



Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement¹

This standard is issued under the fixed designation A 704/A 704M; 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.

1. Scope

1.1 This specification covers material in mat (or sheet) form fabricated from hot rolled, plain steel bars or rods to be used for the reinforcement of concrete. The mats shall consist of two layers of bars or rods which are assembled by welding at right angles to each other.

1.2 This specification is applicable for orders in either inch-pound units (as A 704) or in SI units [as A 704M].

1.3 The values stated in either inch-pound units or SI units are to be regarded 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 this specification.

2. Referenced Documents

2.1 ASTM Standards:

A 185 Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement²

A 615/A 615M Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement²

A 497 Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement²

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment³

A 706/A 706M Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement²

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications⁴

2.2 U.S. Military Standards:

MIL-STD 129 Marking for Shipment and Storage

MIL-STD 163 Steel Mill Products Preparation for Shipment and Storage

2.3 U.S. Federal Standard:

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)

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 A01.05 on Steel Reinforcement.

Current edition approved September 10, 2001. Published October 2001. Originally published as A 704 – 74. Last previous edition A 704/A 704M – 96.

² Annual Book of ASTM Standards, Vol 01.04.

³ Annual Book of ASTM Standards, Vol 01.05.

⁴ Annual Book of ASTM Standards, Vol 14.02.

3. Ordering Information

3.1 The purchaser should specify:

3.1.1 Quantity, no. of mats and/or area,

3.1.2 Size and spacing of steel bars or rods in each direction,

3.1.3 Plain bar or rod,

3.1.4 Grade required (Grade 40 or 60 [300 or 420] as appropriate),

3.1.5 Type of steel, as appropriate (see Section 4), and

3.1.6 ASTM designation and year of issue.

NOTE 1—A typical ordering description is as follows: 1000 welded bar mats; Grade 40; to ASTM A 704 – _____. 6 by 12 in.; ½ in. diameter by 120 in. longitudinal tip to tip, outer bars spaced 54 in.; ½ in. diameter by 60 in. transverse, outer bars spaced 108 in. [1000 welded bar mats; Grade 300; to ASTM A 704M – _____. 150 by 300 mm; 12 mm diameter by 3000 mm longitudinal tip-to-tip, outer bars spaced 1350 mm; 12 mm diameter by 1500 mm transverse, outer bars spaced 2750 mm].

4. Materials

4.1 Plain bars or rods of Grades 40 and 60 [300 and 420] used in the manufacture of mats shall conform to Specification A 615 [A 615M] or Specification A 706/A 706M.

4.2 Maximum size of bar and rod material shall be ¾ in. [19 mm] nominal diameter. Minimum size of rod material shall be ⅞ in. [6 mm] nominal diameter.

5. Fabrication

5.1 Fabricated mats shall be composed of two layers of plain bars or rods substantially parallel and perpendicular to each other.

5.2 *Assembly*—Mats shall be assembled by means of welding to provide attachment at all intersections.

5.2.1 Welded joints shall withstand normal shipping and handling without becoming broken, but the presence of broken welds, regardless of cause, shall not constitute cause for rejection unless the number of broken welds per sheet exceed 1 % of the total, provided that not more than one half of the permissible maximum number of broken welds are located on any one bar or rod.

5.2.2 Welding shall be done in such a manner that the minimum tensile strength, yield strength, and elongation requirements for material as described in Section 4 shall be met

when a specimen is tested across a point of weld. Weld shear strength requirements shall be in compliance with Section 6.

6. Mechanical Requirements

6.1 *Strength of Connections in Welded Plain Bar or Rod Mats*—In order to assure adequate weld shear strength between longitudinal and transverse bar or rod, weld shear strength tests, as described in 6.3.2, shall be made. The minimum average shear value shall not be less than 25 000 lbf [172 N] multiplied by the nominal area of the larger bar or rod in in.²[mm²].

6.2 Number of Tests:

6.2.1 One bar or rod of each size and grade to be used in the fabrication of the mat shall be tested for conformance with the provisions of 4.1 or 4.2 for each 75 000 ft²[7000 m²] of mats or fraction thereof.

6.2.2 One sample consisting of longitudinal bars or rods with not less than two connections on the same transverse bar or rod shall be taken and tested for conformance with the provisions of 5.2.2 and 6.1 from each 75 000 ft² [7000 m²] of mats or fractions thereof.

6.3 Test Methods:

6.3.1 Tension test specimens for determining conformance with 5.2.2 shall have a welded joint located approximately at the center of the bar or rod being tested, and the cross bar or rod shall extend approximately 1 in. [25 mm] beyond each side. All unit stress determinations shall be based on the nominal area calculated using the nominal diameter specified.

6.3.2 Weld shear tests for determining conformance with the requirements of 6.1 shall be conducted with a fixture as described in Section 11 of Specification A 185 or Section 8 of Specification A 497.

7. Size, Dimensions, and Tolerances

7.1 Size and Spacing Dimensions:

7.1.1 The sizes, spacings, dimensions, and arrangement of the bar or rod mats shall conform to the design specified by the purchaser. Bars or rods shall extend beyond exterior intersections a distance of not less than 1 in. [25 mm]. The spacing of bars or rods shall average that specified in the design, and the space between individual bars or rods shall not vary more than ¼in. [6 mm] from that specified.

7.1.2 Where bars or rods of two sizes are used, the nominal area of the smaller size shall not be less than 70 % of the area of the larger size.

7.2 *Width and Length Tolerances*—The overall length or width of the mats shall not be more than 1 in. [25 mm] greater or less than the specified dimension.

8. Finish and Surface Condition

8.1 The finished mats shall be free of injurious defects in material or workmanship.

8.2 Rust, seams, surface irregularities, or mill scale shall not be cause for rejection provided the weight, dimensions, cross-sectional area, and tensile properties of a hand wire brushed test specimen are not less than the requirements of this specification.

9. Rejection and Retests

9.1 Fabricated mats that do not meet the requirements of

this specification shall be rejected and reported to the manufacturer within 5 working days from the receipt of samples by the purchaser.

9.2 When a test specimen fails to meet the provisions of 5.2.3, two additional samples shall be selected and tested. All retest specimens shall meet the requirements of this specification.

9.3 When a test specimen fails to meet the provisions of 6.1, all of the remaining welds on the transverse member shall be tested and the average of all tests (including the original test) shall meet the requirements specified in 6.1.

10. Inspection and Test Reports

10.1 *Inspection*—The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's plant which concern the fabrication of the mats ordered. The manufacturer shall afford the inspector all reasonable facilities to satisfy him that the mats are being furnished in accordance with this specification. All tests and inspection shall be made at the place of fabrication prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with fabricating operations. Inspection as to general workmanship shall be visual.

10.2 *Test Reports on Bar Material*—The manufacturer shall supply test reports showing that the material used in the fabrication of the mats as delivered has fulfilled the tension and bend test requirements of the specified type and grade described in Section 4, which reports shall show the manufacturer's test identification numbers, including the identity of the material.

10.3 *For Government Procurement Only*—Except as otherwise specified in the contract, the contractor is responsible for the performance of all inspection and test requirements specified herein and may use his own or any other suitable facilities for the performance of all inspection and test requirements specified herein, unless disapproved by the purchaser at the time of purchase. The purchaser shall have the right to perform any of the inspections and tests at the same frequency as set forth in this specification, where such inspections are deemed necessary to ensure that material conforms to prescribed requirements.

11. Rehearing

11.1 Samples tested in accordance with this specification that represent rejected material shall be preserved for two weeks from the date rejection is reported to the manufacturer. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a hearing within that time.

12. Packaging

12.1 When specified in the purchase order, packaging shall be in accordance with the procedures in Practices A 700.

12.2 *For Government Procurement Only*—When specified in the contract or order, and for direct procurement by or direct shipment to the U.S. Government, material shall be preserved, packaged, and packed in accordance with the requirements of MIL-STD-163. The applicable levels shall be as specified in the contract. Marking for shipment of such material shall be in

 **A 704/A 704M**

accordance with Fed. Std. No. 123 for civil agencies and MIL-STD-129 for military agencies.

13. Marking

13.1 Each bundle of mats shall be marked with a suitable tag showing the name of the manufacturer and other marking to identify it with the order.

13.2 Tags shall also identify size and grade used.

14. Keywords

14.1 concrete reinforcement; mats; steel bars; steel rods

The American Society for Testing and Materials takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).