling cutters

Ball nose end mills, 2-fluted

DIN 327 D

Catalogue no. **54275**

Suitable for milling materials of low to medium tensile strengths up to approx. 1200 N/mm². Particularly suitable for copy and profile milling.

Tool material	M42
Surface	FIRE
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	e8

centre cutting

Ball nose end mills, 2-fluted

Stock std.

Catalogue no. **74276**

Suitable for milling materials with low to medium tensile strengths of up to approx. 1000 N/mm². Particularly suitable for copy and profile milling.

Tool material	M42
Surface	bright
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	h10

centre cutting

Ball nose end mills, 2-fluted

Stock std.

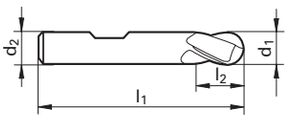
Catalogue no. **54276**

Suitable for milling materials with low to medium tensile strengths of up to approx. 1000 N/mm². Particularly suitable for copy and profile milling.

Tool material	M42
Surface	FIRE
Type	*N*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	h10

centre cutting

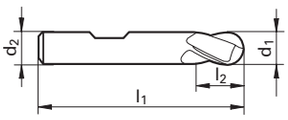
Ball nose end mills, 2-fluted



Catalogue no.	54275
Tool material	M42
Type	N
Discount group	112
Surface	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€
2.000	6.000	48.00	4.00	2	●
3.000	6.000	49.00	5.00	2	●
4.000	6.000	51.00	7.00	2	●
5.000	6.000	52.00	8.00	2	●
6.000	6.000	52.00	8.00	2	●
7.000	10.000	60.00	10.00	2	●
8.000	10.000	61.00	11.00	2	●
10.000	10.000	63.00	13.00	2	●
12.000	12.000	73.00	16.00	2	●
13.000	12.000	73.00	16.00	2	❍
14.000	12.000	73.00	16.00	2	●
15.000	12.000	73.00	16.00	2	●
16.000	16.000	79.00	19.00	2	●
20.000	20.000	88.00	22.00	2	●

Ball nose end mills, 2-fluted



Catalogue no.	74276	54276
Tool material	M42	
Type	N	
Discount group	112	112
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
3.000	6.000	56.00	8.00	2	❍	●
4.000	6.000	63.00	11.00	2	❍	●
5.000	6.000	68.00	13.00	2	❍	●
6.000	6.000	68.00	13.00	2	❍	●
7.000	10.000	80.00	16.00	2		❍
8.000	10.000	88.00	19.00	2	❍	●
10.000	10.000	95.00	22.00	2	❍	●
12.000	12.000	110.00	26.00	2	❍	●
14.000	12.000	110.00	26.00	2	❍	●
15.000	12.000	110.00	26.00	2		❍
16.000	16.000	123.00	32.00	2	❍	●
18.000	16.000	123.00	32.00	2	❍	●
20.000	20.000	141.00	38.00	2	❍	●

Roughing and Finishing End Mills, 4-fluted

DIN 844 K

Catalogue no. **74815**

Standard roughing-finishing design.

Suitable for milling difficult to cut materials with tensile strengths of up to 1200 N/mm², as well as Titanium and Ti-alloys.

Tool material	M42
Surface	bright
Type	*NF*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k12

centre cutting

Roughing and Finishing End Mills, 4-fluted

DIN 844 K

Catalogue no. **54815**

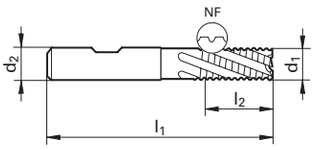
Standard roughing-finishing design.

Suitable for milling difficult to cut materials with tensile strengths of up to 1200 N/mm², as well as Titanium and Ti-alloys.

Tool material	M42
Surface	FIRE
Type	*NF*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k12

centre cutting

Roughing and Finishing End Mills, 4-fluted



Catalogue no.	**74815**	**54815**
Tool material	**M42**	
Type	**NF**	
Discount group	**112**	**112**
Surface	**bright**	**FIRE**

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
6.000	6.000	57.00	13.00	4	●	●
8.000	10.000	69.00	19.00	4	●	●
10.000	10.000	72.00	22.00	4	●	●
12.000	12.000	83.00	26.00	4	●	●
14.000	12.000	83.00	26.00	4	●	●
16.000	16.000	92.00	32.00	4	●	●
18.000	16.000	92.00	32.00	4	●	●
20.000	20.000	104.00	38.00	4	●	●
25.000	25.000	121.00	45.00	4	●	●

Roughing and Finishing End Mills, 4-fluted

DIN 844 L

Catalogue no. **74835**

Standard roughing-finishing design.
Suitable for milling difficult to cut materials, as well as titanium and Ti-alloys.

Tool material	M42
Surface	bright
Type	*NF*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k12

centre cutting

Roughing and Finishing End Mills, 4-fluted

DIN 844 L

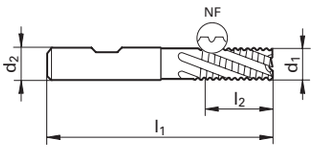
Catalogue no. **54835**

Standard roughing-finishing design.
Suitable for milling difficult to cut materials, as well as titanium and Ti-alloys.

Tool material	M42
Surface	FIRE
Type	*NF*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k12

centre cutting

Roughing and Finishing End Mills, 4-fluted



Catalogue no.	**74835**	**54835**
Tool material	**M42**	
Type	**NF**	
Discount group	**112**	**112**
Surface	**bright**	**FIRE**

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
6.000	6.000	68.00	24.00	4	❍	❍
8.000	10.000	88.00	38.00	4	❍	❍
10.000	10.000	95.00	45.00	4	❍	❍
14.000	12.000	110.00	53.00	4		❍
16.000	16.000	123.00	63.00	4	❍	❍
18.000	16.000	123.00	63.00	4	❍	❍
20.000	20.000	141.00	75.00	4	❍	❍
25.000	25.000	166.00	90.00	4	❍	

Roughing end mills

DIN 844 K

Catalogue no. **74825**

Fine tooth roughing profile.

Suitable for milling materials with tensile strengths of up to 1400 N/mm², Titanium and Ti-alloys, cast and grey cast iron.

Tool material	HSS-E-PM
Surface	bright
Type	*NRf*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k10

centre cutting

Roughing end mills

DIN 844 K

Catalogue no. **54825**

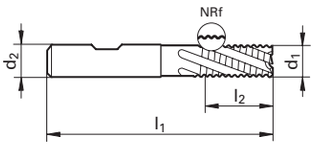
Fine tooth roughing profile.

Suitable for milling materials with tensile strengths of up to 1400 N/mm², Titanium and Ti-alloys, cast and grey cast iron.

Tool material	HSS-E-PM
Surface	FIRE
Type	*NRf*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k10

centre cutting

Roughing end mills



Catalogue no.	74825	54825
Tool material	HSS-E-PM	
Type	NRf	
Discount group	112	112
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
6.000	6.000	57.00	13.00	3	●	●
8.000	10.000	69.00	19.00	3	●	●
10.000	10.000	72.00	22.00	3	●	●
12.000	12.000	83.00	26.00	3	●	●
14.000	12.000	83.00	26.00	3	●	
16.000	16.000	92.00	32.00	3	●	●
18.000	16.000	92.00	32.00	3	●	●
20.000	20.000	104.00	38.00	3	●	●

High speed steel milling cutters

Roughing end mills

DIN 844 K

Catalogue no. **74816**

Coarse tooth roughing profile.

Suitable for milling difficult to cut materials with tensile strengths of up to 1200 N/mm², as well as Titanium and Ti-alloys.

Tool material	M42
Surface	bright
Type	*NR*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k12

centre cutting

Roughing end mills

DIN 844 K

Catalogue no. **54816**

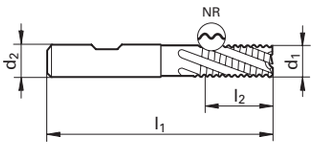
Coarse tooth roughing profile.

Suitable for milling difficult to cut materials with tensile strengths of up to 1200 N/mm², as well as Titanium and Ti-alloys.

Tool material	M42
Surface	FIRE
Type	*NR*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k12

centre cutting

Roughing end mills



Catalogue no.	**74816**	**54816**
Tool material	**M42**	
Type	**NR**	
Discount group	**112**	**112**
Surface	**bright**	**FIRE**

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
6.000	6.000	57.00	13.00	4	●	●
8.000	10.000	69.00	19.00	4	●	●
10.000	10.000	72.00	22.00	4	●	●
12.000	12.000	83.00	26.00	4	●	●
14.000	12.000	83.00	26.00	4	●	●
16.000	16.000	92.00	32.00	4	●	●
18.000	16.000	92.00	32.00	4	●	●
20.000	20.000	104.00	38.00	4	●	●
25.000	25.000	121.00	45.00	4	●	

Roughing end mills

DIN 844 K

Catalogue no. **74845**

Fine tooth roughing profile.

Suitable for milling materials with tensile strengths of up to 1400 N/mm², Titanium and Ti-alloys, cast and grey cast iron.

Tool material	HSS-E-PM
Surface	bright
Type	*NRf*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k12

centre cutting

Roughing end mills

DIN 844 K

Catalogue no. **54845**

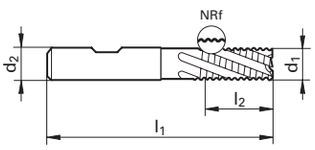
Fine tooth roughing profile.

Suitable for milling materials with tensile strengths of up to 1400 N/mm², Titanium and Ti-alloys, cast and grey cast iron.

Tool material	HSS-E-PM
Surface	FIRE
Type	*NRf*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k12

centre cutting

Roughing end mills



Catalogue no.	74845	54845
Tool material	HSS-E-PM	
Type	NRf	
Discount group	112	112
Surface	bright	FIRE

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
6.000	6.000	57.00	13.00	4	●	●
8.000	10.000	69.00	19.00	4	●	●
10.000	10.000	72.00	22.00	4	●	●
12.000	12.000	83.00	26.00	4	●	●
14.000	12.000	83.00	26.00	4	●	●
16.000	16.000	92.00	32.00	4	●	●
18.000	16.000	92.00	32.00	4	●	●
20.000	20.000	104.00	38.00	4	●	●
25.000	25.000	121.00	45.00	5	●	●

Roughing end mills

DIN 844 L

Catalogue no. 74836

Coarse tooth roughing profile.

Suitable for milling difficult to cut materials with tensile strengths of up to 1200 N/mm², as well as Titanium and Ti-alloys.

Tool material	M42
Surface	bright
Type	*NR*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k12

centre cutting

Roughing end mills

DIN 844 L

Catalogue no. 54836

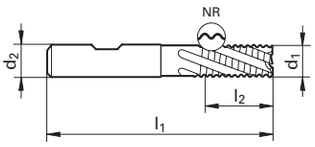
Coarse tooth roughing profile.

Suitable for milling difficult to cut materials with tensile strengths of up to 1200 N/mm², as well as Titanium and Ti-alloys.

Tool material	M42
Surface	FIRE
Type	*NR*
Flute form	30°
Shank	B
Cutting direction	right-hand
Tolerance	k12

centre cutting

Roughing end mills



Catalogue no.	**74836**	**54836**
Tool material	**M42**	
Type	**NR**	
Discount group	**112**	**112**
Surface	**bright**	**FIRE**

d1 mm	d2 mm	l1 mm	l2 mm	Z	Gross price/€	
6.000	6.000	68.00	24.00	4	❍	●
8.000	10.000	88.00	38.00	4	❍	●
10.000	10.000	95.00	45.00	4		●
12.000	12.000	110.00	53.00	4	❍	●
14.000	12.000	110.00	53.00	4	❍	●
16.000	16.000	123.00	63.00	4	❍	●
18.000	16.000	123.00	63.00	4	❍	●
20.000	20.000	141.00	75.00	4	❍	●
25.000	25.000	166.00	90.00	4	❍	●