Designation: ~~A704/A704M – 17~~ A704/A704M – 18

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

This standard is issued under the fixed designation A704/A704M; 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~~ are made from two layers of bars or rods ~~which~~that are assembled by welding the intersections at right angles to each other.

1.2 This specification is applicable for orders in either inch-pound units (as A704) or in SI units [as A704M].

1.3 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~~may not be exact equivalents; therefore, each system ~~must~~shall be used independently of the other. Combining values from the two systems may result in ~~nonconformance~~non-conformance with this specification.

1.4 *This specification does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this specification to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A615/A615M Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

~~A700 Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment~~

A706/A706M Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement

A1064/A1064M Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

2.2 *AWS Standard:*[3]

AWS D1.4/D1.4M Structural Welding Code – Steel Reinforcing Bars

2.3 *U.S. Military Standard:*[4]

~~MIL-STD-29~~MIL-STD-129 Marking for Shipment and Storage

2.4 *U.S. Federal Standard:*[4]

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

3. Ordering Information

3.1 Orders for welded steel plain bar or rod mats for concrete reinforcement under this specification shall contain the following information:

3.1.1 Quantity of mats,

3.1.2 ~~Bar designation number~~ Nominal diameter (size), length, and spacing of steel bars or rods in each direction,

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[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.

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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 American Welding Society (AWS), 8669 NW 36 St., #130, Miami, FL 33166-6672, http://www.aws.org.

[4] Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, http://quicksearch.dla.mil.

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

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 (see Section 4.1); 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 A704 – _____. 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 A704M – _____. 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].

3.2 The purchaser shall have the option to specify additional requirements, including but not limited to, the following:
3.2.1 Requirements for inspection (10.1),
3.2.2 Packaging and special package marking requirements (Section 12), and
3.2.3 Other special requirements, if any.

4. Materials

4.1 Plain bars or rods of ~~Grades 40 and~~ Grade 40 [280] used in the fabrication of mats shall conform to Specification A615 [A615M~~60 [280 and 420]~~]. Plain bars or rods of Grade 60 [420] used in the ~~manufacture~~fabrication of mats shall conform to Specification ~~A615/A615M~~A615 [A615M] or Specification ~~A706/A706M~~A706.~~ [A706M].~~

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~~ at right angles 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~~intersections 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~~mat exceeds 1 % of the total, provided that not more than ~~one half~~ 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~~performed in accordance with AWS D1.4/D1.4M and the strength and ductility requirements for material as ~~described~~specified 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~~—Welded Intersections*—In order to assure adequate weld shear strength between longitudinal and transverse ~~bar~~bars or rod, weld shear strength tests, as ~~described~~specified in 6.3.2, shall be ~~made.~~performed. 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~~and grade to be used in the fabrication of the mat shall be tested for conformance with the ~~provisions~~requirements 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~~ test specimen consisting of longitudinal bars or rods with not less than two ~~connections~~ welded intersections on the same transverse bar or rod shall be taken and tested for conformance with the ~~provisions~~requirements of 5.2.2 and Section 6 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~~intersection 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 19 of Specification A1064/A1064M.

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~~ center-to-center spacing between individual bars or rods shall not vary more than ¼ in. [6 mm] from that specified.