

ASTM A 687

## ADOPTION NOTICE

ASTM A 687, Bolts and Studs, High Strength, Nonheaded, Steel was adopted on 20 August 1993 for use by the Department of Defense (DoD). Proposed changes by DoD activities must be submitted to the DoD Adopting Activity: U.S. Army Armament, Research Development and Engineering Center, ATTN: SMCAR-BAC-S, Picatinny Arsenal, NJ 07806-5000. DoD activities may obtain copies of this standard from the Standardization Document Order Desk, 700 Robbins Ave, Building 4D, Philadelphia, PA. 19111-5094. The private sector and other Government agencies may purchase copies from the American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103-1187.

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## Standard Specification for High-Strength Nonheaded Steel Bolts and Studs<sup>1</sup>

This standard is issued under the fixed designation A 687; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This specification has been approved for use by agencies of the Department of Defense. Consult the DoD Index of Specifications and Standards for the specific year of issue which has been adopted by the Department of Defense.*

### 1. Scope

1.1 This specification covers the chemical and mechanical requirements for quenched and tempered steel nonheaded bolts and studs with enhanced Charpy V-notch impact properties for anchorage and other purposes. The material shall be alloy steel as described in Table 1 and is limited to  $\frac{5}{8}$  to 3 in. (15.875 to 76 mm) inclusive, in nominal diameter.

1.2 This specification does not apply to mechanical expansion anchors for concrete or to powder-activated nails or studs for concrete or steel.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

A 153 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware<sup>2</sup>

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products<sup>3</sup>

A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products<sup>4</sup>

F 606 Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets<sup>5</sup>

F 788/F 788M Specification for Surface Discontinuities of Bolts, Screws, and Studs, Inch and Metric Series<sup>5</sup>

#### 2.2 ANSI Standards:

B1.1 Unified Screw Threads<sup>6</sup>

B18.2.2 Square and Hex Nuts<sup>6</sup>

### 3. Ordering Information

3.1 Orders for material under this specification shall include the following information:

3.1.1 Quantity (number of pieces),

3.1.2 For stud bolts: the thread length at each end, and overall length,

3.1.3 For special bolts: a specific description of their form,

dimensions, and thread length required (preferably a drawing),

3.1.4 Galvanizing, if required,

3.1.5 Requirements, if any, for test reports covering melt analysis, mechanical properties, and dimensions,

3.1.6 ASTM designation and year of issue, and

3.1.7 Additional requirements, if any.

### 4. Materials and Manufacture

4.1 Steel for nonheaded bolts and studs shall be made by the open-hearth, basic-oxygen, or electric-furnace process.

4.2 Bars or bolts and studs shall be heat treated by the steel manufacturer by quenching in a liquid medium from above the austenizing temperature and then tempering by reheating to a temperature of at least 800°F (427°C).

4.3 Threads of nonheaded bolts or studs may be rolled or cut.

### 5. Chemical Composition

5.1 The steel from which nonheaded bolts and studs are made shall conform to the requirements as to chemical composition prescribed in Table 1.

5.2 Application of heats of steel to which bismuth, selenium, tellurium, or lead has been intentionally added shall not be permitted.

5.3 Chemical analyses shall be performed in accordance with Test Methods A 751.

### 6. Mechanical Properties

6.1 When the bolts and studs are not subsequently heat treated, the steel bars from which nonheaded bolts or studs are made shall conform to the tensile requirements of Table 2 in accordance with 9.1. If the bolts or studs are given the heat treatment described in 4.2, the bolts and studs shall conform to the tensile requirements of Table 2 in accordance with 10.1.

6.2 The steel from which the nonheaded bolts and studs are made shall meet the Charpy V-notch impact requirements as given in Table 3 in accordance with 9.5.

### 7. Dimensions

7.1 Unless otherwise specified, threads shall be Coarse Thread Series as specified in the latest issue of ANSI B1.1, and shall have Class 2A tolerances.

7.2 When threads are rolled, the shank area shall not be less than the stress area for the specified bolt and thread as specified in the latest issue of ANSI B1.1.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F-16 on Fasteners and is the direct responsibility of Subcommittee F16.02 on Steel Bolts, Nuts, Rivets, and Washers.

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<sup>2</sup> Annual Book of ASTM Standards, Vol 01.06.

<sup>3</sup> Annual Book of ASTM Standards, Vols 01.01 through 01.05 and 03.01.

<sup>4</sup> Annual Book of ASTM Standards, Vols 01.01 through 01.05.

<sup>5</sup> Annual Book of ASTM Standards, Vol 15.08.

<sup>6</sup> Available from American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.