

# 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		

# Laydown Threading - Cutting Speeds

## STEP 2 - Locate Cutting Speed by Insert Grade & Material Group

OPG-009 (07/2021)



DIN ISO 513	Material Group # VDI 3323	Cutting Speed (SFM)		
		TT5080	TT9030	TT8010
P	1	440-750	380-620	280-410
	2	430-720	360-590	280-410
	3	390-690	330-570	260-395
	4	360-660	300-540	260-395
	5	300-600	300-540	230-330
	6	390-710	330-590	165-230
	7	300-560	250-480	230-330
	8	280-520	230-440	195-330
	9	280-920	230-440	130-260
	10	310-480	260-390	130-230
	11	200-390	160-330	130-230
M	12	280-510	230-430	130-230
	13	330-430	280-360	260-395
	14	360-560	300-460	130-195
K	15	490-620	410-520	260-395
	16	360-480	300-390	260-395
	17	280-510	230-430	260-395
	18	230-460	200-380	260-395
	19	230-280	200-230	195-330
	20	230-570	200-480	180-310
N	21	390-1440	330-1200	700-900
	22	310-870	260-720	330-430
	23	790-1570	660-1310	350-800
	24	790-1100	660-920	100-750
	25	790-1100	660-920	110-700
	26	310-1000	260-840	150-1000
	27	310-1000	260-840	150-100
	28	310-1000	260-840	80-500
	29	310-980	260-820	80-500
	30	310-980	260-820	100-210
S	31	180-230	150-200	65-165
	32	130-200	110-160	65-165
	33	80-110	70-100	65-130
	34	60-100	50-80	50-100
	35	60-100	50-80	50-100
	36	500-670	460-560	295-360
	37	200-280	160-230	65-165
H	38	150-230	100-200	65-115
	39	100-230	80-150	65-100
	40	100-230	65-130	65-100
	41	100-200	65-100	50-80

### Recommended # of Cutting Passes

Pitch	ISO TPI	0.5 48	1.0 24	1.5 16	2.0 12	2.5 10	3.0 8	4.0 6	6.0 4
# Of Passes		4-6	5-9	5-12	6-14	7-15	8-17	10-20	11-22