



Standard Specification for High-Temperature Bolting Materials, with Expansion Coefficients Comparable to Austenitic Stainless Steels¹

This standard is issued under the fixed designation A 453/A 453M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (€) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

€¹ NOTE—4.1.3 and 8.1 were editorially corrected August 2001.

1. Scope

1.1 This specification² covers four grades of bolting materials with nine classes of yield strength ranging from 50 to 120 ksi [345 to 827 MPa] for use in high-temperature service such as fasteners for pressure vessel and valve flanges. The material requires special processing and is not intended for general purpose applications. The term “bolting material,” as used in this specification, covers rolled, forged, or hot-extruded bars; bolts, nuts, screws, washers, studs, and stud bolts. Headed bolts and rolled threads may be supplied.

NOTE 1—Other bolting materials are covered by Specification A 193/A 193M and Specification A 437/A 437M.

1.2 Supplementary Requirement S 1 of an optional nature is provided. This shall apply only when specified by the purchaser in the order.

1.3 This specification is expressed in both inch-pound units and in SI units. However, unless the order specifies the applicable “M” specification designation (SI units), the material shall be furnished to inch-pound units.

1.4 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

2. Referenced Documents

2.1 ASTM Standards:

- A 193/A 193M Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service³
- A 437/A 437M Specification for Alloy-Steel Turbine-Type

¹ This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.22 on Valves, Fittings, Bolting, and Flanges for High and Subatmospheric Temperatures.

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² For ASME Boiler and Pressure Vessel Code Applications see related Specification SA-453 in Section II of that Code.

³ *Annual Book of ASTM Standards*, Vol 01.01.

Bolting Material Specially Heat Treated for High-Temperature Service³

A 962/A 962M Specification for Steel Fasteners or Fastener Materials, or Both, Intended for Use at Any Temperature from Cryogenic to the Creep Range³

E 139 Practice for Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials⁴

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *bolting material*—this covers rolled, forged, or hot-extruded bars; bolts, nuts, screws, washers, studs, and stud bolts; and also includes those manufactured by upset heading or roll threading techniques.

3.1.2 *heat-treatment charge*—one heat of material heat treated in one batch. If a continuous operation is used, the weight processed as a heat-treatment charge shall not exceed the weights in Table 1.

3.1.3 *lot*—a lot shall consist of the quantities shown in Table 2.

4. Ordering Information

4.1 The inquiry and order shall indicate the following:

- 4.1.1 Quantity (weight or number of pieces),
- 4.1.2 Type of material (bars, bolts, nuts, etc.),
- 4.1.3 Grade and class (see Table 4),
- 4.1.4 Method of finishing (see 6.1),
- 4.1.5 Type of thread desired (see 6.1.1),
- 4.1.6 Alternative test method option (see 7.2.4.3),
- 4.1.7 Bolt shape option, if any,
- 4.1.8 Thread option, if any,
- 4.1.9 Test method for surface quality, if any,
- 4.1.10 Test location option, if any,
- 4.1.11 Rejection option, if any, and
- 4.1.12 If stress-rupture testing is not required (see 7.2.1).

5. Common Requirements

5.1 Material and fasteners supplied to this specification shall conform to the requirements of Specification A 962/A 962M.

⁴ *Annual Book of ASTM Standards*, Vol 03.01.