



Tool material **Solid Carbide**

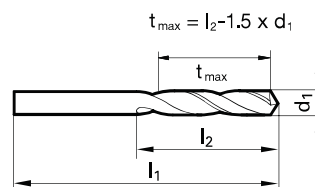
Surface



P Steel	○	web thinning ≥ Ø 2.060
M Stainless steel	○	• facet point grinding
		• main cutting edge form straight

K Cast iron	○	structural and case hardened steels • free-cutting steels, heat-treatable steels • cast materials • brass • Al materials with high Si-content • magnesium and magnesium alloys • plastics and fiber reinforced plastics
N Aluminum	●	
S Titanium alloys	○	
H Hardened steel		

●=Optimal
○=Limited



Speeds and feeds information on pg. 537

Shank diameter = cut diameter

Diameter (d1)			l1 mm	t _{max} mm	l2 mm	EDP #
inch	wire/ltr	mm				
0.0394		1.00	26.00	4.50	6.00	9024630010000
0.0402	#60	1.02	26.00	4.47	6.00	9024630010200
0.0409	#59	1.04	26.00	4.44	6.00	9024630010400
0.0421	#58	1.07	28.00	5.40	7.00	9024630010700
0.0429	#57	1.09	28.00	5.37	7.00	9024630010900
0.0433		1.10	28.00	5.35	7.00	9024630011000
0.0465	#56	1.18	28.00	5.23	7.00	9024630011800
0.0469	3/64	1.19	30.00	6.22	8.00	9024630011900
0.0472		1.20	30.00	6.20	8.00	9024630012000
0.0512		1.30	30.00	6.05	8.00	9024630013000
0.0520	#55	1.32	30.00	6.02	8.00	9024630013200
0.0551	#54	1.40	32.00	6.90	9.00	9024630014000
0.0591		1.50	32.00	6.75	9.00	9024630015000
0.0594	#53	1.51	34.00	7.74	10.00	9024630015100
0.0626	1/16	1.59	34.00	7.62	10.00	9024630015900
0.0630		1.60	34.00	7.60	10.00	9024630016000
0.0634	#52	1.61	34.00	7.59	10.00	9024630016100
0.0669	#51	1.70	34.00	7.45	10.00	9024630017000
0.0701	#50	1.78	36.00	8.33	11.00	9024630017800
0.0709		1.80	36.00	8.30	11.00	9024630018000
0.0728	#49	1.85	36.00	8.23	11.00	9024630018500
0.0748		1.90	36.00	8.15	11.00	9024630019000
0.0760	#48	1.93	38.00	9.11	12.00	9024630019300
0.0780	5/64	1.98	38.00	9.03	12.00	9024630019800
0.0783	#47	1.99	38.00	9.02	12.00	9024630019900
0.0787		2.00	38.00	9.00	12.00	9024630020000
0.0811	#46	2.06	38.00	8.91	12.00	9024630020600
0.0819	#45	2.08	38.00	8.88	12.00	9024630020800
0.0827		2.10	38.00	8.85	12.00	9024630021000
0.0858	#44	2.18	40.00	9.73	13.00	9024630021800
0.0866		2.20	40.00	9.70	13.00	9024630022000
0.0886		2.25	40.00	9.63	13.00	9024630022500
0.0890	#43	2.26	40.00	9.61	13.00	9024630022600
0.0906		2.30	40.00	9.55	13.00	9024630023000
0.0933	#47	2.37	43.00	10.45	14.00	9024630023700
0.0937	3/32	2.38	43.00	10.43	14.00	9024630023800
0.0945		2.40	43.00	10.40	14.00	9024630024000
0.0961	#41	2.44	43.00	10.34	14.00	9024630024400
0.0980	#40	2.49	43.00	10.27	14.00	9024630024900
0.0984		2.50	43.00	10.25	14.00	9024630025000
0.0996	#39	2.53	43.00	10.21	14.00	9024630025300
0.1016	#38	2.58	43.00	10.13	14.00	9024630025800

Diameter (d1)			l1 mm	t _{max} mm	l2 mm	EDP #
inch	wire/ltr	mm				
0.1024		2.60	43.00	10.10	14.00	9024630026000
0.1039	#37	2.64	43.00	10.04	14.00	9024630026400
0.1063		2.70	46.00	11.95	16.00	9024630027000
0.1067	#36	2.71	46.00	11.94	16.00	9024630027100
0.1094	7/64	2.78	46.00	11.83	16.00	9024630027800
0.1098	#35	2.79	46.00	11.82	16.00	9024630027900
0.1102		2.80	46.00	11.80	16.00	9024630028000
0.1110	#34	2.82	46.00	11.77	16.00	9024630028200
0.1130	#33	2.87	46.00	11.70	16.00	9024630028700
0.1142		2.90	46.00	11.65	16.00	9024630029000
0.1161	#32	2.95	46.00	11.58	16.00	9024630029500
0.1181		3.00	46.00	11.50	16.00	9024630030000
0.1201	#31	3.05	49.00	13.43	18.00	9024630030500
0.1220		3.10	49.00	13.35	18.00	9024630031000
0.1248	1/8	3.17	49.00	13.25	18.00	9024630031700
0.1260		3.20	49.00	13.20	18.00	9024630032000
0.1283	#30	3.26	49.00	13.11	18.00	9024630032600
0.1299		3.30	49.00	13.05	18.00	9024630033000
0.1339		3.40	52.00	14.90	20.00	9024630034000
0.1358	#29	3.45	52.00	14.83	20.00	9024630034500
0.1378		3.50	52.00	14.75	20.00	9024630035000
0.1406	9/64	3.57	52.00	14.65	20.00	9024630035700
0.1417		3.60	52.00	14.60	20.00	9024630036000
0.1441	#27	3.66	52.00	14.51	20.00	9024630036600
0.1457		3.70	52.00	14.45	20.00	9024630037000
0.1469	#26	3.73	52.00	14.41	20.00	9024630037300
0.1496	#25	3.80	55.00	16.30	22.00	9024630038000
0.1520	#24	3.86	55.00	16.21	22.00	9024630038600
0.1535		3.90	55.00	16.15	22.00	9024630039000
0.1539	#23	3.91	55.00	16.14	22.00	9024630039100
0.1563	5/32	3.97	55.00	16.05	22.00	9024630039700
0.1571	#22	3.99	55.00	16.02	22.00	9024630039900
0.1575		4.00	55.00	16.00	22.00	9024630040000
0.1591	#21	4.04	55.00	15.94	22.00	9024630040400
0.1610	#20	4.09	55.00	15.87	22.00	9024630040900
0.1614		4.10	55.00	15.85	22.00	9024630041000
0.1654		4.20	55.00	15.70	22.00	9024630042000
0.1661	#19	4.22	55.00	15.67	22.00	9024630042200
0.1693	#18	4.30	58.00	17.55	24.00	9024630043000
0.1720	11/64	4.37	58.00	17.45	24.00	9024630043700
0.1728	#17	4.39	58.00	17.42	24.00	9024630043900
0.1732		4.40	58.00	17.40	24.00	9024630044000

Diameter (d1)			l1 mm	t _{max} mm	l2 mm	EDP #
inch	wire/ltr	mm				
0.1772	#16	4.50	58.00	17.25	24.00	9024630045000
0.1799	#15	4.57	58.00	17.15	24.00	9024630045700
0.1811		4.60	58.00	17.10	24.00	9024630046000
0.1819	#14	4.62	58.00	17.07	24.00	9024630046200
0.1850	#13	4.70	58.00	16.95	24.00	9024630047000
0.1874	3/16	4.76	62.00	18.86	26.00	9024630047600
0.1890	#12	4.80	62.00	18.80	26.00	9024630048000
0.1909	#11	4.85	62.00	18.73	26.00	9024630048500
0.1929		4.90	62.00	18.65	26.00	9024630049000
0.1937	#10	4.92	62.00	18.62	26.00	9024630049200
0.1961	#9	4.98	62.00	18.53	26.00	9024630049800
0.1969		5.00	62.00	18.50	26.00	9024630050000
0.1992	#8	5.06	62.00	18.41	26.00	9024630050600
0.2008		5.10	62.00	18.35	26.00	9024630051000
0.2012	#7	5.11	62.00	18.34	26.00	9024630051100
0.2031	13/64	5.16	62.00	18.26	26.00	9024630051600
0.2039	#6	5.18	62.00	18.23	26.00	9024630051800
0.2047		5.20	62.00	18.20	26.00	9024630052000
0.2055	#5	5.22	62.00	18.17	26.00	9024630052200
0.2087		5.30	62.00	18.05	26.00	9024630053000
0.2091	#4	5.31	66.00	20.04	28.00	9024630053100
0.2126		5.40	66.00	19.90	28.00	9024630054000
0.2130	#3	5.41	66.00	19.89	28.00	9024630054100
0.2165		5.50	66.00	19.75	28.00	9024630055000
0.2189	7/32	5.56	66.00	19.66	28.00	9024630055600
0.2205		5.60	66.00	19.60	28.00	9024630056000
0.2209	#2	5.61	66.00	19.59	28.00	9024630056100
0.2244		5.70	66.00	19.45	28.00	9024630057000
0.2280	#1	5.79	66.00	19.32	28.00	9024630057900
0.2283		5.80	66.00	19.30	28.00	9024630058000
0.2323		5.90	66.00	19.15	28.00	9024630059000
0.2339	A	5.94	66.00	19.09	28.00	9024630059400
0.2343	15/64	5.95	66.00	19.08	28.00	9024630059500
0.2362		6.00	66.00	19.00	28.00	9024630060000
0.2378	B	6.04	70.00	21.94	31.00	9024630060400
0.2402		6.10	70.00	21.85	31.00	9024630061000
0.2421	C	6.15	70.00	21.78	31.00	9024630061500
0.2441		6.20	70.00	21.70	31.00	9024630062000
0.2461	D	6.25	70.00	21.63	31.00	9024630062500
0.2480		6.30	70.00	21.55	31.00	9024630063000
0.2500	1/4	6.35	70.00	21.48	31.00	9024630063500
0.2520		6.40	70.00	21.40	31.00	9024630064000
0.2559		6.50	70.00	21.25	31.00	9024630065000
0.2571	F	6.53	70.00	21.21	31.00	9024630065300
0.2598		6.60	70.00	21.10	31.00	9024630066000
0.2610	G	6.63	70.00	21.06	31.00	9024630066300
0.2638		6.70	70.00	20.95	31.00	9024630067000
0.2657	17/64	6.75	74.00	23.88	34.00	9024630067500
0.2677		6.80	74.00	23.80	34.00	9024630068000
0.2717		6.90	74.00	23.65	34.00	9024630069000
0.2756		7.00	74.00	23.50	34.00	9024630070000
0.2768	J	7.03	74.00	23.46	34.00	9024630070300
0.2795		7.10	74.00	23.35	34.00	9024630071000
0.2811	9/32	7.14	74.00	23.29	34.00	9024630071400
0.2835		7.20	74.00	23.20	34.00	9024630072000
0.2874		7.30	74.00	23.05	34.00	9024630073000
0.2902	L	7.37	74.00	22.95	34.00	9024630073700
0.2913		7.40	74.00	22.90	34.00	9024630074000
0.2953		7.50	74.00	22.75	34.00	9024630075000
0.2969	19/64	7.54	79.00	25.69	37.00	9024630075400
0.2992		7.60	79.00	25.60	37.00	9024630076000

Diameter (d1)			l1 mm	t _{max} mm	l2 mm	EDP #
inch	wire/ltr	mm				
0.3020	N	7.67	79.00	25.50	37.00	9024630076700
0.3031		7.70	79.00	25.45	37.00	9024630077000
0.3071		7.80	79.00	25.30	37.00	9024630078000
0.3110		7.90	79.00	25.15	37.00	9024630079000
0.3126	5/16	7.94	79.00	25.09	37.00	9024630079400
0.3150		8.00	79.00	25.00	37.00	9024630080000
0.3161	O	8.03	79.00	24.96	37.00	9024630080300
0.3189		8.10	79.00	24.85	37.00	9024630081000
0.3228		8.20	79.00	24.70	37.00	9024630082000
0.3268		8.30	79.00	24.55	37.00	9024630083000
0.3280	21/64	8.33	79.00	24.51	37.00	9024630083300
0.3307		8.40	79.00	24.40	37.00	9024630084000
0.3319	Q	8.43	79.00	24.36	37.00	9024630084300
0.3346		8.50	79.00	24.25	37.00	9024630085000
0.3386		8.60	84.00	27.10	40.00	9024630086000
0.3390	R	8.61	84.00	27.09	40.00	9024630086100
0.3425		8.70	84.00	26.95	40.00	9024630087000
0.3437	11/32	8.73	84.00	26.91	40.00	9024630087300
0.3465		8.80	84.00	26.80	40.00	9024630088000
0.3480	S	8.84	84.00	26.74	40.00	9024630088400
0.3504		8.90	84.00	26.65	40.00	9024630089000
0.3543		9.00	84.00	26.50	40.00	9024630090000
0.3579	T	9.09	84.00	26.37	40.00	9024630090900
0.3583		9.10	84.00	26.35	40.00	9024630091000
0.3594	23/64	9.13	84.00	26.31	40.00	9024630091300
0.3622		9.20	84.00	26.20	40.00	9024630092000
0.3661		9.30	84.00	26.05	40.00	9024630093000
0.3677	U	9.34	84.00	25.99	40.00	9024630093400
0.3701		9.40	84.00	25.90	40.00	9024630094000
0.3740		9.50	84.00	25.75	40.00	9024630095000
0.3748	3/8	9.52	89.00	28.72	43.00	9024630095200
0.3772	V	9.58	89.00	28.63	43.00	9024630095800
0.3780		9.60	89.00	28.60	43.00	9024630096000
0.3819		9.70	89.00	28.45	43.00	9024630097000
0.3858	W	9.80	89.00	28.30	43.00	9024630098000
0.3898		9.90	89.00	28.15	43.00	9024630099000
0.3906	25/64	9.92	89.00	28.12	43.00	9024630099200
0.3937		10.00	89.00	28.00	43.00	9024630100000
0.3969	X	10.08	89.00	27.88	43.00	9024630100800
0.4016		10.20	89.00	27.70	43.00	9024630102000
0.4039	Y	10.26	89.00	27.61	43.00	9024630102600
0.4055		10.30	89.00	27.55	43.00	9024630103000
0.4063	13/32	10.32	89.00	27.52	43.00	9024630103200
0.4130	Z	10.49	89.00	27.27	43.00	9024630104900
0.4134		10.50	89.00	27.25	43.00	9024630105000
0.4220	27/64	10.72	95.00	30.92	47.00	9024630107200
0.4331		11.00	95.00	30.50	47.00	9024630110000
0.4374	7/16	11.11	95.00	30.34	47.00	9024630111100
0.4528		11.50	95.00	29.75	47.00	9024630115000
0.4531	29/64	11.51	95.00	29.74	47.00	9024630115100
0.4689	15/32	11.91	102.00	33.14	51.00	9024630119100
0.4724		12.00	102.00	33.00	51.00	9024630120000
0.4843	31/64	12.30	102.00	32.55	51.00	9024630123000
0.5000	1/2	12.70	102.00	31.95	51.00	9024630127000
0.5118		13.00	102.00	31.50	51.00	9024630130000
0.5311	17/32	13.49	107.00	33.77	54.00	9024630134900
0.5512		14.00	107.00	33.00	54.00	9024630140000
0.5626	9/16	14.29	111.00	34.57	56.00	9024630142900
0.5906		15.00	111.00	33.50	56.00	9024630150000
0.6299		16.00	115.00	34.00	58.00	9024630160000

Material group	Hardness		SFM	Feed Rate - IPR									
	HRc	Bhn		1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	- ≤ 32	≤ 150 ≤ 301	340 300	0.0015 0.0015	0.0040 0.0040	0.0065 0.0065	0.0080 0.0080	0.0100 0.0100					
Free-cutting steels	≤ 25 ≤ 32	≤ 255 ≤ 301	340 300	0.0017 0.0015	0.0050 0.0040	0.0080 0.0065	0.0100 0.0080	0.0125 0.0100					
Unalloyed heat-treatable steels	≤ 20 ≤ 25 ≤ 32	≤ 220 ≤ 255 ≤ 301	340 300 255	0.0015 0.0015 0.0015	0.0040 0.0040 0.0040	0.0065 0.0065 0.0065	0.0080 0.0080 0.0080	0.0100 0.0100 0.0100					
Alloyed heat-treatable steels	≤ 32 ≤ 43	≤ 301 ≤ 402	255 255	0.0015 0.0015	0.0040 0.0040	0.0065 0.0065	0.0080 0.0080	0.0100 0.0100					
Unalloyed case hardened steels	≤ 25	≤ 255	340	0.0017	0.0050	0.0080	0.0100	0.0125					
Alloyed case hardened steels	≤ 32 ≤ 43	≤ 301 ≤ 402	255	0.0015	0.0040	0.0065	0.0080	0.0100					
Nitriding steels	≤ 32 ≤ 43	≤ 301 ≤ 402	215	0.0015	0.0040	0.0065	0.0080	0.0100					
Tool steels	≤ 25 ≤ 43	≤ 255 ≤ 402	215	0.0012	0.0030	0.0050	0.0065	0.0080					
High speed steels	≤ 43	≤ 402											
Spring steels	≤ 38	≤ 354	105	0.0010	0.0025	0.0040	0.0050	0.0065					
Hardened steels	≤ 48 ≤ 66	≤ 460 -	85	0.0012	0.0030	0.0050	0.0065	0.0080					
Stainless steels, sulphured austenitic martensitic	≤ 28 ≤ 36 ≤ 46	≤ 273 ≤ 337 ≤ 435	105 105 105	0.0015 0.0012 0.0012	0.0040 0.0030 0.0030	0.0065 0.0050 0.0050	0.0080 0.0065 0.0065	0.0100 0.0080 0.0080					
Cast iron	≤ 23 ≤ 38	≤ 242 ≤ 354	385 340	0.0015 0.0015	0.0040 0.0040	0.0065 0.0065	0.0080 0.0080	0.0100 0.0100					
Spheroidal graphite iron and malleable cast iron	≤ 23 ≤ 38	≤ 242 ≤ 354	300 340	0.0015 0.0015	0.0040 0.0040	0.0065 0.0065	0.0080 0.0080	0.0100 0.0100					
Chilled cast iron	≤ 38	≤ 354											
New cast materials GGV	≤ 20 ≤ 32	≤ 220 ≤ 301											
New cast materials ADI	≤ 32 ≤ 43	≤ 301 ≤ 402											
Special alloys	≤ 54	≤ 549	65	0.0010	0.0025	0.0040	0.0050	0.0065					
Ti and Ti-alloys	≤ 25 ≤ 43	≤ 255 ≤ 402	85 65	0.0012 0.0010	0.0030 0.0025	0.0050 0.0040	0.0065 0.0050	0.0080 0.0065					
Aluminium and Al-alloys	-	≤ 120	855	0.0025	0.0080	0.0125	0.0160	0.0200					
Al wrought alloys	-	≤ 200	855	0.0025	0.0080	0.0125	0.0160	0.0200					
Al cast alloys ≤ 10 % Si ≤ 24 % Si	- -	≤ 180 ≤ 180	640 510	0.0020 0.0020	0.0065 0.0065	0.0100 0.0100	0.0125 0.0125	0.0160 0.0160					
Magnesium alloys	-	≤ 120	770	0.0017	0.0050	0.0080	0.0100	0.0125					
Copper, low-alloyed	-	≤ 150	340	0.0017	0.0050	0.0080	0.0100	0.0125					
Brass, short-chipping long-chipping	- -	≤ 180 ≤ 180	770 770	0.0017 0.0017	0.0050 0.0050	0.0080 0.0080	0.0100 0.0100	0.0125 0.0125					
Bronze, short-chipping	-	≤ 180	510	0.0017	0.0050	0.0080	0.0100	0.0125					
Bronze, long-chipping	≤ 25 ≤ 32	≤ 255 ≤ 301	300 215	0.0015 0.0012	0.0040 0.0030	0.0065 0.0050	0.0080 0.0065	0.0100 0.0080					
Duroplastics Thermoplastics Reinforced plastics - Kevlar Reinforced plastics - GFK / CFK			215 170 340	0.0015 0.0012	0.0040 0.0030	0.0065 0.0050	0.0080 0.0065	0.0100 0.0080					

Material group	Hardness		SFM	Feed Rate - IPR									
	HRc	Bhn		1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	- ≤ 32	≤ 150 ≤ 301	330 295	0.0015 0.0015	0.0040 0.0040	0.0065 0.0065	0.0080 0.0080	0.0100 0.0100					
Free-cutting steels	≤ 25 ≤ 32	≤ 255 ≤ 301	330 295	0.0017 0.0015	0.0050 0.0040	0.0080 0.0065	0.0100 0.0080	0.0125 0.0100					
Unalloyed heat-treatable steels	≤ 20 ≤ 25 ≤ 32	≤ 220 ≤ 255 ≤ 301	330 295 260	0.0015 0.0015 0.0015	0.0040 0.0040 0.0040	0.0065 0.0065 0.0065	0.0080 0.0080 0.0080	0.0100 0.0100 0.0100					
Alloyed heat-treatable steels	≤ 32 ≤ 43	≤ 301 ≤ 402	260 260	0.0015 0.0015	0.0040 0.0040	0.0065 0.0065	0.0080 0.0080	0.0100 0.0100					
Unalloyed case hardened steels	≤ 25	≤ 255	330	0.0017	0.0050	0.0080	0.0100	0.0125					
Alloyed case hardened steels	≤ 32 ≤ 43	≤ 301 ≤ 402	260	0.0015	0.0040	0.0065	0.0080	0.0100					
Nitriding steels	≤ 32 ≤ 43	≤ 301 ≤ 402	215	0.0015	0.0040	0.0065	0.0080	0.0100					
Tool steels	≤ 25 ≤ 43	≤ 255 ≤ 402	215	0.0012	0.0030	0.0050	0.0065	0.0080					
High speed steels	≤ 43	≤ 402											
Spring steels	≤ 38	≤ 354	100	0.0010	0.0025	0.0040	0.0050	0.0065					
Hardened steels	≤ 48 ≤ 66	≤ 460 -	80	0.0012	0.0030	0.0050	0.0065	0.0080					
Stainless steels, sulphured austenitic martensitic	≤ 28 ≤ 36 ≤ 46	≤ 273 ≤ 337 ≤ 435	100 100 100	0.0015 0.0012 0.0012	0.0040 0.0030 0.0030	0.0065 0.0050 0.0050	0.0080 0.0065 0.0065	0.0100 0.0080 0.0080					
Cast iron	≤ 23 ≤ 38	≤ 242 ≤ 354	375 360	0.0015 0.0015	0.0040 0.0040	0.0065 0.0065	0.0080 0.0080	0.0100 0.0100					
Spheroidal graphite iron and malleable cast iron	≤ 23 ≤ 38	≤ 242 ≤ 354	295 260	0.0015 0.0015	0.0040 0.0040	0.0065 0.0065	0.0080 0.0080	0.0100 0.0100					
Chilled cast iron	≤ 38	≤ 354											
New cast materials GGV	≤ 20 ≤ 32	≤ 220 ≤ 301											
New cast materials ADI	≤ 32 ≤ 43	≤ 301 ≤ 402											
Special alloys	≤ 54	≤ 549	65	0.0010	0.0025	0.0040	0.0050	0.0065					
Ti and Ti-alloys	≤ 25 ≤ 43	≤ 255 ≤ 402	80 65	0.0012 0.0010	0.0030 0.0025	0.0050 0.0040	0.0065 0.0050	0.0080 0.0065					
Aluminium and Al-alloys	-	≤ 120	855	0.0025	0.0080	0.0125	0.0160	0.0200					
Al wrought alloys	-	≤ 200	855	0.0025	0.0080	0.0125	0.0160	0.0200					
Al cast alloys ≤ 10 % Si ≤ 24 % Si	- -	≤ 180 ≤ 180	640 510	0.0020 0.0020	0.0065 0.0065	0.0100 0.0100	0.0125 0.0125	0.0160 0.0160					
Magnesium alloys	-	≤ 120	770	0.0017	0.0050	0.0080	0.0100	0.0125					
Copper, low-alloyed	-	≤ 150	340	0.0017	0.0050	0.0080	0.0100	0.0125					
Brass, short-chipping long-chipping	- -	≤ 180 ≤ 180	770 770	0.0017 0.0017	0.0050 0.0050	0.0080 0.0080	0.0100 0.0100	0.0125 0.0125					
Bronze, short-chipping	-	≤ 180	510	0.0017	0.0050	0.0080	0.0100	0.0125					
Bronze, long-chipping	≤ 25 ≤ 32	≤ 255 ≤ 301	300 215	0.0015 0.0012	0.0040 0.0030	0.0065 0.0050	0.0080 0.0065	0.0100 0.0080					
Duroplastics Thermoplastics Reinforced plastics - Kevlar Reinforced plastics - GFK / CFK			165 215 330	0.0015 0.0012	0.0040 0.0030	0.0065 0.0050	0.0080 0.0065	0.0100 0.0080					