Designation: A 704/A 704M – 06

Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement[1]

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. Mats 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:* [2]

A 185 Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

A 615/A 615M Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

A 497/A 497M Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete

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

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

2.2 *U.S. Military Standard:*

MIL-STD 129 Marking for Shipment and Storage[3]

2.3 *U.S. Federal Standard:*

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)[3]

3. Ordering Information

3.1 It shall be the responsibility of the purchaser to specify all requirements that are necessary for material ordered to this specification. Such requirements shall include, but are not limited to, the following:

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 [280 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 280; 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 [280 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 7⁄32 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

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS. Or visit: http://assist.daps.dla.mil/online.

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

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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* 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}[mm^2].

6.2 *Number of Tests*:

6.2.1 One bar or rod of each size or 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 ft^2[7000 m^2] 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 ft^2 [7000 m^2] 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/A 497M.

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 ¼ in. [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 A material test report, certificate of inspection, or similar document printed from or used in electronic form from an electronic data interchange (EDI) transmission shall be regarded as having the same validity as a counterpart printed in the certifier's facility. The content of the EDI transmitted document must meet the requirements of the invoked ASTM standard(s) and conform to any existing EDI agreement between the purchaser and the supplier. Notwithstanding the absence of a signature, the organization submitting the EDI transmission is responsible for the content of the report.

NOTE 2—The industry definition as invoked here is: EDI is the computer-to-computer exchange of business information in a standard format such as ANSI ASC X12.

10.4 *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

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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 and Package Marking

12.1 Packaging, marking, and loading for shipment shall be in accordance with Practices A 700.

12.2 When specified in the contract or order, and for direct procurement by or direct shipment to the U.S. Government, marking for shipment, in addition to requirements specified in the contract or order, shall be in accordance with MIL-STD-129 for military agencies and with Fed. Std. No. 123 for civil agencies.

12.3 Each bundle of mats shall be marked with a suitable tag showing the order number, name of the manufacturer, size, and grade of the material used.

13. Keywords

13.1 concrete reinforcement; mats; steel bars; steel rods

SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last issue (A 704/A 704M – 05) that may impact the use of this standard. (Approved March 1, 2006.)

(1) Revised section 2.2 and Section 12.

(2) Removed Section 13 on Marking.

Committee A01 has identified the location of selected changes to this standard since the last issue (A 704/A 704M – 01) that may impact the use of this standard. (Approved March 1, 2005.)

(1) Revised sections 1.1, 2.1, 3.1, 3.1.4, 4.1, 6.3.2, and Note 1.

(2) Added section 10.3 and Note 2.

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