



■ Made
■ in
■ Germany



BASIC-DRILL 5xD

EMUGE



Solid Carbide Twist Drills

Main area of application

The twist drill BASIC-DRILL is universally applicable and available in the diameter range from 3.0 to 16.0 mm.

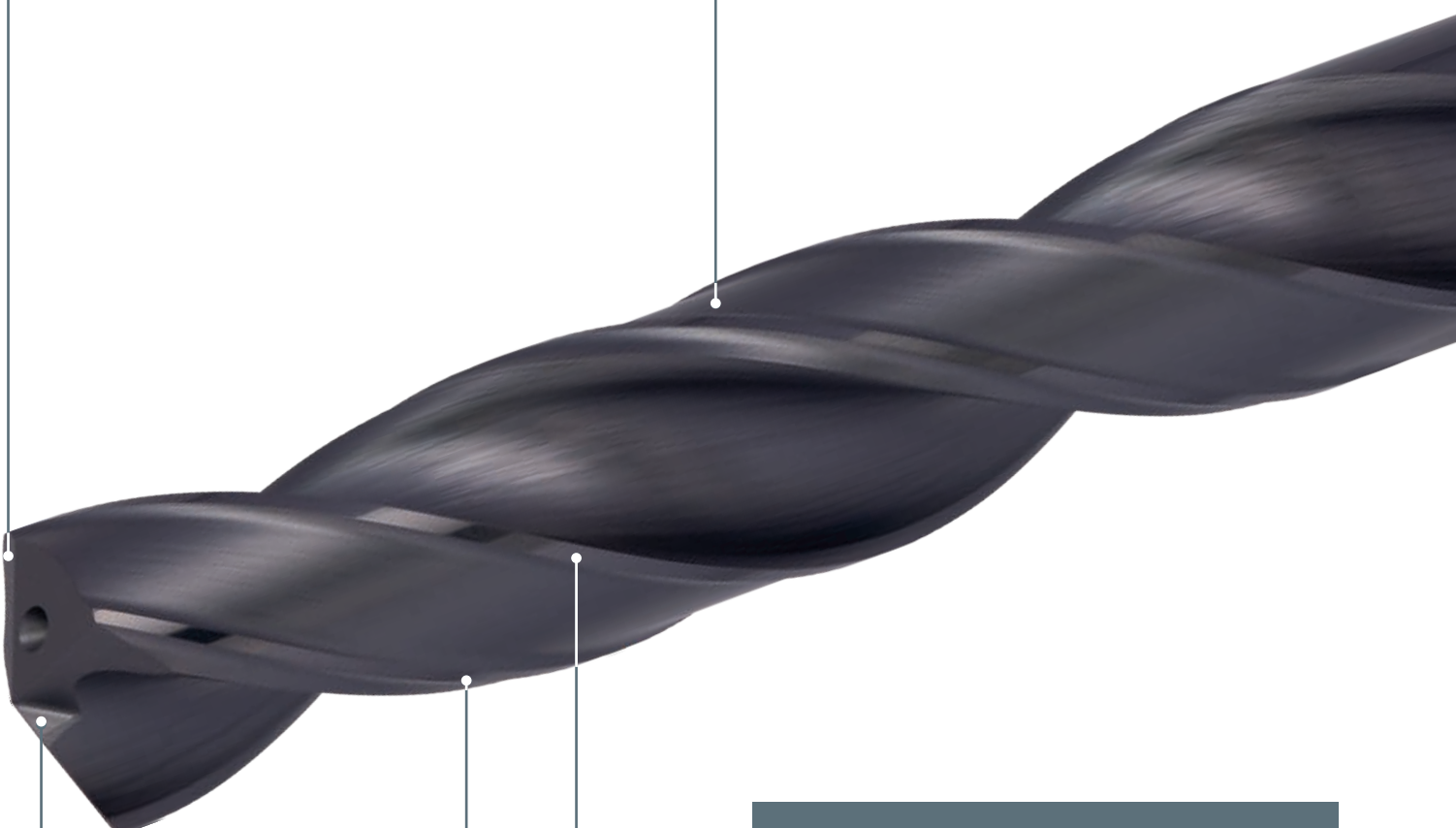
The application area of the BASIC-DRILL covers the material groups steel materials, stainless steel materials, cast materials and non-ferrous materials. Its application focus is the steel area.

Cutting edge shape and edge preparation

The convex main cutting edge combined with an optimised edge preparation enables the best cutting behaviour in the steel and cast iron area with excellent tool life.

Cutting material and coating

The combination of carbide and a high-performance coating enables higher cutting speeds and feed rates.



Margins

The design with four margins ensures optimum guidance of the twist drill in the bore. The third and fourth margin are arranged in such a way that they engage at an early stage. The special design prevents jamming even in stainless steel materials.

Point geometry

An optimised point design allows sufficient space for chip forming and coolant distribution.

Shank end

The shank end has been designed in such a way that the drilling tool can be used with emulsion as well as with minimum quantity lubrication (MQL).

Flutes

The open shape of the flute facilitates smooth chip evacuation.



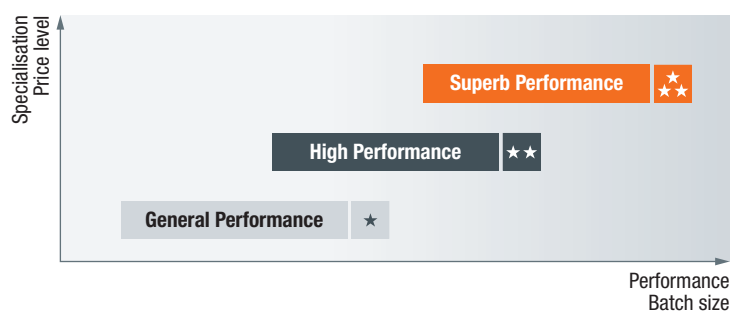
The EMUGE-FRANKEN performance classes of twist drills

The performance classes indicated by stars make it easier to find the right tool for the specific performance requirements and the batch size to be produced.

Tools for standard requirements and versatile use are assigned to the category “General Performance”.

Tools designed for special materials or applications are marked “High Performance”.

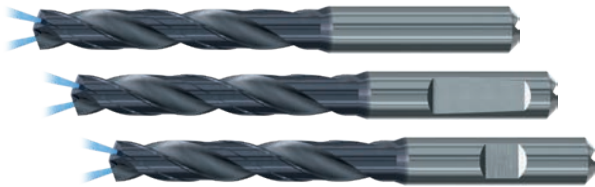
Specialists with the highest performance values and the best possible technology are classified as “Superb Performance”.



BASIC-DRILL-5xD-IK



5xD

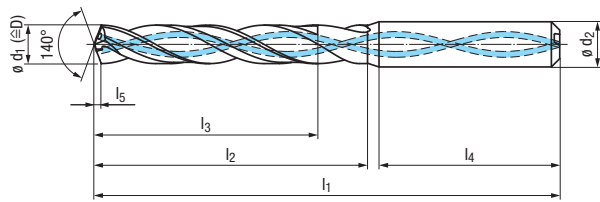


Solid carbide twist drill, 5xD, in BASIC geometry for universal application.

Product features and benefits:

- Four margins for better guidance and hole quality.
- Internal cooling channels and high-performance coating for high process reliability.
- Use in various materials with steel as the main application area.

Applications – material	
P	1.1-5.1
M	1.1-3.1
K	1.1-3.2
N	1.1-2.3
S	1.2-1.3, 2.2-2.3
H	1.1-1.3








Long design

Information about this product is also available on the web



ϕd_1 m7	Taps		Cold-forming taps					ϕd_2 h6	Material			
			l_1	l_2	l_3	l_4	l_5		DIN 6535 HA	DIN 6535 HE	DIN 6535 HB	
3.00	M3.5x0.5, MJ3.5x0.6		66	28	23	36	0.6	6	TA211344.0300	TA511344.0300	TA611344.0300	●
3.10			66	28	23	36	0.6	6	TA211344.0310	TA511344.0310	TA611344.0310	●
3.20			66	28	23	36	0.6	6	TA211344.0320	TA511344.0320	TA611344.0320	●
3.30	M4	M3.5x0.5	66	28	23	36	0.6	6	TA211344.0330	TA511344.0330	TA611344.0330	●
3.40	MJ4x0.7		66	28	23	36	0.6	6	TA211344.0340	TA511344.0340	TA611344.0340	●
3.50	M4x0.5		66	28	23	36	0.6	6	TA211344.0350	TA511344.0350	TA611344.0350	●
3.70	M4.5	M4, MJ4x0.7	66	28	23	36	0.7	6	TA211344.0370	TA511344.0370	TA611344.0370	●
3.80		M4x0.5	74	36	29	36	0.7	6	TA211344.0380	TA511344.0380	TA611344.0380	●
3.90			74	36	29	36	0.7	6	TA211344.0390	TA511344.0390	TA611344.0390	●
4.00	M4.5x0.5		74	36	29	36	0.7	6	TA211344.0400	TA511344.0400	TA611344.0400	●
4.10			74	36	29	36	0.8	6	TA211344.0410	TA511344.0410	TA611344.0410	●
4.20	M5	M4.5	74	36	29	36	0.8	6	TA211344.0420	TA511344.0420	TA611344.0420	●
4.30	MJ5x0.8	M4.5x0.5	74	36	29	36	0.8	6	TA211344.0430	TA511344.0430	TA611344.0430	●
4.50	M5x0.5		74	36	29	36	0.8	6	TA211344.0450	TA511344.0450	TA611344.0450	●
4.60			74	36	29	36	0.8	6	TA211344.0460	TA511344.0460	TA611344.0460	●
4.65		M5	74	36	29	36	0.9	6	TA211344.0465	TA511344.0465	TA611344.0465	●
4.70			74	36	29	36	0.9	6	TA211344.0470	TA511344.0470	TA611344.0470	●
4.80		M5x0.5	82	44	35	36	0.9	6	TA211344.0480	TA511344.0480	TA611344.0480	●
4.90			82	44	35	36	0.9	6	TA211344.0490	TA511344.0490	TA611344.0490	●
5.00	M6		82	44	35	36	0.9	6	TA211344.0500	TA511344.0500	TA611344.0500	●
5.10	MJ6x1		82	44	35	36	0.9	6	TA211344.0510	TA511344.0510	TA611344.0510	●
5.20	M6x0.75		82	44	35	36	1.0	6	TA211344.0520	TA511344.0520	TA611344.0520	●
5.30			82	44	35	36	1.0	6	TA211344.0530	TA511344.0530	TA611344.0530	●
5.50	M6x0.5		82	44	35	36	1.0	6	TA211344.0550	TA511344.0550	TA611344.0550	●
5.55		MJ6x1	82	44	35	36	1.0	6	TA211344.0555	TA511344.0555	TA611344.0555	●
5.60		M6	82	44	35	36	1.0	6	TA211344.0560	TA511344.0560	TA611344.0560	●
5.70		M6x0.75	82	44	35	36	1.0	6	TA211344.0570	TA511344.0570	TA611344.0570	●
5.80		M6x0.5	82	44	35	36	1.1	6	TA211344.0580	TA511344.0580	TA611344.0580	●
5.90			82	44	35	36	1.1	6	TA211344.0590	TA511344.0590	TA611344.0590	●
6.00	M7		82	44	35	36	1.1	6	TA211344.0600	TA511344.0600	TA611344.0600	●
6.20	M7x0.75		91	53	43	36	1.1	8	TA211344.0620	TA511344.0620	TA611344.0620	●
6.30			91	53	43	36	1.1	8	TA211344.0630	TA511344.0630	TA611344.0630	●
6.35	MJ7x0.75		91	53	43	36	1.2	8	TA211344.0635	TA511344.0635	TA611344.0635	●
6.40			91	53	43	36	1.2	8	TA211344.0640	TA511344.0640	TA611344.0640	●
6.50	M7x0.5		91	53	43	36	1.2	8	TA211344.0650	TA511344.0650	TA611344.0650	●
6.60		M7	91	53	43	36	1.2	8	TA211344.0660	TA511344.0660	TA611344.0660	●
6.80	M8, G1/16	M7x0.5	91	53	43	36	1.2	8	TA211344.0680	TA511344.0680	TA611344.0680	●
6.90	MJ8x1.25		91	53	43	36	1.3	8	TA211344.0690	TA511344.0690	TA611344.0690	●
7.00	M8x1		91	53	43	36	1.3	8	TA211344.0700	TA511344.0700	TA611344.0700	●
7.20	M8x0.75		91	53	43	36	1.3	8	TA211344.0720	TA511344.0720	TA611344.0720	●
7.40			91	53	43	36	1.4	8	TA211344.0740	TA511344.0740	TA611344.0740	●
7.45		M8	91	53	43	36	1.4	8	TA211344.0745	TA511344.0745	TA611344.0745	●
7.60		M8x1	91	53	43	36	1.4	8	TA211344.0760	TA511344.0760	TA611344.0760	●

Ø d ₁ m7	Taps		Cold-forming taps					Ø d ₂ h6	DIN 6535 HA	DIN 6535 HE	DIN 6535 HB	
			l ₁	l ₂	l ₃	l ₄	l ₅					
7.80	M9	M8x0.5	91	53	43	36	1.4	8	TA211344.0780	TA511344.0780	TA611344.0780	●
8.00	M9x1		91	53	43	36	1.5	8	TA211344.0800	TA511344.0800	TA611344.0800	●
8.10			103	61	49	40	1.5	10	TA211344.0810	TA511344.0810	TA611344.0810	●
8.20	M9x0.75		103	61	49	40	1.5	10	TA211344.0820	TA511344.0820	TA611344.0820	●
8.30			103	61	49	40	1.6	10	TA211344.0830	TA511344.0830	TA611344.0830	●
8.40			103	61	49	40	1.6	10	TA211344.0840	TA511344.0840	TA611344.0840	●
8.50	M10 / M9x0.5		103	61	49	40	1.6	10	TA211344.0850	TA511344.0850	TA611344.0850	●
8.60	MJ10x1.5	M9x1	103	61	49	40	1.6	10	TA211344.0860	TA511344.0860	TA611344.0860	●
8.80	M10x1.25, G1/8	M9x0.5	103	61	49	40	1.6	10	TA211344.0880	TA511344.0880	TA611344.0880	●
9.00	M10x1		103	61	49	40	1.6	10	TA211344.0900	TA511344.0900	TA611344.0900	●
9.30			103	61	49	40	1.7	10	TA211344.0930	TA511344.0930	TA611344.0930	●
9.35		M10	103	61	49	40	1.7	10	TA211344.0935	TA511344.0935	TA611344.0935	●
9.40			103	61	49	40	1.7	10	TA211344.0940	TA511344.0940	TA611344.0940	●
9.50	M10x0.5, M11		103	61	49	40	1.7	10	TA211344.0950	TA511344.0950	TA611344.0950	●
9.60		M10x1	103	61	49	40	1.8	10	TA211344.0960	TA511344.0960	TA611344.0960	●
9.80		M10x0.5	103	61	49	40	1.8	10	TA211344.0980	TA511344.0980	TA611344.0980	●
9.90			103	61	49	40	1.8	10	TA211344.0990	TA511344.0990	TA611344.0990	●
10.00	M11x1		103	61	49	40	1.8	10	TA211344.1000	TA511344.1000	TA611344.1000	●
10.20	M11x0.75, M12		118	71	56	45	1.9	12	TA211344.1020	TA511344.1020	TA611344.1020	●
10.30			118	71	56	45	1.9	12	TA211344.1030	TA511344.1030	TA611344.1030	●
10.40			118	71	56	45	1.9	12	TA211344.1040	TA511344.1040	TA611344.1040	●
10.50	M12x1.5		118	71	56	45	1.9	12	TA211344.1050	TA511344.1050	TA611344.1050	●
10.80	M12x1.25		118	71	56	45	2.0	12	TA211344.1080	TA511344.1080	TA611344.1080	●
11.00	M12x1		118	71	56	45	2.0	12	TA211344.1100	TA511344.1100	TA611344.1100	●
11.20			118	71	56	45	2.0	12	TA211344.1120	TA511344.1120	TA611344.1120	●
11.25	M12x0.75	M12	118	71	56	45	2.1	12	TA211344.1125	TA511344.1125	TA611344.1125	●
11.35		M12x1.5	118	71	56	45	2.1	12	TA211344.1135	TA511344.1135	TA611344.1135	●
11.50			118	71	56	45	2.1	12	TA211344.1150	TA511344.1150	TA611344.1150	●
11.60		M12x1	118	71	56	45	2.1	12	TA211344.1160	TA511344.1160	TA611344.1160	●
11.80	G1/4		118	71	56	45	2.2	12	TA211344.1180	TA511344.1180	TA611344.1180	●
12.00	M13x1, M14		118	71	56	45	2.2	12	TA211344.1200	TA511344.1200	TA611344.1200	●
12.20			124	77	60	45	2.2	14	TA211344.1220	TA511344.1220	TA611344.1220	●
12.50	M14x1,5		124	77	60	45	2.3	14	TA211344.1250	TA511344.1250	TA611344.1250	●
12.70			124	77	60	45	2.3	14	TA211344.1270	TA511344.1270	TA611344.1270	●
12.90			124	77	60	45	2.4	14	TA211344.1290	TA511344.1290	TA611344.1290	●
13.00	M14x1		124	77	60	45	2.4	14	TA211344.1300	TA511344.1300	TA611344.1300	●
13.10		M14	124	77	60	45	2.4	14	TA211344.1310	TA511344.1310	TA611344.1310	●
13.35		M14x1.5	124	77	60	45	2.4	14	TA211344.1335	TA511344.1335	TA611344.1335	●
13.50			124	77	60	45	2.5	14	TA211344.1350	TA511344.1350	TA611344.1350	●
14.00	M15x1, M16		124	77	60	45	2.6	14	TA211344.1400	TA511344.1400	TA611344.1400	●
14.50	M16x1.5		133	83	63	48	2.6	16	TA211344.1450	TA511344.1450	TA611344.1450	●
15.00	M16x1		133	83	63	48	2.7	16	TA211344.1500	TA511344.1500	TA611344.1500	●
15.10		M16	133	83	63	48	2.8	16	TA211344.1510	TA511344.1510	TA611344.1510	●
15.25	G3/8		133	83	63	48	2.8	16	TA211344.1525	TA511344.1525	TA611344.1525	●
15.35		M16x1.5	133	83	63	48	2.8	16	TA211344.1535	TA511344.1535	TA611344.1535	●
15.50	M18		133	83	63	48	2.8	16	TA211344.1550	TA511344.1550	TA611344.1550	●
16.00	M18x2		133	83	63	48	2.9	16	TA211344.1600	TA511344.1600	TA611344.1600	●

Regrinding and Recoating Service

Regrinding and recoating form an essential contribution to the economically efficient use of drilling tools.

The EMUGE regrinding and recoating service guarantees the restoration of the original geometry and the original coating of the tool.

If you are interested, please contact us.



★ General Performance ★

★★ High Performance

★★★

★★★★ Superb Performance

★★★★★

Application recommendation and cutting data

Please note:

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

v_c = Cutting speed [m/min]

f = Feed per revolution [mm/rev.]

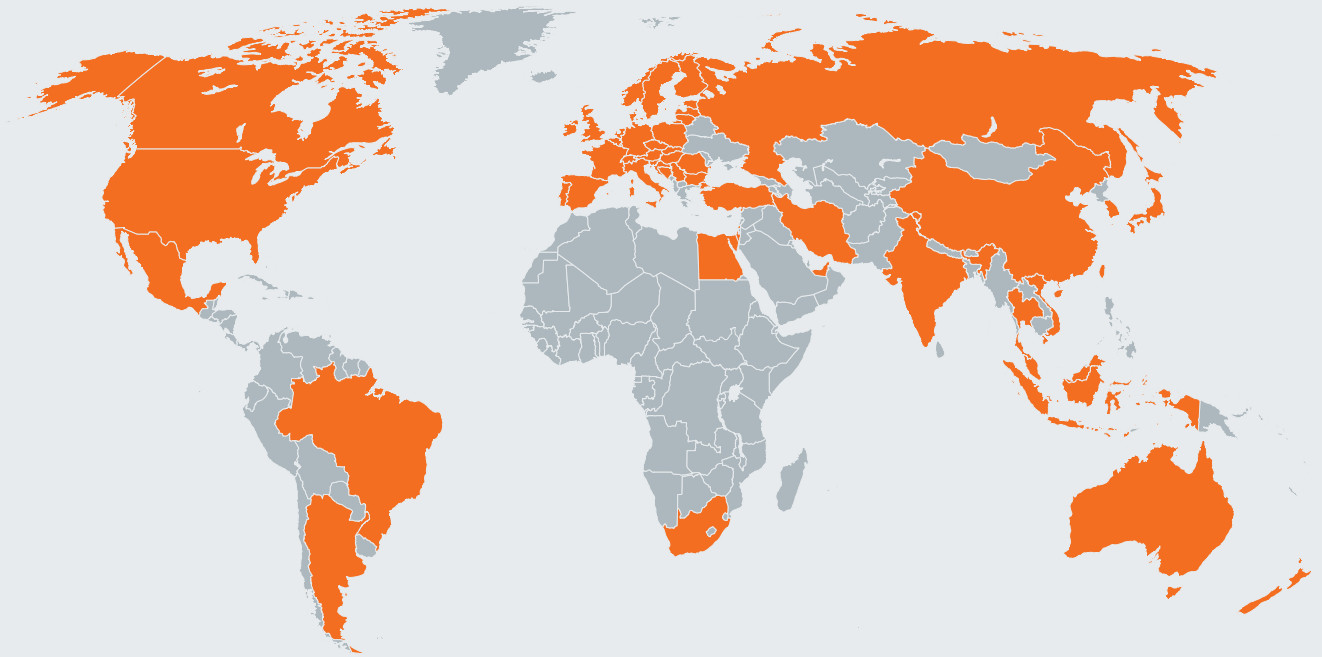
Applications – material		Material examples	Material numbers		
P	Steel materials				
	1.1 Cold-extrusion steels, Construction steels, Free-cutting steels, etc.	≤ 600 N/mm ²	Cq15 S235JR (St37-2) 10SPb20	1.1132 1.0037 1.0722	
	2.1 Construction steels, Cementation steels, Steel castings, etc.	≤ 800 N/mm ²	E360 (St70-2) 16MnCr5 GS-25CrMo4	1.0070 1.7131 1.7218	
	3.1 Cementation steels, Heat-treatable steels, Cold work steels, etc.	≤ 1000 N/mm ²	20MoCr3 42CrMo4 102Cr6 50CrMo4	1.7320 1.7225 1.2067 1.7228	
	4.1 Heat-treatable steels, Cold work steels, Nitriding steels, etc.	≤ 1200 N/mm ²	X45NiCrMo4 31CrMo12	1.2767 1.8515	
	5.1 High-alloyed steels, Cold work steels, Hot work steels, etc.	≤ 1400 N/mm ²	X38CrMoV5-3 X100CrMoV8-1-1 X40CrMoV5-1	1.2367 1.2990 1.2344	
	M	Stainless steel materials			
		1.1 Ferritic, martensitic	≤ 950 N/mm ²	X2CrTi12	1.4512
		2.1 Austenitic	≤ 950 N/mm ²	X6CrNiMoTi17-12-2	1.4571
		3.1 Austenitic-ferritic (Duplex)	≤ 1100 N/mm ²	X2CrNiMoN22-5-3	1.4462
		4.1 Austenitic-ferritic heat-resistant (Super Duplex)	≤ 1250 N/mm ²	X2CrNiMoN25-7-4	1.4410
	K	Cast materials			
1.1 Cast iron with lamellar graphite (GJL)		100-250 N/mm ²	EN-GJL-200 (GG20)	EN-JL-1030	
1.2		250-450 N/mm ²	EN-GJL-300 (GG30)	EN-JL-1050	
2.1 Cast iron with nodular graphite (GJS)		350-500 N/mm ²	EN-GJS-400-15 (GGG40)	EN-JS-1030	
2.2		500-900 N/mm ²	EN-GJS-700-2 (GGG70)	EN-JS-1070	
3.1 Cast iron with vermicular graphite (GJV)		300-400 N/mm ²	GJV 300		
3.2		400-500 N/mm ²	GJV 450		
4.1 Malleable cast iron (GTMW, GTMB)		250-500 N/mm ²	EN-GJMW-350-4 (GTW-35)	EN-JM-1010	
4.2	500-800 N/mm ²	EN-GJMB-450-6 (GTS-45)	EN-JM-1140		
N	Non ferrous materials				
	Aluminium alloys				
	1.1	≤ 200 N/mm ²	EN AW-AlMn1	EN AW-3103	
	1.2	≤ 350 N/mm ²	EN AW-AlMgSi	EN AW-6060	
	1.3	≤ 550 N/mm ²	EN AW-AlZn5Mg3Cu	EN AW-7022	
	1.4	Si $\leq 7\%$	EN AC-AlMg5	EN AC-51300	
	1.5	7% < Si $\leq 12\%$	EN AC-AlSi9Cu3	EN AC-46500	
	1.6	12% < Si $\leq 17\%$	GD-AlSi17Cu4FeMg		
	Copper alloys				
	2.1 Pure copper, low-alloyed copper	≤ 400 N/mm ²	E-Cu 57	EN CW 004 A	
	2.2 Copper-zinc alloys (brass, long-chipping)	≤ 550 N/mm ²	CuZn37 (Ms63)	EN CW 508 L	
	2.3 Copper-zinc alloys (brass, short-chipping)	≤ 550 N/mm ²	CuZn36Pb3 (Ms58)	EN CW 603 N	
	2.4 Copper-aluminium alloys (alu bronze, long-chipping)	≤ 800 N/mm ²	CuAl10Ni5Fe4	EN CW 307 G	
	2.5 Copper-tin alloys (tin bronze, long-chipping)	≤ 700 N/mm ²	CuSn8P	EN CW 459 K	
	2.6 Copper-tin alloys (tin bronze, short-chipping)	≤ 400 N/mm ²	CuSn7 ZnPb (Rg7)	2.1090	
	2.7	≤ 600 N/mm ²	(AMPICO® 8)		
	2.8	≤ 1400 N/mm ²	(AMPICO® 45)		
	Magnesium alloys				
	3.1 Magnesium wrought alloys	≤ 500 N/mm ²	MgAl6Zn	3.5612	
	3.2 Magnesium cast alloys	≤ 500 N/mm ²	EN-MCMgAl9Zn1	EN-MC21120	
	Synthetics				
	4.1 Duroplastics (short-chipping)		Bakelit, Pertinax		
	4.2 Thermoplastics (long-chipping)		PMMA, POM, PVC		
	4.3 Fibre-reinforced synthetics (fibre content $\leq 30\%$)		GFK, CFK, AFK		
	4.4 Fibre-reinforced synthetics (fibre content > 30%)		GFK, CFK, AFK		
	Special materials				
	5.1 Graphite		C 8000		
	5.2 Tungsten-copper alloys		W-Cu 80/20		
5.3 Composite materials		Hylite, Alucobond			
S	Special materials				
	Titanium alloys				
	1.1 Pure titanium	≤ 450 N/mm ²	Ti1	3.7025	
	1.2	≤ 900 N/mm ²	TiAl6V4	3.7165	
	1.3	≤ 1250 N/mm ²	TiAl4Mo4Sn2	3.7185	
	Nickel alloys, cobalt alloys and iron alloys				
	2.1 Pure nickel	≤ 600 N/mm ²	Ni 99.6	2.4060	
	2.2	≤ 1000 N/mm ²	Monel 400	2.4360	
	2.3 Nickel-base alloys	≤ 1600 N/mm ²	Inconel 718	2.4688	
	2.4	≤ 1000 N/mm ²	Udimet 605		
	2.5 Cobalt-base alloys	≤ 1600 N/mm ²	Haynes 25	2.4964	
	2.6 Iron-base alloys	≤ 1500 N/mm ²	Incoloy 800	1.4958	
H	Hard materials				
	1.1	44 - 50 HRC	Weldox 1100		
	1.2	50 - 55 HRC	Hardox 550		
	1.3	55 - 60 HRC	Armox 600T		
	1.4	60 - 63 HRC	Ferro-Titanit		
	1.5	63 - 66 HRC	HSSE		

5xD



Coolant-lubricant recommendation

Emulsion	Oil	Minimum quantity lubrication (MQL)	Dry / Pressurised air	v _c [m/min]			D = 3 mm			D = 5 mm			D = 8 mm			D = 10 mm			D = 12 mm			D = 16 mm			
				min.	rec.	max.	f [mm/rev.]			f [mm/rev.]			f [mm/rev.]			f [mm/rev.]			f [mm/rev.]			f [mm/rev.]			
							min.	rec.	max.	min.	rec.	max.	min.	rec.	max.	min.	rec.	max.	min.	rec.	max.	min.	rec.	max.	
■	■	■		100	140	180	0.11	0.16	0.25	0.16	0.20	0.28	0.20	0.25	0.35	0.23	0.28	0.40	0.25	0.31	0.43	0.27	0.34	0.47	1.1
■	■	■		80	120	160	0.11	0.16	0.25	0.16	0.20	0.28	0.20	0.25	0.35	0.23	0.28	0.40	0.25	0.31	0.43	0.27	0.34	0.47	2.1
■	■	■		80	100	120	0.11	0.15	0.24	0.16	0.18	0.24	0.20	0.24	0.30	0.23	0.26	0.34	0.25	0.29	0.37	0.27	0.32	0.41	3.1
■	■	■		50	70	100	0.11	0.15	0.24	0.16	0.18	0.24	0.20	0.24	0.30	0.23	0.26	0.34	0.25	0.29	0.37	0.27	0.32	0.41	4.1
■	■	■		50	65	90	0.10	0.13	0.21	0.13	0.17	0.24	0.17	0.21	0.30	0.19	0.24	0.34	0.21	0.26	0.37	0.22	0.28	0.39	5.1
■	■	■		40	60	80	0.04	0.06	0.09	0.09	0.12	0.19	0.11	0.17	0.26	0.14	0.19	0.30	0.15	0.21	0.33	0.16	0.23	0.36	1.1
■	■	■		40	55	75	0.04	0.05	0.08	0.08	0.11	0.16	0.10	0.15	0.20	0.14	0.18	0.27	0.15	0.20	0.30	0.16	0.22	0.32	2.1
■	■	■		40	50	70	0.04	0.05	0.08	0.08	0.11	0.16	0.10	0.15	0.20	0.14	0.18	0.27	0.15	0.20	0.30	0.16	0.22	0.32	3.1
■	■	■																						4.1	
■	■	■	■	120	140	160	0.11	0.16	0.25	0.16	0.20	0.28	0.20	0.25	0.35	0.23	0.28	0.40	0.25	0.31	0.43	0.27	0.34	0.47	1.1
■	■	■	■	110	130	150	0.11	0.16	0.25	0.16	0.20	0.28	0.20	0.25	0.35	0.23	0.28	0.40	0.25	0.31	0.43	0.27	0.34	0.47	1.2
■	■	■	■	140	160	180	0.11	0.16	0.25	0.16	0.20	0.28	0.20	0.25	0.35	0.23	0.28	0.40	0.25	0.31	0.43	0.27	0.34	0.47	2.1
■	■	■	■	100	120	140	0.11	0.15	0.24	0.16	0.18	0.24	0.20	0.24	0.30	0.23	0.26	0.34	0.25	0.29	0.37	0.27	0.32	0.41	2.2
■	■	■	■	80	100	120	0.11	0.16	0.25	0.16	0.20	0.28	0.20	0.25	0.35	0.23	0.28	0.40	0.25	0.31	0.43	0.27	0.34	0.47	3.1
■	■	■	■	60	80	100	0.10	0.14	0.22	0.14	0.18	0.25	0.18	0.23	0.32	0.20	0.25	0.36	0.22	0.28	0.39	0.24	0.30	0.43	3.2
																								4.1	
																								4.2	
■	■	■	■	160	180	240	0.14	0.19	0.31	0.19	0.28	0.38	0.24	0.33	0.42	0.27	0.37	0.47	0.30	0.41	0.52	0.32	0.45	0.57	1.1
■	■	■	■	160	180	240	0.14	0.19	0.31	0.19	0.28	0.38	0.24	0.33	0.42	0.27	0.37	0.47	0.30	0.41	0.52	0.32	0.45	0.57	1.2
■	■	■	■	160	180	240	0.14	0.19	0.31	0.19	0.28	0.38	0.24	0.33	0.42	0.27	0.37	0.47	0.30	0.41	0.52	0.32	0.45	0.57	1.3
■	■	■	■	160	180	240	0.14	0.19	0.31	0.19	0.28	0.38	0.24	0.33	0.42	0.27	0.37	0.47	0.30	0.41	0.52	0.32	0.45	0.57	1.4
■	■	■	■	160	180	240	0.14	0.19	0.31	0.19	0.28	0.38	0.24	0.33	0.42	0.27	0.37	0.47	0.30	0.41	0.52	0.32	0.45	0.57	1.5
■	■	■	■	160	180	240	0.14	0.19	0.31	0.19	0.28	0.38	0.24	0.33	0.42	0.27	0.37	0.47	0.30	0.41	0.52	0.32	0.45	0.57	1.6
■	■	■		120	140	180	0.03	0.05	0.07	0.04	0.06	0.08	0.05	0.10	0.13	0.06	0.12	0.14	0.06	0.14	0.16	0.07	0.15	0.17	2.1
■	■	■		120	140	180	0.03	0.05	0.07	0.04	0.06	0.08	0.05	0.10	0.13	0.06	0.12	0.14	0.06	0.14	0.16	0.07	0.15	0.17	2.2
■	■	■		120	140	180	0.11	0.14	0.19	0.17	0.22	0.30	0.22	0.28	0.39	0.25	0.31	0.42	0.27	0.33	0.44	0.30	0.36	0.48	2.3
																								2.4	
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																								4.4	
																								5.1	
																								5.2	
																								5.3	
■	■	■		40	50	60	0.04	0.05	0.06	0.06	0.08	0.10	0.10	0.12	0.15	0.11	0.13	0.17	0.12	0.14	0.19	0.14	0.16	0.20	1.1
■	■	■		30	40	50	0.04	0.05	0.06	0.06	0.08	0.10	0.10	0.12	0.15	0.11	0.13	0.17	0.12	0.14	0.19	0.14	0.16	0.20	1.2
■	■	■																							1.3
■	■	■		20	40	60	0.04	0.05	0.07	0.06	0.08	0.11	0.10	0.13	0.20	0.11	0.15	0.23	0.12	0.17	0.25	0.14	0.18	0.27	2.1
■	■	■		10	25	40	0.04	0.05	0.07	0.06	0.08	0.10	0.10	0.12	0.15	0.11	0.13	0.17	0.12	0.14	0.19	0.14	0.16	0.20	2.2
																									2.3
																									2.4
																									2.5
																									2.6
■	■	■		20	40	50	0.05	0.06	0.11	0.08	0.11	0.16	0.10	0.16	0.25	0.11	0.18	0.28	0.12	0.19	0.31	0.14	0.20	0.34	1.1
■	■	■		20	30	50	0.05	0.06	0.11	0.08	0.11	0.16	0.10	0.16	0.25	0.11	0.18	0.28	0.12	0.19	0.31	0.14	0.20	0.34	1.2
■	■	■		20	30	50	0.05	0.06	0.11	0.08	0.11	0.16	0.10	0.16	0.25	0.11	0.18	0.28	0.12	0.19	0.31	0.14	0.20	0.34	1.3
																									1.4
																									1.5



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