

# Material Overview

ANSI ISO 513	VDI 3323	Work Material	State	Rm N/mm <sup>2</sup>	Hardness	Examples
P	1	Alloy Steels C < 0.25%	G	420	125	1010, 1015, 1020, 1023, 1102, 1108, 1109, 1213, 1215
	2	0.25 ≤ C < 0.55%	G	650	190	1025, 1030, 1035, 1040, 1041, 1045, 1050, 1140, 1141, 1146, 1330
	3		V	850	250	1025, 1030, 1035, 1040, 1041, 1045, 1050, 1140, 1141, 1146, 1330
	4	Free cutting steel 0.55% ≤ C	G	750	220	1055, 1060, 1151
	5		V	1000	300	1055, 1060, 1151
	6	Low alloy steel	G	600	180	4130, 4137, 4150, 4320, 4340, 5120, 5132, 5135, 5140, 5155, 6150, 8620, 8625, 9260, A 355/A, A 355/C, A 355/D, A485/2, A 485/3, E-3310
	7		V	930	275	
	8		V	1000	300	
	9		V	1200	350	
	10	High alloy steel	G	680	200	440 C, 613, EV 8, M2 regular C, T1
	11	Tool steel	V	1100	325	440 C, 613, EV 8, M2 regular C, T1
	12		FE / MA	680	200	403, 405, 409, 410, 410 S, 416, 420, 430, 430 Ti, 439, 446,
	13.1	Stainless steel	MA	820	240	420, 430 F, 431, 434, 440 B, 440 C
13.2		MA-PH	1060	330	630, 630	
M	14.1	Stainless steel	AU	600	180	301, 303, 304, 304 L, 304 LN, 305, 309 S, 316, 316 L, 316 LN, 317 L, 317 LN
	14.2		DU	740	260	201, 329, 2205
	14.3		S-AU	680	160	310 mod
	14.4		AU-PH	1060	250	17-7 PH, 630
K	15	Grey iron GG	FE / PE		180	Class 20 B, Class 25 B,
	16		PE		260	Class 30 B, Class 40 B, Class 45 B, Class 50 B
	17	Nodular cast iron GGG	FE		160	Class 50 B, Grade 60-40-18, Grade 65-45-12
	18		PE		250	Grade 80-55-06, Grade 100-70-03, Grade 120-90-02
	19	Malleable irons GTS / GTW	FE		130	Grade 22010, 32510
20		PE		230	GTW-35-04, GTS-55-04, GTS-65-02	
N	21	Wrought aluminum		NAG	60	6061, 2014-T6, 2011-T3, 2024-T4, A2, 7075, 1000, AlMg 1, AlCuMg 1, AlMgSiPb, AlMgSi 1
	22		AG		100	6061, 2014-T6, 2011-T3, 2024-T4, A2, 7075, 1000, AlMg 1, AlCuMg 1, AlMgSiPb, AlMgSi 1
	23	Cast iron alloys	NAG		75	A380-1, A280, A390-1, G-AlSi 10 Mg, G-AlSi12, G-AlCu 5 Si 3, G-AlSi 17, G-AlSi 23
	24		AG		90	A380-1, A280, A390-1, G-AlSi 10 Mg, G-AlSi12, G-AlCu 5 Si 3, G-AlSi 17, G-AlSi 23
	25				130	A380-1, A280, A390-1, G-AlSi 10 Mg, G-AlSi12, G-AlCu 5 Si 3, G-AlSi 17, G-AlSi 23
	26	Copper / Copper alloys			110	Free cutting brass, CuNi 18 Zn 19 Pb
	27				90	Brass, Red brass, CuZn33, CuZn-/CuSnZn-alloys
	28				100	Bronze, Electrolytic copper, CuNi 3 Si, CuSn-alloys
	29	Nonmetals				Thermosetting plastics, FVK, Fiber reinforced plastics, Bakelit
	30					Hard rubber
S	31	High-temperature alloys Fe-Basis/base	G		200	A-286, 321, 321 H, 330, 409, EV 9, EV11, HNV3
	32	Ni-/Co Basis/base	AG		280	A-286, 321, 321 H, 330, 409, EV 9, EV11, HNV3
	33		G		250	Inconel 601/617/625/700/706/718, Nimonic 80 A, Hasteloy, Udimet, Haynes 25, Waspaloy, Rene41, Stelite
	34		AG		350	Inconel 601/617/625/700/706/718, Nimonic 80 A, Hasteloy, Udimet, Haynes 25, Waspaloy, Rene41, Stelite
	35		GO		320	Inconel 601/617/625/700/706/718, Nimonic 80 A, Hasteloy, Udimet, Haynes 25, Waspaloy, Rene41, Stelite
	36	Titanium, pure titanium			400	Titanium
37	titanium alloys alpha / beta alloys	AG		1050	TiAl64V	
H	38.1	Steel	H		45 HRC	90 MnV 8, Hardox 400
	38.2		H		55 HRC	Hardox 500
	39.1		H		60 HRC	HSS, 90 MnV 8
	39.2		H		>62 HRC	HSS, 90 MnV 8
	40.1	Chill cast iron	GO		400	G-X 260 Cr 27, G-X 260 NiCr 42, G-X 300 CrNiSi 9 5 2, G-X 330 NiCr 42
	40.2		GO		>440	G-X 260 Cr 27, G-X 260 NiCr 42, G-X 300 CrNiSi 9 5 2, G-X 330 NiCr 42
	41.1	Cast iron	H		55 HRC	G-X 300 NiMo 3 Mg
	41.2		H		>57 HRC	G-X 300 NiMo 3 Mg

## Condition Codes

AG — Aged	AU — Austenitic	DU — Duplex (austenitic/ferritic)	FE — Ferritic
G — Annealed (soft, solution)	GO — Cast	H — Hardened	MA — Martensitic
NAG — Non age hardenable, not aged	PE — Pearlitic	PH — Precipitation hardened	S-AU — Super austenitic
			V — Quenched and tempered