



Standard Specification for Steel Wire, Plain, for Concrete Reinforcement¹

This standard is issued under the fixed designation A 82/A 82M; 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 cold-drawn steel wire, as-drawn or galvanized, to be used as such, or in fabricated form, for the reinforcement of concrete, in sizes not less than 2.03 mm [0.080 in.] nominal diameter.

1.2 Supplement S1 describes high-strength wire, which shall be furnished when specifically ordered. It shall be permissible to furnish high-strength wire in place of regular wire if mutually agreed to by the purchaser and the manufacturer.

1.3 The values stated in either SI units or inch-pound units are to be regarded as standard. Within the text the inch-pound units are shown in brackets (except in Table 6). The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values may result in nonconformance with the specification.

2. Referenced Documents

2.1 ASTM Standards:²

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

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products

A 641/A 641M Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

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

E 83 Practice for Verification and Classification of Extensometer System

2.2 U.S. Military Standards:

MIL-STD-129 Marking for Shipment and Storage³

MIL-STD-163 Steel Mill Products Preparation for Shipment and Storage³

2.3 U.S. Federal Standard:

Fed. Std. No. 123 Marking for Shipments (Civil Agencies)³

2.4 Other Standard:

ACI 318 Building Code Requirements for Structural Concrete⁴

3. Ordering Information

3.1 It shall be the responsibility of the purchaser to specify all requirements that are necessary for the manufacture and delivery of the wire under this specification. Such requirements to be considered include, but are not limited to, the following:

3.1.1 Quantity (mass [weight]),

3.1.2 Name of material (cold-drawn steel wire for concrete reinforcement),

3.1.3 Wire size number (see Section 8),

3.1.4 Yield strength measurement (see 5.1, 11.3),

3.1.5 Packaging (see Section 15),

3.1.6 ASTM designation and year of issue, and

3.1.7 Special requirements, if any. (See Supplement S1.)

NOTE 1—A typical ordering description is as follows: 50 000 kg [100 000 lb] cold-drawn steel wire for concrete reinforcement, Size No. W5 in 800 kg [2000 lb] secured coils, to ASTM – _____.

4. Materials and Manufacture

4.1 The steel shall be made by one of the following processes: open-hearth, electric furnace, or basic-oxygen.

4.2 The wire shall be cold drawn from rods that have been hot rolled from billets.

4.3 Unless otherwise specified, the wire shall be supplied uncoated. When specified as galvanized, it shall be galvanized at finish size.

5. Mechanical Property Requirements

5.1 Tension Tests:

5.1.1 When tested as described in Test Methods and Definitions **A 370**, the material, except as specified in 5.1.2, shall conform to the tensile property requirements in **Table 1** based on nominal area of wire.

5.1.2 When required by the purchaser, yield strength shall be determined as described using a Class B-1 extensometer as

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 Oct. 1, 2005. Published October 2005. Originally approved in 1921. Last previous edition approved in 2005 as A 82 – 05.

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.

⁴ Available from American Concrete Institute, P. O. Box 9094, Farmington Hills, MI 48333-9094.

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



TABLE 1 Tension Test Requirements

| | |
|----------------------------------|-----------------|
| Tensile strength, min, MPa [ksi] | 550 [80] |
| Yield strength, min, MPa [ksi] | 485 [70] |
| Reduction of area, min, % | 30 ^A |

^A For material testing over 690 MPa [100 ksi] tensile strength, the reduction of area shall be not less than 25 %.

described in Practice E 83. The yield strength shall be determined as described in Test Methods and Definitions A 370 at an extension under load of 0.5 % of gage length. It shall be permissible to remove the extensometer after the yield strength has been determined. The wire shall meet the requirements of Table 1 or Table 2, whichever is applicable.

5.1.3 For material to be used in the fabrication of welded wire reinforcement, the tensile and yield strength properties shall conform to the requirements given in Table 2, based on nominal area of the wire.

5.1.4 The material shall not exhibit a definite yield point as evidenced by a distinct drop of the beam or halt in the gage of the testing machine prior to reaching ultimate tensile load.

5.2 *Bend Test*—The bend test specimen shall withstand being bent at room temperature through 180° without cracking on the outside of the bent portion, as prescribed in Table 3.

5.3 *Reduction of Area Test*—The reduction of area shall be determined as described in Test Methods and Definitions A 370, and the wire shall conform to the reduction of area requirements in Table 1 and Table 2.

6. Permissible Variation in Wire Diameter

6.1 The permissible variation in wire diameter shall conform to the requirements in Table 4.

6.2 The difference between the maximum and minimum diameters, as measured on any given cross section of the wire, shall not exceed the tolerances listed in Table 4 for the given wire size.

7. Workmanship, Finish, and Appearance

7.1 The wire shall be free of detrimental imperfections and shall have a workmanlike finish.

7.2 Galvanized wire shall be produced as described in Specification A 641, regular coating.

7.3 Rust, surface seams, or surface irregularities shall not be a cause for rejection provided the requirements of 7.4 are met, and the minimum dimensions and mechanical properties of a hand wire-brushed test specimen are not less than the requirements of this specification.

7.4 Wire intended for welded wire reinforcement shall be sufficiently free of rust and drawing lubricant so as not to interfere with electric resistance welding.

TABLE 2 Tension Test Requirements (Material for Welded Wire Reinforcement)

| | Size MW7.7 [W1.2] and Larger | Smaller than Size MW7.7 [W1.2] |
|----------------------------------|------------------------------------|--------------------------------------|
| Tensile strength, min, MPa [ksi] | 515 [75] | 485 [70] |
| Yield strength, min, MPa [ksi] | 450 [65] | 385 [56] |
| Reduction of area, min, % | 30 ^A | 30 ^A |

^A For material testing over 690 MPa [100 ksi] tensile strength, the reduction of area shall be not less than 25 %.

TABLE 3 Bend Test Requirements

| Size Number of Wire | Bend Test |
|------------------------|--|
| MW45 [W7] and smaller | Bend around a pin the diameter that is equal to the diameter of the specimen |
| Larger than MW 45 [W7] | Bend around a pin the diameter that is equal to twice the diameter of the specimen |

TABLE 4 Permissible Variation in Wire Diameter

| Size Number | Nominal Diameter, mm [in.] | Permissible Variation Plus and Minus, mm [in.] |
|--------------------------------------|--|--|
| Smaller than MW32 [W5] | under 6.40 [0.252] | 0.08 [0.003] |
| MW32 [W5] to MW77 [W12], incl | 6.40 [0.252] to 9.93 [0.391] | 0.10 [0.004] |
| Over MW77 [W12] to MW129 [W20], incl | over 9.93 [0.391] to 12.83 [0.505], incl | 0.15 [0.006] |
| Over MW129 [W20] | over 12.83 [0.505] | 0.20 [0.008] |

8. General Requirements

8.1 When wire for concrete reinforcement is ordered by size number, the relation between size number, diameter, and area shown in Table 5 and Table 6 shall apply.

9. Sampling

9.1 Test specimens for testing mechanical properties shall be full wire sections and shall be obtained from ends of wire coils as drawn or as galvanized. The specimens shall be of sufficient length to perform testing described in 5.1 and 5.2.

TABLE 5 Dimensional Requirements for Plain Wire—SI Units, Wire Sizes

NOTE—Table 1 represents a hard metrication of the most readily available sizes in the welded wire reinforcement industry. Table 5 should be used on projects that are designed using SI units; Table 6 should be used on projects using inch-pound units. Areas of wire should be checked with the most efficient and readily available material from manufacturers. Other wire sizes are available and many manufacturers can produce them in 1-mm²[0.0015 in.²] increments.

| Size Number | Nominal Diameter mm [in.] | Nominal Area mm ² [in. ²] |
|-------------|---------------------------|--|
| MW 5 | 2.52 [0.099] | 5 [0.008] |
| MW 10 | 3.57 [0.140] | 10 [0.016] |
| MW 15 | 4.37 [0.172] | 15 [0.023] |
| MW 20 | 5.05 [0.199] | 20 [0.031] |
| MW 25 | 5.64 [0.222] | 25 [0.039] |
| MW 30 | 6.18 [0.243] | 30 [0.047] |
| MW 35 | 6.68 [0.263] | 35 [0.054] |
| MW 40 | 7.14 [0.281] | 40 [0.062] |
| MW 45 | 7.57 [0.298] | 45 [0.070] |
| MW 50 | 7.98 [0.314] | 50 [0.078] |
| MW 55 | 8.37 [0.329] | 55 [0.085] |
| MW 60 | 8.74 [0.344] | 60 [0.093] |
| MW 65 | 9.10 [0.358] | 65 [0.101] |
| MW 70 | 9.44 [0.372] | 70 [0.109] |
| MW 80 | 10.1 [0.397] | 80 [0.124] |
| MW 90 | 10.7 [0.421] | 90 [0.140] |
| MW 100 | 11.3 [0.444] | 100 [0.155] |
| MW 120 | 12.4 [0.487] | 120 [0.186] |
| MW 130 | 12.9 [0.507] | 130 [0.202] |
| MW 200 | 16.0 [0.628] | 200 [0.310] |
| MW 290 | 19.2 [0.757] | 290 [0.450] |