

# ASTM A193 B7 vs A320 L7 Stud Bolts

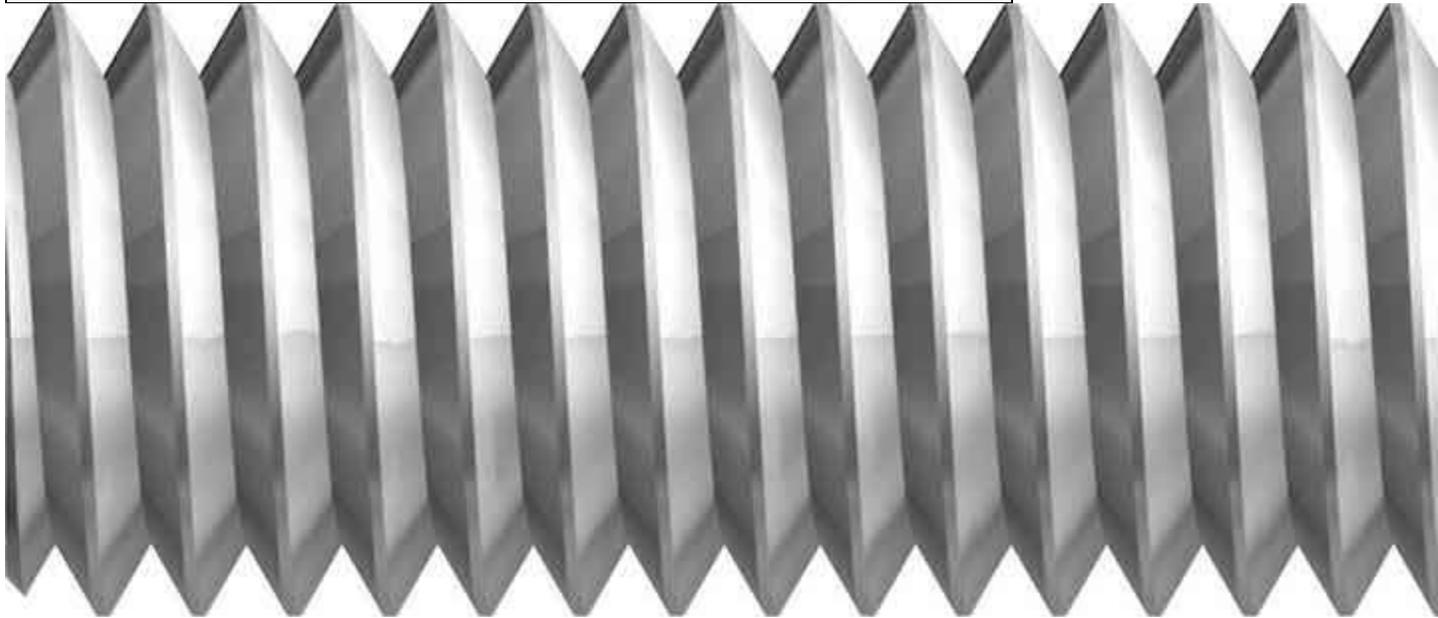
ASTM A193 B7 is a Bolting specification for medium-high temperature applications. It is a heat treated Chromium Molybdenum steel and is considered for applications up to 450° Celsius (840° Fahrenheit).

ASTM A320 L7 has the same chemical and physical properties as B7, with additional [Charpy V Notch tests](#) taken at -101° Celsius (-150° Fahrenheit) for low temperature applications.

Steel is manufactured via Electric Arc Furnace, continuously cast followed by heat treatment and Bright conversion. It is typically used for the manufacture of Bolts, Fasteners, Studs and Studbolts in the Petrochemical industry. Available Drawn or Turned depending on the size in both Metric and Imperial sizes in standard and Thread Rolling Diameters. Typical stock size range 8mm to 4in Diameter in B7/L7 and 110mm to 130mm Diameter B7 only.

## Mechanical Properties B7/L7

Grade	Size	Tensile ksi, min	Yield, ksi, min	Elong, %, min	RA % min
B7	Up to 2-1/2	125	105	16	50
L7	Up to 2-1/2	125	105	16	50



## Chemical Composition B7/L7

Element	B7 (AISI 4140)	L7 (AISI 4140)
Carbon	0.37 - 0.49%	0.37 - 0.49%
Manganese	0.65 - 1.10%	0.65 - 1.10%

Phosphorus, max	0.035%	0.035%
Sulfur, max	0.040%	0.040%
Silicon	0.15 - 0.35%	0.15 - 0.35%
Chromium	0.75 - 1.20%	0.75 - 1.20%
Nickel		
Molybdenum	0.15 - 0.25%	0.15 - 0.25%

## Alloy Steel Stud Bolting Materials

### ASTM A193

The ASTM A193 is heavily utilized in petroleum and chemical construction applications. The ASTM standard covers alloy steel and stainless steel bolting materials for high temperature or high pressure service. This specification includes fasteners intended for use in pressure vessels, valves, flanges, and fittings. Although, this material is often available in national coarse (UNC) thread pitches, if being used in traditional applications, threads are specified 8 threads per inch (tpi) for diameters above one inch.

#### ASTM 193, Grade B7

Heat treated chromium-molybdenum steel recommended for medium high temperature service. (Liquid quench -50° to 900° F, Air quench -40° to 900° F)

#### ASTM A193, Grade B7M

Similar to B7 studs except that the minimum yield and tensile strength requirements are reduced and the hardness controlled to 235 Brinell maximum. Recommended for use in corrosive environments. (-50° to 900° F)

#### ASTM A193, Grade B16

A heat treated chromium-molybdenum-vanadium steel recommended for high pressure, high temperature service. (-50° to 1100° F)

#### ASTM A320, Grade L7

This grade is intended for low temperature service down to minus 150° F and has a minimum Charpy impact value of 20 ft. lbs. at this temperature. (-50° to 1100° F)

#### ASTM A320, Grade L7M

Similar to L7 studs except that the minimum yield and tensile strength requirements are reduced and the hardness controlled to 235 Brinell maximum. This stud is recommended for use in low temperature corrosive environments. (-50° to 1100° F)

#### ASTM A320, Grade L43

This grade is intended for low temperature service down to minus 150° F and has a minimum Charpy impact value of 20 ft. lbs. at this temperature. Available in sizes up to a 4 inch diameter. (-150° to 1100° F)

### **ASTM A193, Grade B8**

These Chromium-Nickel (AISI 304) austenitic steel studs are recommended for use in corrosive environments. (-325° to 1500° F)

### **ASTM A193, Grade B8M**

These chromium-nickel molybdenum (AISI 316) austenitic steel studs are recommended for use in corrosive environments. (-325° to 1500° F)

## **Carbon and Alloy Steel Nuts**

### **ASTM A194**

The ASTM A194 specification covers carbon, alloy and stainless steel nuts intended for use in high-pressure and/or high-temperature service. Unless otherwise specified, the American National Standard Heavy Hex Series (ANSI B 18.2.2) shall be used. Nuts up to and including 1in nominal size shall be UNC Series Class 2B fit. Nuts over 1in nominal size shall be either UNC Series Class 2B fit or 8 UN Series Class 2B fit. High strength ASTM A194 grade 2H nuts are common in the marketplace.



### **ASTM A194 Grade 2**

Suitable for use in high temperatures and high pressure conditions.

### **ASTM A194 Grade 2H**

Suitable for use in high temperatures and high pressure conditions. Quenched & tempered.

### **ASTM A194 Grade 2HM**

Similar to 2H nuts except this grade is recommended for use in corrosive environments.

### **ASTM A194 Grade 4**

Heat treated molybdenum steel nuts suitable for severe temperature and pressure conditions.

**ASTM A194 Grade 7**

Heat treated chrome-molybdenum steel nuts suitable for extreme temperature and pressure conditions. Suitable for sub-zero service conditions and have minimum Charpy impact values in accordance with ASTM specifications.

**ASTM A194 Grade 7L**

Heat treated chrome-molybdenum steel nuts suitable for extreme temperature and pressure conditions. Suitable for sub-zero service conditions and have minimum Charpy impact values in accordance with ASTM specifications.

**ASTM A194 Grade 7M**

Similar to grade L7 nuts except this grade is recommended for use in corrosive environments.

**ASTM A194 Grade 8/8M**

Stainless steel nuts recommended for use in corrosive environments.