

Material Group

STEP 1 - Identify workpiece Material Group



DIN ISO 513	Material	Condition	Tensile Strength (Kpsi)	Hardness HB	Material Group # VDI 3323	Trade Names	
P	Non-alloy steel, cast steel, free cutting steel	<0.25%C Annealed	61	125	1	1010, 1015, 1018, 1020, 1023, 1102, 1108, 1109, 1213, 12L13, 1215	
		>=0.25%C Annealed	94	190	2	1025, 1030, 1035, 1040, 1045, 1050, 1140, 1141, 1330	
		<0.55%C Quenched and tempered	123	250	3	1025, 1030, 1035, 1040, 1045, 1050, 1140, 1141, 1330	
		>=0.55%C Annealed	109	220	4	1055, 1060, 1070, 1080, 1151, W112	
	Low alloy steel and cast steel (Less than 5% of alloying elements)	Quenched and tempered	145	300	5	1055, 1060, 1151	
		Annealed	87	200	6	3135, 3435, 3440, 4130, 4140, 4150, 4320, 4340, 5015, 5060, 5120, 5132, 5140, 5160, 6150, 8620, 8640, 9254, 9255, 9262, L1, L2, L3, O1, O2, S1, P2, P3, P5, P20, W1, W2, W5, 51100, 52100,	
		Quenched and tempered	135	275	7		
			145	300	8		
			174	350	9		
	High alloy steel, cast steel and tool steel	Annealed	99	200	10	A2, A3, A4, A,6 A7, A10, D2, D3, D4, D5, D7, H11, H12, H13, H14, H17, H22, H23, S7, M1, M2, M3, M4, M6, M7, M10, M30, M42, T1, T2, T4, T5,	
Quenched and tempered		160	325	11			
M	Stainless steel and cast steel	Ferritic/martensitic	99	200	12	203, 303, 303Plus X, 303Pb, 409, 430, 430F, 440, 444	
		Martensitic	119	240	13	410, 420, 431, 440A, 416	
		Austenitic	87	180	14	304, 310, 316, 316L, 317, Nitronic 40, Carpenter 20, 13-8, 15-5, 17-4	
K	Gray cast iron (GG)	Ferritic		180	15	ASTM A48 Classes 20, 25, SAEJ431c grades G1800, G2000, G2500	
		Pearlitic		260	16	ASTM A48 Classes 30, 35, 40, 45, 50, SAEJ431c grades G3000, G3500	
	Cast iron nodular (GGG)	Ferritic		160	17	60-40-18, 65-45-12	
		Pearlitic		250	18	80-55-06, 100-70-03, 120-90-02	
	Malleable cast iron	Ferritic		130	19	22010, 325110	
		Pearlitic		230	20	40010, 50005, 70003, 90001	
N	Aluminum - Wrought alloy	Not cureable		60	21	1000, 2011, 2014, 2124, 2024, 6061, 7075	
		Cured		100	22		
	Aluminum - cast, alloyed	<=12% Si Not cureable		75	23	319, 383, 356, 413, 535, A280, A380, A413	
		Cured		90	24		
		>12% Si High temp		130	25		
	Copper alloys	>1% Pb Free cutting		110	26	C23000, C36000, C83600, C93200, C93600	
		Brass		90	27	C18200, C27200, C27700, C86500, Red Brass	
		Electrolitic copper		100	28	B-148-52, C63000, C81500, C90700, C90800	
	Non-metallic	Duroplastics, fiber plastics			29		
		Hard rubber			30		
S	High temp. alloys	Fe based	Annealed		200	A286, Incoloy 800, Incoloy 801, Incoloy 802, N-155, W-545	
			Cured		280		32
		Ni or Co based	Annealed		250	33	Astroloy, Hastelloy, C-272, IN-100, Inconel 625, Inconel 718, Inconel 750, Numonic, Rene, Udimet, Waspaoly, Haynes, Stellite, AR213, MP35N
			Cured		350	34	
			Cast		320	35	
	Titanium, Ti alloys		Rm 58		36	Grade 1, Grade 2, Grade 2H, Grade 3	
		Alpha+beta alloys cured	Rm 152		37	Grade 5, Ti6AL4V, Ti6-4	
H	Hardened steel	Hardened		55 HRC	38	Hardox 400, Hardox 500, W1, W210	
		Hardened		60 HRC	39	HSS, 90 MnV8	
	Chilled cast iron	Cast		400	40	Ni-Hard 1, Ni-Hard 2, Ni-Hard 4, A532, GX300	
	Cast iron nodular	Hardened		55 HRC	41		

T-Cap - Cutting Speeds & Feeds

STEP 2 - Locate Cutting Speed & Feed by Operation & Material Group

OPG-008 (07/2021)



DIN ISO 513	Material Group # VDI 3323	Drilling		Turning & Boring		Grooving	
		SFM	IPR	SFM	IPR	SFM	IPR
P	1	395-855	.002-.006	460-920	.0015-.0055	395-820	.0015-.010
	2	260-625	.002-.006	295-655	.0015-.005	260-590	.0015-.010
	3	330-920	.0025-.007	330-655	.0015-.006	260-590	.0015-.010
	4	330-920	.0025-.007	330-655	.0015-.006	260-590	.0015-.010
	5	330-920	.0025-.007	330-655	.0015-.006	260-590	.0015-.010
	6	330-920	.0025-.007	330-655	.0015-.006	260-590	.0015-.010
	7	195-260	.0015-.006	260-590	.003-.005	195-525	.0015-.010
	8	195-260	.0015-.006	260-590	.003-.005	195-525	.0015-.010
	9	195-260	.0015-.006	260-590	.003-.005	195-525	.0015-.010
	10	260-625	.002-.006	260-655	.0015-.005	260-525	.0015-.010
	11	165-490	.0015-.0055	195-490	.0015-.005	165-395	.0015-.010
M	12	165-690	.0015-.006	195-755	.003-.005	165-655	.0015-.010
	13	165-690	.0015-.006	195-755	.003-.005	165-655	.0015-.010
	14	165-690	.0015-.006	195-755	.003-.005	165-655	.0015-.010
K	15	330-985	.0025-.009	395-755	.003-.008	330-655	.0015-.010
	16	330-985	.0025-.009	395-755	.003-.008	330-655	.0015-.010
	17	330-985	.0025-.009	395-755	.003-.008	330-655	.0015-.010
	18	330-985	.0025-.009	395-755	.003-.008	330-655	.0015-.010
	19	330-655	.0025-.006	395-755	.0015-.005	330-655	.0015-.010
	20	330-655	.0025-.006	395-755	.0015-.005	330-655	.0015-.010
N	21	395-1640	.002-.012	395-2295	.0015-.010	330-2295	.0015-.010
	22	395-1640	.002-.012	395-2295	.0015-.010	330-2295	.0015-.010
	23	395-1640	.002-.012	395-2295	.0015-.010	330-2295	.0015-.010
	24	395-1640	.002-.012	395-2295	.0015-.010	330-2295	.0015-.010
	25	395-1640	.002-.012	395-2295	.0015-.010	330-2295	.0015-.010
	26	260-1245	.002-.009	260-1640	.0015-.008	260-1150	.0015-.010
	27	260-1245	.002-.009	260-1640	.0015-.008	260-1150	.0015-.010
	28	260-1245	.002-.009	260-1640	.0015-.008	260-1150	.0015-.010
	29	165-460	.0015-.0055	165-525	.0015-.005	165-425	.0015-.010
	30	165-460	.0015-.0055	165-525	.0015-.005	165-425	.0015-.010
S	31	65-165	.0015-.002	65-590	.0015-.002	65-165	.0015-.002
	32	65-165	.0015-.002	65-590	.0015-.002	65-165	.0015-.002
	33	65-165	.0015-.002	65-590	.0015-.002	65-165	.0015-.002
	34	65-165	.0015-.002	65-590	.0015-.002	65-165	.0015-.002
	35	65-165	.0015-.002	65-590	.0015-.002	65-165	.0015-.002
	36	100-195	.0015-.002	100-330	.0015-.002	100-590	.0015-.002
	37	100-195	.0015-.002	100-330	.0015-.002	100-590	.0015-.002
H	38	65-130	.0015-.002	65-230	.0015-.002	65-165	.0015-.002
	39	65-130	.0015-.002	65-230	.0015-.002	65-165	.0015-.002
	40	65-130	.0015-.002	65-230	.0015-.002	65-165	.0015-.002
	41	65-130	.0015-.002	65-230	.0015-.002	65-165	.0015-.002