



Designation: A 183 – 03

Standard Specification for Carbon Steel Track Bolts and Nuts¹

This standard is issued under the fixed designation A 183; 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 (ϵ) 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. Scope*

1.1 This specification covers carbon steel track bolts and carbon steel nuts for use in conjunction with joint bars to connect rails in railroad track.

1.2 Two grades of track bolts are defined:

1.2.1 *Grade 1, Low-Carbon, Untreated*, primarily for industrial and mine track use.

1.2.2 *Grade 2, Heat-Treated*, for general track use.

1.3 Two grades of nuts are defined:

1.3.1 *Grade 1, Low-Carbon or Soft Steel*, primarily for application on Grade 1 track bolts.

1.3.2 *Grade 2, Medium-Carbon*, for general application on track bolts.

1.4 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

2.1 *ASTM Standards*:

F 606 Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets²

2.2 *ANSI Standards*:

B1.1 Unified Screw Threads³

B18.10 Track Bolts and Nuts³

2.3 *AREMA Standard*:

American Railway Engineering and Maintenance-of-Way Association Manual, Design of Track Bolts and Nuts, Chapter 4, Part 1⁴

3. Ordering Information

3.1 Orders for track bolts and nuts under this specification shall include the following information:

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 A01.01 on Steel Rails and Accessories.

Current edition approved Sept. 10, 2003. Published October 2003. Originally approved in 1935 to replace A 50, A 51. Combined with A 76 in 1980. Last previous edition approved in 1998 as A 183 – 98.

² *Annual Book of ASTM Standards*, Vol 01.08.

³ Available from American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036.

⁴ Available from the American Railway Engineering and Maintenance of Way Assn., 8201 Corporate Drive, Suite 1125, Landover, MD 20785..

3.1.1 Quantity of bolts and nuts (weights),

3.1.2 ASTM designation and date of issue,

3.1.3 Grade of bolt: 1, low-carbon untreated, or 2, heat-treated (see 1.2 and Table 1),

3.1.4 Design of bolt: oval or elliptical neck (see 2.3),

3.1.5 Dimensions of bolt: nominal diameter and length under head,

3.1.6 Grade of nut: 1, low-carbon, or 2, medium-carbon (see 1.3 and Table 2 and Table 1),

3.1.7 Nominal size of nut, thickness, and chamfer angle (see 2.3),

3.1.8 Thread fit of nuts on bolts: free or wrench-turn fit (see 2.2), and

3.1.9 Certification or test reports, if required (see Section 12).

4. Manufacture

4.1 The steel shall be made by the open-hearth, basic-oxygen, or electric-furnace process, and may be either continuous strand or ingot cast.

4.2 Bolts, including the head and oval or elliptical neck, may be produced by hot or cold forging at the option of the manufacturer.

4.3 Bolt threads may be machine cut or hot- or cold-rolled at the option of the manufacturer.

4.4 Grade 2 bolts shall be heat-treated by quenching in a liquid medium from above the austenitizing temperature, and tempering at a temperature not less than 750°F (399°C). Grade 1 bolts need not be heat-treated.

5. Chemical Requirements

5.1 The steel shall conform to the requirements for chemical composition specified in Table 1.

5.2 *Heat or Cast Analysis*—An analysis of each heat or cast shall be made by the manufacturer to determine the percentages of the elements specified in Table 1. The analysis shall be made from a test sample taken preferably during the pouring of the heat. The chemical composition thus determined shall conform to the heat-cast requirements of Table 1.

5.3 *Product Analysis*—An analysis may be made by the purchaser from a finished bolt or nut. The chemical composition thus determined shall conform to the product requirements

*A Summary of Changes section appears at the end of this standard.

TABLE 1 Chemical Requirements

| Element, % | Bolts | | | | Nuts | | | |
|----------------------|-----------|--------------|-----------|---------|-----------|--------------|-----------|-----------|
| | Grade 1 | | Grade 2 | | Grade 1 | | Grade 2 | |
| | Heat-Cast | Product | Heat-Cast | Product | Heat-Cast | Product | Heat-Cast | Product |
| Carbon, min or range | 0.15 | 0.13 | 0.30 | 0.27 | 0.15 | 0.13 | 0.40–0.55 | 0.37–0.58 |
| Phosphorus, max | 0.04 | 0.050 | 0.04 | 0.050 | 0.12 | ^A | 0.04 | 0.050 |
| Sulfur, max | 0.33 | ^A | 0.06 | 0.070 | 0.33 | ^A | 0.06 | 0.070 |

^A Where rephosphorized or resulphurized material is applied, due to the degree to which phosphorus and sulfur segregate, check analyses for these elements are not technologically appropriate.

TABLE 2 Nut Suitability

| Bolt Grade | Nut Grade | | | | | |
|------------|----------------------------|--------------------------|---|-----------------------|--------------------------|---|
| | Low-Carbon Grade 1 | | | Medium-Carbon Grade 2 | | |
| | Regular Square 25° Chamfer | Heavy Square 25° Chamfer | Heavy Square 1/8 in Oversize in Thickness 60° Chamfer | Regular Square | Heavy Square 25° Chamfer | Heavy Square 1/8 in Oversize in Thickness 60° Chamfer |
| Grade 1 | X ^A | X ^A | X ^A | X ^A | X ^A | X ^A |
| Grade 2 | ... | ... | X ^A | X ^A | X ^A | X ^A |

^A X = suitable combination.

of Table 1. Note that rephosphorized or resulphurized material is not subject to rejection based on product analysis for these elements.

6. Tensile Requirements

6.1 Tension Tests:

6.1.1 The material as represented by a tension test of a full-section bolt with nut assembled, or by a specimen machined from a finished bolt, as prescribed in Table 3, shall conform to the respective requirements specified in Table 4 or Table 5.

6.1.2 Full-section and reduced-section bolt tension tests shall be performed as described in Test Methods F 606.

6.1.3 Nuts shall be tested by assembling the nut on the grade bolt with which it is to be used, and testing as described under the full-section tension test for bolts in Test Methods F 606.

6.1.4 The bolt-nut assembly shall be capable of reaching the minimum load specified in Table 4 before failure of the assembly.

6.2 Number of Tests:

TABLE 3 Required Tension Tests

| Product | Grade | Full-Section Test of Bolt with Nut Assembled | Reduced-Section Test Specimen |
|---------|-------|--|-------------------------------|
| Bolts | 1 | X ^A | NR ^B |
| Nuts | 2 | X ^A | X |
| | 1 | X | NA ^C |
| | 2 | X | NA ^C |

^A X = required test. Test must be performed with 10° wedge under bolt head.

^B NR = test not required.

^C NA = test not applicable.

6.2.1 *Grade 1 Bolts*—One full-section tension test shall be made by the manufacturer from each lot of bolts. Each lot shall consist of not more than one heat of steel, nor be greater than 10 tons (9.7 Mg).

6.2.2 *Grade 2 Bolts*—One full-section tension test and one reduced-section tension test shall be made by the manufacturer from each lot of bolts. Each lot shall consist of not more than one heat of steel, heat-treated in the same furnace load in a batch heat-treating operation or under the same conditions in a continuous heat-treating operation, with no lot to exceed 10 tons (9.7 Mg).

6.3 Retests:

6.3.1 *Grade 1 Bolts*—If the result of the full-section tension test of any lot does not conform to the specified requirement, two bolts shall be selected from the same lot for tension tests. If the results of both tests conform to the specified requirements, the lot shall be accepted.

6.3.2 *Grade 2 Bolts*—If the result of the full-section or reduced-section tension tests of any lot does not conform to the specified requirements, the manufacturer may re-heat treat such lot, not more than two times, in which case two additional full-section and two additional reduced-section tension tests shall be made from the retreated lot. If all retest results conform to the specified requirements, the lot shall be accepted.

6.3.3 If the percentage of elongation of any reduced section test specimen is less than that specified and any part of the fracture is more than 3/4 in. (19 mm) from the center of the gage length, a retest shall be allowed.

6.3.4 If during the full-section tension test a flaw is detected in the bolt or nut that does not permit attainment of the test requirements, the manufacturer shall be permitted to conduct sorting or other reconditioning to eliminate the material containing that flaw, after which the test shall be repeated.

7. Dimensions and Permissible Variations

7.1 Track bolts manufactured in accordance with this specification may have either oval or elliptical necks; the nuts may be square or heavy square, with 25° chamfer, or heavy square with 60° chamfer.

7.2 The bolts and nuts shall conform to the designs and nominal dimensions specified by the purchaser in the order or contract, subject to the tolerances and variations prescribed in ANSI B18.10.

8. Threads and Thread Fit

8.1 The threads and thread fit of bolts and nuts shall be as described in ANSI B18.10 for either free fit or wrench turn fit