

Tool style 04/03

- Carbide circular saws
- Carbide thread cutters
- Carbide form cutters
- Carbide milling hobs

$f_z =$  0,01–0,10 mm  
according to materials and  
thickness

G	1		2		3		4		5		6		7		8		9	
V <sub>c</sub>	120–200		100–180		60–140		50–120		40–100		20–60		80–300		100–400		300–700	
D	n	f <sub>z</sub>	n	f <sub>z</sub>	n	f <sub>z</sub>	n	f <sub>z</sub>	n	f <sub>z</sub>	n	f <sub>z</sub>	n	f <sub>z</sub>	n	f <sub>z</sub>	n	f <sub>z</sub>
15	3000		2600		2100		1500		1300		850		3800		5000		10000	
20	2200		1900		1600		1100		950		620		2800		4000		8000	
25	1800		1500		1200		900		750		500		2200		3200		6400	
30	1500		1300		1000		720		640		420		1900		2600		5200	
40	1100		950		800		550		480		320		1400		2000		4000	
50	900		760		650		440		380		260		1100		1600		3200	
63	700		600		500		350		300		200		900		1200		2400	
80	550		480		400		280		240		160		700		1000		2000	
100	440		380		320		220		180		130		560		800		1600	
125	350		300		250		180		150		100		460		650		1300	

G = Material class  
V<sub>c</sub> = Cutting speed (m/min)  
D = Cutting diameter (mm)  
n = Rotation speed (/min)  
f<sub>z</sub> = Feed per tooth (mm)



## Material class

**Class 1** Steels up to 50 daN/mm<sup>2</sup>

- construction steels
- case hardening steels
- tempering steels
- steels for automatic lathes

**Class 2** Steels 50–80 daN/mm<sup>2</sup>

- construction steels
- case hardening steels
- tempering steels
- spring steels
- non-alloyed tool steels

**Class 3** Steels 80–100 daN/mm<sup>2</sup>

- construction steels
- tempering steels
- nitrid steels
- cast iron < 180 HB
- spring steels
- tools steels

**Class 4** Steels 100–130 daN/mm<sup>2</sup>

- stainless steels
- alloyed tool steels
- high speed steels
- heat resisting steels
- cast iron > 180 HB

**Class 5** Alloyed steels Cr, Ni

- stainless steels
- heat resisting steels
- Titanium alloys

**Class 6** Tough materials

- high alloyed steels
- Nickel alloys
  - Inconel
  - Waspalloy
  - Nimonic

**Class 7**

- Copper
- Brass
- Bronze

**Class 8**

- Aluminium

**Class 9** Plastic

- Thermoplast
- Duroplast

**Class 10**

## Composites

- glass fibers reinforced
- carbon fibers reinforced
- aramid fibers reinforced

V varies very much according to composition and cutting method.

Werkstoffklassen und  
DIN-Werkstoffnummern

Groupes-matières et  
matériaux selon DIN

Material class and  
DIN material number

Material Nummer	Klasse Gruppe	Bezeichnung	Matériel Numéro	Classe Groupe	Désignation	Material Number	Class Group	Designation
0.6010	3	GG-10	1.1203	2-3	Ck55	1.4961	4-5	X8CrNiNb1613
0.6020	3	GG-20	1.1221	3	Ck60	1.4986	4-5	X8CrNiMoNb1616
0.6025	3	GG-25	1.1248	4	Ck75	1.4988	4-5	X8CrNiMoVnB1613
0.6030	4	GG-30	1.1269	5	Ck85	1.5029	5	71Si7
0.6035	4	GG-35	1.1274	5	Ck101	1.5065	5	28Mn6
0.6652	4	GGL-NiMn 137	1.1730	4	C45W	1.5067	5	36Mn5
0.6661	4	GGL-NiCr203	1.1740	4	C60W	1.5415	4-5	15Mo3
0.6680	4	GGL-NiSiCr3055	1.2067	4	100Cr6	1.5419	4-5	GS-22Mo
0.7033	4	GGG-35	1.2080	4-5	X210Cr12	1.5467	4-5	30WCrV179
0.7040	4	GGG-40	1.2162	5	21MnCr5	1.5622	3-4	14Ni9
0.7050	4-5	GGG-50	1.2210	4-5	115CrV3	1.5662	4	X8Ni9
0.7060	4-5	GGG-60	1.2241	4-5	51CrV4	1.5680	4-5	12Ni19
0.7070	5	GGG-70	1.2344	5	X6CrMo4	1.5732	5	14NiCr10
0.7080	5	GGG-80	1.2344	5	X40CrMoV51	1.5919	5	15CrNi6
0.7652	4-5	GGG-NiMn 137	1.2419	4	105WCr6	1.6511	4	36CrNiMo4
0.7661	4-5	GGG-NiCr203	1.2436	4-5	X210CrW12	1.6580	4	30CrNiMo8
0.7680	4-5	GGG-NiSiCr3055	1.2542	4-5	45WCrV7	1.6582	4	34CrNiMo6
0.7685	4-5	GGG-NiCr353	1.2550	5	60WCrV7	1.6748	5	GS-40NiCrMo656
0.8135	4	GTS-35	1.2567	5	X30WCrV53	1.6903	5	X10CrNiTi810
0.8145	4	GTS-45	1.2601	5	X165CrMoV12	1.6905	5	X10CrNiNb1810
0.8155	4-5	GTS-55	1.2713	5	55NiCrMoV6	1.6906	5	X5CrNi1810
1.0033	1	Si33-1	1.2721	5	50NiCr13	1.7033	4-5	34Cr4
1.0035	1	Si33	1.2767	5	X45NiCrMo4	1.7035	4-5	41Cr4
1.0036	1	USI37-3	1.2842	6	90MnCrV8	1-7103	5-6	67SiCr5
1.0037	1	Si37-2	1.3207	4	Si10-4-3-10	1.7131	5-6	16MnCr5
1.0038	1	RS37-2	1.3243	4	S6-5-2	1.7176	5-6	55Cr53
1.0040	2	USI42-2	1.3505	4-5	100Cr6	1.7218	4-5	GS-25CrMo4
1.0044	2	SI44-2	1.4000	4-5	X7Cr13	1.7220	4-5	34CrMo4
1.0060	2	SI60-2	1.4006	4-5	X10Cr13	1.7225	4-5	42CrMo4
1.0070	3	SI70-2	1.4016	4-5	X8Cr17	1.7225	4-5	GS-42CrMo4
1.0075	2	USI42-1	1.4021	5	X20Cr13	1.7228	4-5	50CrMo4
1.0116	2	SI37-3	1.4027	5	GX20Cr14	1.7258	4-5	24CrMo5
1.0144	2	SI44-3	1.4034	5	X40Cr13	1.7335	4-5	13CrMo44
1.0301	1	C10	1.4057	5	X20CrNi17	1.7361	4-5	32CrMo12
1.0305	1	SI35-8	1.4086	4-5	GX120Cr29	1.7380	4-5	10CrMo910
1.0356	1	TTS135V	1.4104	4-5	X12CrMoS17	1.7701	4-5	51CrMoV14
1.0401	1	C15	1.4112	4-5	X90CrMoY18	1.7706	4-5	GS-17CrMoV5
1.0402	2	C22	1.4116	4-5	X45CrMoV15	1.7709	4-5	21CrMoV57
1.0416	2	GS40	1.4120	4-5	X20CrMo13	1.7715	4-5	14MoV63
1.0443	3	GS45	1.4301	4-5	X5CrNi189	1.7737	4-5	45CrMoV67
1.0501	3	C35	1.4306	4-5	X2CrNi189	1.8159	4-5	50CrV4
1.0503	3	C45	1.4310	4-5	X12CrNi177	1.8239	5-6	65WMo348
1.0535	4	C55	1.4312	4-5	GX10CrNi18	1.8506	3-4	34CrAlSi5
1.0551	4	GS52	1.4340	4-5	GX40CrNi274	1.8507	3-4	34CrAlMo5
1.0552	4	GS52-3	1.4401	4-5	X5CrNiMo1810	1.8509	4	41CrAlMo7
1.0553	4	GS60	1.4404	4-5	X2CrNiMo1810	1.8515	4-5	31CrMo12
1.0554	4	G570	1.4406	4-5	X2CrNiMo1812	1.8523	4-5	39CrMoV139
1.0570	4	SI52-3	1.4410	4-5	GX10CrNiMo189	1.8550	4-5	34CrAlNi7
1.0601	4	C60	1.4448	4-5	GX6CrNiMo1713	2.0040	7	OF-Cu
1.0603	4-5	C67	1.4500	5-6	GX7NiMoCuNb2520	2.0060	7	E-Cu57
1.0605	4-5	C75	1.4506	5-6	X5NiCrMoCuTi2018	2.0065	7	E-Cu58
1.0619	4-5	GSC25	1.4510	5-6	X8CrTi17	2.0070	7	SE-Cu
1.0715	4-5	9SMn28	1.4511	5-6	X8CrNb17	2.0076	7	SW-Cu
1.0718	4-5	9SMnPb28	1.4541	5-5	X10CrNiTi89	2.0090	7	SF-Cu
1.0844	4-5	17Mn4	1.4552	5-6	GX7CrNiNb189	2.0241	7	G-CuZn15
1.0874	3	V200-50B	1.4568	5-6	X7CrNiAl177	2.0261	7	CuZn28
1.0879	3	V110-50B	1.4571	5-6	X10CrNiMoTi810	2.0280	7	CuZn33
1.0897	3-4	V135-50A	1.4585	5-6	GX7CrNiMoCuNb1818	2.0290	7	G-CuZn33Pb
1.0899	3-4	V110-35A	1.4710	5-6	GX30CrSi6	2.0321	7	CuZn37
1.0903	4-5	58Si7	1.4777	5-6	GX130CrSi29	2.0331	7	CuZn36Pb1.5
1.0904	4-5	55Si7	1.4810	4-5	GNI30Mo30	2.0332	7	CuZn37Pb0.5
1.0961	4-5	60SiCr7	1.4827	4-5	G-X8CrNiNb19	2.0335	7	CuZn36
1.0970	4-5	38Si7	1.4837	4-5	GX35CrNiSi2512	2.0340	7	GD-CuZn37Pb
1.1141	2	Ck15	1.4857	5	G-X40CrNiSi35	2.0360	7	CuZn40
1.1155	2	GSKC25	1.4865	5	GX40NiCrSi3616	2.0371	7	CuZn38Pb1.5
1.1181	2	Ck35	1.4885	5	X12CrNiMoNb2015	2.0372	7	CuZn39Pb0.5
1.1191	2-3	Ck 45	1.4923	5	X22CrMoV121	2.0375	7	CuZn36Pb3

Material Nummer	Klasse Gruppe	Bezeichnung	Matiériel Numéro	Classe Groupe	Désignation	Material Number	Class Group	Designation
2.0401	7	CuZn39Pb3	2.0980	7	G-CuAl11Ni	3.1255	8	AlCuSiMn
2.0402	7	CuZn40Pb2	2.1010	7	CuSn2	3.1303	8	AlCu2Mg0,5
2.0460	7	CuZn20Al	2.1020	7	CuSn6	3.1325	8	AlCuMg1
2.0490	7	CuZn31Si	2.1030	7	CuSn8	3.1355	8	AlCuMg2
2.0492	7	G-CuZn15Al4	2.1050	7	G-CuSn10	3.2315	8	AlMgSi1
2.0510	7	CuZn37Al	2.1052	7	G-CuSn12	3.2316	8	AlMgSi0,8
2.0540	7	CuZn35Ni	2.1060	7	G-CuSn12Ni	3.3316	8	AlMg1,5
2.0550	7	CuZn40Al2	2.1061	7	G-CuSn12Pb	3.3316	8	AlMg1,5
2.0561	7	CuZn40I1	2.1080	7	CuSn6Zn	3.3317	8	Al99,85Mg1
2.0571	7	CuZn40Ni	2.1086	7	G-CuSn10Zn	3.3523	8	AlMg2,5
2.0572	7	CuZn40Mn	2.1090	7	G-CuSn7ZnPb	3.3527	8	AlMg2Mn0,8
2.0580	7	CuZn40MnPb	2.1093	7	G-CuSn6ZnNi	3.3535	8	AlMg3
2.0590	7	G-CuZn40Fe	2.1096	7	G-CuSn5ZnPb	3.3545	8	AlMg4Mn
2.0591	7	GK-CuZn38Al	2.1098	7	G-CuSn2ZNPb	3.4335	7-8	AlZn4,5Mg1
2.0592	7	G-CuZn45Al1	2.1166	7	G-CuPb22Sn	3.4345	7-8	AlZnMgCu0,5
2.0595	7	GK-CU2n37Al1	2.1170	7	G-CuPb5Sn	3.4365	7-8	AlZnMgCu1,5
2.0596	7	G-CuZn34Al2	2.1176	7	G-CuPb10Sn	3.7025	5	Ti99,8
2.0598	7	G-CuZn25Al5	2.1182	7	G-CuPb15Sn	3.7035	5	Ti99,7
2.0740	7	CuNi18Zn20	2.1188	7	G-CuPb20Sn	3.6055	5	Ti99,6
2.0916	7	CuAl5	2.1245	7	CuBe1,7	3.7065	5	Ti99,5
2.0920	7	CuAl8	2.1247	7	CuBe2	3.7114	5-6	TiAl5Sn2
2.0932	7	CuAl8Fe	2.1285	7	CuCoBe	3.7115	5-6	TiAl5Sn2
2.0936	7	CUAl10Fe	2.4631	6	NIMONIC 80A	3.7124	5-6	TiCu2
2.0940	7	G-CUAl10Fe	2.4636	6	NIMONIC 105	3.7134	5-6	TiAl8Mo1V1
2.0960	7	CuAl9Mn	3.0205	8	Al99	3.7164	5-6	TiAl6V4
2.0962	7	G-CuAl8Mn	3.0255	8	Al99,5	3.7165	5-6	TiAl6V4
2.0966	7	CuAl10Ni	3.0285	8	Al99,8	3.7174	5-6	TiAl6V6Sn2
2.0970	7	G-CuAl9Ni	3.0305	8	Al99,9	3.7184	5-6	TiAl4Mo4SnZrSi0,5
2.0975	7	G-CuAl10Ni	3.0385	8	Al99,98R			
2.0978	7	CuAl11Ni	3.0515	8	AlMn			

Berechnungsformeln  
von Drehzahl,  
Schnittgeschwindigkeit  
und Vorschub

Formules pour le calcul  
du nombre de tours,  
de la vitesse de coupe  
et de l'avance

Calculation of revolution  
cutting speed and  
feed

$$n = \frac{10^3 \times V_c}{\pi \times D}$$

$$V_c = \pi \times D \times n \times 10^{-3}$$

n (min<sup>-1</sup>)  
Umdrehungen pro Minute  
V<sub>c</sub> (m x Min<sup>-1</sup>)  
Schnittgeschwindigkeit  
π (-)  
3,14159  
D (mm)  
Werkzeugdurchmesser

n (min<sup>-1</sup>)  
nombre de tours par min.  
V<sub>c</sub> (m x min<sup>-1</sup>)  
vitesse de coupe  
π (-)  
3,14159  
D (mm)  
diamètre de l'outil

n (min<sup>-1</sup>)  
revolutions per minute  
V<sub>c</sub> (m x Min<sup>-1</sup>)  
cutting speed  
π (-)  
3,14159  
D (mm)  
cutting diameter

$$V_f = f_z \times z \times n$$

$$f_z = \frac{V_f}{n \times z}$$

V<sub>f</sub> (mm x min<sup>-1</sup>)  
Vorschub  
f<sub>z</sub> (mm)  
Vorschub pro Zahn  
z (-)  
Zähnezahl

V<sub>f</sub> (mm x min<sup>-1</sup>)  
avance  
f<sub>z</sub> (mm)  
avance par dent  
z (-)  
nombre de dents

V<sub>f</sub> (mm x min<sup>-1</sup>)  
Feed  
f<sub>z</sub> (mm)  
Feed per Tooth  
z (-)  
Number of teeth