

ASTM A193 Grade B7M Stud Bolts ASTM A194 Grade 2HM Heavy Hex Nuts

TECHNICAL DATASHEET

Product Family: High Pressure Bolting Materials

Industry: Oil & Gas, Petrochemical, LNG, Refinery, Power Generation

Standards: ASTM A193 / ASTM A194 / ASME B18.2.2 / ASME B1.1 / NACE MR0175

1. Product Description & Standards

ASTM A193 Grade B7M is a quenched and tempered chromium-molybdenum alloy steel bolting material developed for pressure-containing equipment operating under high pressure and elevated temperatures. The controlled hardness requirement makes B7M suitable for sour service environments where sulfide stress cracking resistance is required.

Standard	Description
ASTM A193 B7M	Alloy steel stud bolts
ASTM A194 2HM	Heavy hex nuts
ASME B18.2.2	Nut dimensions
ASME B1.1	Unified inch threads
ASME B16.5	Flange assemblies
NACE MR0175	H2S service guidance

2. Chemical Composition & Mechanical Properties

Element	B7M (%)
Carbon	0.37-0.49
Manganese	0.65-1.10
Silicon	0.15-0.35
Chromium	0.75-1.20
Molybdenum	0.15-0.25
Phosphorus	0.035 max
Sulfur	0.040 max

Property	Requirement
Tensile Strength	100 ksi (690 MPa) min
Yield Strength	75 ksi (515 MPa) min
Elongation	16% min
Reduction of Area	50% min
Hardness	235 HBW max

3. B7M vs B7 Comparison

Property	B7	B7M
Tensile Strength	125 ksi min	100 ksi min
Hardness	Higher	Controlled \leq 235 HBW
SSC Resistance	Limited	Improved
Sour Service	Project dependent	Preferred
Heat Treatment	Q&T	Q&T

4. ASTM A194 2H vs 2HM Nut Comparison

Property	2H	2HM
Heat Treated	Yes	Yes
Sour Service	Limited	Improved
Typical Pairing	B7	B7M
Hardness Control	Standard	More restrictive

5. Dimensions, Manufacturing & Inspection

Available Sizes

Diameter: 1/2" through 4"

Length: Up to 6000 mm or customer specified.

Nominal Size	TPI	Major Dia. D (Min- Max) in	Pitch Dia. D1 (Min- Max) in	Minor Dia. D2 Min in	Runout b Max in
1/2"-13 UNC	13	0.488 – 0.499	0.444 – 0.449	0.404	0.157
9/16"-12 UNC	12	0.550 – 0.561	0.502 – 0.507	0.459	0.197
5/8"-11 UNC	11	0.611 – 0.623	0.559 – 0.564	0.512	0.197
3/4"-10 UNC	10	0.735 – 0.748	0.677 – 0.683	0.626	0.197
7/8"-9 UNC	9	0.859 – 0.873	0.795 – 0.801	0.737	0.197
1"-8 UNC	8	0.983 – 0.998	0.910 – 0.917	0.845	0.236
1-1/8"-8UN	8	1.079 – 1.123	1.035 – 1.042	0.970	0.236
1-1/4"-8UN	8	1.233 – 1.248	1.160 – 1.167	1.095	0.276
1-3/8"-8UN	8	1.358 – 1.373	1.284 – 1.292	1.219	0.276
1-1/2"-8UN	8	1.483 – 1.498	1.409 – 1.417	1.344	0.315
1-5/8"-8UN	8	1.608 – 1.623	1.534 – 1.542	1.469	0.354
1-3/4"-8UN	8	1.733 – 1.748	1.659 – 1.667	1.594	0.354
1-7/8"-8UN	8	1.858 – 1.873	1.784 – 1.792	1.719	0.394
2"-8UN	8	1.983 – 1.998	1.909 – 1.917	1.844	0.394
2-1/4"-8UN	8	2.233 – 2.248	2.158 – 2.166	2.094	0.433
2-1/2"-8UN	8	2.483 – 2.498	2.408 – 2.416	2.344	0.472
2-3/4"-8UN	8	2.733 – 2.748	2.658 – 2.666	2.594	0.512
3"-8UN	8	2.982 – 2.997	2.908 – 2.916	2.844	0.591

Technical Notes

1. Threads conform to ASME B1.1 Unified Inch Screw Threads.
2. Sizes up to 1" utilize UNC thread series.
3. Sizes above 1" generally utilize 8UN thread series for stud bolt applications.
4. Major Diameter (D) refers to external thread crest diameter.
5. Pitch Diameter (D1) is the functional thread diameter used for thread fit.
6. Minor Diameter (D2) is the root diameter of external threads.
7. Runout (b) indicates the maximum thread runout/undercut length permitted adjacent to the shank.
8. Standard tolerance class: Unified Thread Class 2A unless otherwise specified.

Manufacturing Process

- Raw material traceability
- Hot forging or machining
- Quench and temper heat treatment
- Thread rolling/cutting
- Mechanical testing
- Final inspection

Inspection & Testing

- Tensile testing
- Hardness testing
- PMI testing
- Dimensional inspection
- UT / MPI (optional)
- EN10204 3.1 certification

6. Applications, Ordering Information & Certification

Applications

- Refinery process units
- Petrochemical plants
- LNG facilities
- Offshore platforms
- Pressure vessels
- Heat exchangers
- High-pressure piping systems

Ordering Example

[ASTM A193 Grade B7M Stud Bolt](#)

1-1/8"-8UN x 220 mm

Plain Finish

Complete with ASTM A194 Grade 2HM Heavy Hex Nuts

EN10204 3.1 Certified

Manufacturer Quality Documentation Available

- EN10204 Type 3.1 MTC
- Dimensional Inspection Report
- Heat Treatment Report
- Hardness Test Report