



Bolting Material Specifications

Common designation.	Specification	Grade	Notes	Common designation.	Specification	Grade	Notes
Alloy & S.S. Bolting	A193	-	(2)(3)	High Temp Bolting (14)	A449	-	(7)(8)
Carbon Steel Bolting	A307 B	-	(4)(5)	Alloy Steel Bolting	A453	-	(9)(10)
Low Temp Bolting	A320	-	(2)(3)(6)	Alloy Steel Bolting Sp.	A540	-	-
Q & T Alloy Bolting	A354	-	-	17-4 PH Bolting	A564	630	(7)
Monel 400 Bolting (13)	B164	-	(11)(12)(13)	Ni-Cr Fe Alloy Bolting	B408	-	(11)(12)(13)
Monel 400 Bolting (17)	B165	-	(11)(12)	Alloy 20 Bolting (15)	B473	-	(11)
Hastelloy B 2 Bolting (18)	B335	N10665	(11)	Hastelloy C276 Bolting (16)	B574	N10276	(11)
Monel K 500 Bolting (17)(20)	B865	N05500	(11)	Hastelloy C22 Bolting (16)	B574	N06022	(11)
Inconel 600 Bolting (19)(20)	B166	N06600	(11)	High Temp PH Ni Alloy	B637	N07718	(11)
				High Temp PH Ni Alloy	A1014	N07718	(11)

Bolt Material	Nut Material	Temperature Range
ASTM A193 Grade B7	ASTM A194 Grade 2H	20°F (30°C) to + 1000°F (+538°C)
ASTM A320 Grade L7	ASTM A194 Grade 4	150°F (101°C) to + 1000°F (+538°C)
ASTM A193 Grade B16	ASTM A194 Grade 2H	20°F (30°C) to + 1100°F (+538°C)
ASTM A193 Grade B8	ASTM A194 Grade 8F	450°F (268°C) to + 1500°F (+ 801°C)
ASTM A193 Grade B8 CL2	ASTM A194 Grade 8F	450°F (268°C) to + 1000°F (+ 538°C)

GENERAL NOTES:

(a) The user is responsible for assuring that bolting material is not used beyond the limits specified in the governing code or regulations.

(b) ASME Boiler and Pressure Vessel Code Section II material that also meet the requirements of the listed ASTM specification may also be used.

(c) Material limitations, restricti temperature tables.

NOTES:

- (1) Repair welding of bolting material is not permitted.
- (2) Where austenitic bolting materials have been carbide solution treated but not strain hardened, they are designated Class 1 or Class 1A in ASTM
- (3) Where austenitic bolting materials have been carbide solution treated and strain hardened, they are designated Class 2 in ASTM A193. ASTM
- (4) For limitations of usage and strength levels, see ASME B16.34 para. 5.1.1.(Limited to 400°F)
- (5) Bolts with drilled or undersize heads shall not be used.
- (6) For ferritic bolting materials intended for service at low temperatures, ASTM A194 Gr. 4 or Gr. 7 nuts are recommended.
- (7) H1150 Condition Standard, H1150M for NACE MR075. Acceptable nuts for use with these quenched and tempered steel bolts are ASTM
- (8) Mechanical property requirements for studs shall be the same as those for bolts.
- (9) These are bolting materials suitable for high temperature service with austenitic stainless steel valve materials.
- (10) Only Grades 651 and 660 shall be used.
- (11) Nuts may be of the same material or may be of compatible grade of ASTM A194.
- (12) Forging quality not permitted unless the producer last heating or working these parts tests them as required for other permitted conditions in the
- (13) Maximum operating temperature is arbitrarily set at 500°F (260°C) unless material has been annealed, solution annealed, or hot finished,
- (14) With expansion Coefficients comparable to Austenitic Stainless Steels.
- (15) For Temperature Service up to 800°F
- (16) For Temperature Service up to 1250°F
- (17) For Temperature Service up to 900°F
- (18) For Temperature Service up to 800°F
- (19) For Temperature Service up to 160