

Materials



Material	CHEMICAL COMPOSITIONS (%) max									MECHANICAL PROPERTIES				
	C	Mn	P	S	Si	Ni	Cr	Mo	Other	Tensile, min MPa (ksi)	Yield, min MPa (ksi)	Elongation min (%)	Reduction of Area min (%)	Hardness Brinell
WCB	0.30	1.00	0.04	0.045	0.60	0.50	0.50	0.20	Cu 0.30 V 0.03	485-655 (70-95)	250 (36)	22	35	
WC1	0.25	0.50~ 0.80	0.04	0.045	0.60	0.50	0.35	0.45~ 0.65	Cu 0.50 W 0.10	450-620 (65-90)	240 (35)	24	35	
WC6	0.05~ 0.20	0.50~ 0.80	0.04	0.045	0.60	0.50	1.00~ 1.50	0.45~ 0.65	Cu 0.50 W 0.10	485-655 (70-95)	275 (40)	20	35	
WC9	0.05~ 0.18	0.40~ 0.70	0.04	0.045	0.60	0.50	2.00~ 2.75	0.90~ 1.20	Cu 0.50 W 0.10	485-655 (70-95)	275 (40)	20	35	
C5	0.20	0.40~ 0.70	0.04	0.045	0.75	0.50	4.00~ 6.50	0.45~ 0.65	Cu 0.50 W 0.10	620-795 (90-115)	415 (60)	18	35	
C12	0.20	0.35~ 0.65	0.04	0.045	1.00	0.50	8.00~ 10.00	0.90~ 1.20	Cu 0.50 W 0.10	620-795 (90-115)	415 (60)	18	35	
CA15	0.15	1.00	0.04	0.040	1.50	1.00	11.50~ 14.00	0.50		620-795 (90-115)	450 (65)	18	30	
LCB	0.30	1.00	0.04	0.045	0.60	0.50	0.50	0.20	Cu 0.30 V 0.03	450-650 (65-90)	240 (35)	24	35	J (lbf · ft) 18 (13)
LCC	0.25	1.20	0.04	0.045	0.60	0.50	0.50	0.20	Cu 0.30 V 0.03	485-655 (70-95)	275 (40)	22	35	J (lbf · ft) 20 (15)
LC2	0.25	0.50~ 0.80	0.04	0.045	0.60	2.0~ 3.0				485-655 (70-95)	275 (40)	24	35	J (lbf · ft) 20 (15)
LC3	0.15	0.50~ 0.80	0.04	0.045	0.60	3.0~ 4.0				485-655 (70-95)	275 (40)	24	35	J (lbf · ft) 20 (15)
CF8	0.08	1.50	0.040	0.040	2.00	8.0~ 11.0	18.0~ 21.0			485 (70)	205 (30)	35		
CF8M	0.08	1.50	0.040	0.040	1.50	9.0~ 12.0	18.0~ 21.0	2.0~ 3.0		485 (70)	205 (30)	30		
CF3	0.03	1.50	0.040	0.040	2.00	8.0~ 12.0	17.0~ 21.0	0.50		485 (70)	205 (30)	35		
CF3M	0.03	1.50	0.040	0.040	1.50	9.0~ 13.0	17.0~ 21.0	2.0~ 3.0		485 (70)	205 (30)	30		
CF8C	0.08	1.50	0.040	0.040	2.00	9.0~ 12.0	18.0~ 21.0	0.50	Nb ≥ 8xC ≤ 1	485 (70)	205 (30)	30		
CN7M	0.07	1.50	0.040	0.040	1.50	27.5~ 30.5	19.0~ 22.0	2.0~ 3.0	Cu 3.0~4.0	450 (62)	170 (25)	35		
A105	0.35	0.60~ 1.05	0.040	0.050	0.35	0.40	0.30	0.12	Cu 0.40 V 0.03 Nb 0.02	485 (70)	250 (36)	22	30	≤ 187
F1	0.28	0.60~ 0.90	0.045	0.045	0.15~ 0.35			0.44~ 0.65		485 (70)	275 (40)	20	30	143-192
F5	0.15	0.30~ 0.60	0.030	0.030	0.50	0.50	4.0~ 6.0	0.44~ 0.65		485 (70)	275 (40)	20	35	143-217
F11-1	0.05~ 0.15	0.30~ 0.60	0.030	0.030	0.50~ 1.00		1.00~ 1.50	0.44~ 0.65		415 (60)	205 (30)	20	45	121-174
F22-1	0.05~ 0.15	0.30~ 0.60	0.040	0.040	0.50		2.00~ 2.50	0.87~ 1.13		415 (60)	205 (30)	20	35	≤ 170
LF2	0.30	0.60~ 1.35	0.035	0.040	0.15~ 0.30	0.40	0.30	0.12	Cu 0.40 V 0.02 Nb 0.02	485-655 (70-95)	250 (36)	22	30	J (lbf · ft) 20 (15)
F6a	0.15	1.00	0.040	0.030	1.00	0.50	11.5~ 13.5			585 (85)	380 (55)	18	35	167-229
F304	0.08	2.00	0.040	0.030	1.00	8.0~ 11.0	18.0~ 20.0			515 (75)	205 (30)	30	50	
F304L	0.03	2.00	0.040	0.030	1.00	8.0~ 13.0	18.0~ 20.0			485 (70)	170 (25)	30	50	



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F316	0.08	2.00	0.040	0.030	1.00	10.0~ 14.0	16.0~ 18.0	2.00~ 3.00		515 (75)	205 (30)	30	50	
F316L	0.035	2.00	0.040	0.030	1.00	10.0~ 15.0	16.0~ 18.0	2.00~ 3.00		485 (70)	170 (25)	30	50	
F321	0.08	2.00	0.040	0.030	1.00	9.0~ 12.0	≥ 17.0		Ti ≥ 5xC ≤ 0.70	515 (75)	205 (30)	30	50	
F347	0.08	2.00	0.040	0.030	1.00	9.0~ 13.0	17.0~ 20.0		Nb+Ta ≥ 10xC ≤ 1.10	515 (75)	205 (30)	30	50	
410	0.15	1.00	0.040	0.030	1.00		11.50~ 13.50			480 (70)	275 (40)	20	45	
416	0.15	1.25	0.06	≥ 0.15	1.00		12.00~ 14.00							≤ 262
420	Over 0.15	1.00	0.040	0.030	1.00		12.00~ 14.00							≤ 241
D-2	3.00	0.70~ 1.25	0.08		1.50~ 3.00	18.00~ 22.00	1.75~ 2.75			400 (58)	207 (30)	8.0		139~202
B7	0.37~ 0.49	0.65~ 1.10	0.035	0.040	0.15~ 0.35		0.75~ 1.20	0.15~ 0.25		860 (125)	720 (105)	16	50	
B7M	0.37~ 0.49	0.65~ 1.10	0.035	0.040	0.15~ 0.35		0.75~ 1.20	0.15~ 0.25		690 (100)	550 (80)	18	50	≤ HB235 or HRB 99
B16	0.36~ 0.47	0.45~ 0.70	0.035	0.040	0.15~ 0.35		0.80~ 1.15	0.50~ 0.65	V 0.25~0.35	860 (125)	725 (105)	18	50	
B8	0.08	2.00	0.045	0.030	1.00	8.00~ 10.50	18.00~ 20.00			515 (75)	205 (30)	30	50	≤ HB223 or HRB 96
B8M	0.08	2.00	0.045	0.030	1.00	10.00~ 14.00	16.00~ 18.00	2.00~ 3.00		515 (75)	205 (30)	30	50	≤ HB223 or HRB 96
L7	0.38~ 0.48	0.75~ 1.00	0.035	0.040	0.15~ 0.35		0.80~ 1.10	0.15~ 0.25		860 (125)	725 (105)	16	50	
L7M	0.38~ 0.48	0.75~ 1.00	0.035	0.040	0.15~ 0.35		0.80~ 1.10	0.15~ 0.25		690 (100)	550 (80)	18	50	≤ HB235 or HRB 99
B			0.04	0.05						415-690 (60~100)		18		HRB121~212 HRC 69~95
2H	≥ 0.40	1.00	0.040	0.050	0.40									HB248~352 HRC24~38
2HM	≥ 0.40	1.00	0.040	0.050	0.40									HB159~237 HRC ≤ 22
4	0.40~ 0.50	0.70~ 0.90	0.035	0.040	0.15~ 0.35			0.20~ 0.30						HB248~352 HRC24~38
7	0.37~ 0.49	0.65~ 1.10	0.040	0.040	0.15~ 0.35		0.75~ 1.20	0.15~ 0.25						HB248~352 HRC24~38
7M	0.37~ 0.49	0.65~ 1.10	0.040	0.040	0.15~ 0.35		0.75~ 1.20	0.15~ 0.25						HB159~237 HRC ≤ 22
8	0.08	2.00	0.045	0.030	1.00	8.00~ 10.50	18.0~ 20.0							HB126~300 HRC60~105
8M	0.08	2.00	0.045	0.030	1.00	10.0~ 14.0	16.0~ 18.0	2.00~ 3.00						HB126~300 HRC60~105