



Designation: A1064/A1064M – 17

# Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete<sup>1</sup>

This standard is issued under the fixed designation A1064/A1064M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This specification covers carbon-steel wire and welded wire reinforcement produced from hot-rolled rod to be used for the reinforcement of concrete. The steel wire is cold-worked, drawn or rolled, plain (non-deformed, as-drawn or galvanized), or deformed. Welded wire reinforcement is made from plain or deformed wire, or a combination of plain and deformed wire. Common wire sizes and dimensions are given in [Table 1](#), [Table 2](#), [Table 3](#), and [Table 4](#). Actual wire sizes are not restricted to those shown in the tables.

NOTE 1—Welded wire for concrete reinforcement has historically been described by various terms: welded wire fabric, WWF, fabric, and mesh. The wire reinforcement industry has adopted the term *welded wire reinforcement* (WWR) as being more representative of the applications of the products being manufactured. Therefore, the term *welded wire fabric* has been replaced with the term *welded wire reinforcement* in this specification and in related specifications.

1.2 The values stated in either inch-pound or SI units are to be regarded separately as standard. Within the text the SI units are shown in brackets (except in [Table 2](#) and [Table 4](#)). 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.

1.3 *This standard 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 standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.4 *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.*

<sup>1</sup> 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. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

[A370 Test Methods and Definitions for Mechanical Testing of Steel Products](#)

[A641/A641M Specification for Zinc-Coated \(Galvanized\) Carbon Steel Wire](#)

[E83 Practice for Verification and Classification of Extensometer Systems](#)

2.2 *U.S. Military Standard*:<sup>3</sup>

[MIL-STD-129 Marking for Shipment and Storage](#)

2.3 *U.S. Military Standard*:<sup>3</sup>

[Fed. Std. No. 123 Marking for Shipments \(Civil Agencies\)](#)

2.4 *American Concrete Institute (ACI) Standard*:<sup>4</sup>

[ACI 318 Building Code Requirements for Structural Concrete](#)

2.5 *Adjuncts*:

[Weld Tester Drawing](#)<sup>5</sup>

## 3. Terminology

3.1 *Definitions of Terms Specific to This Specification*:

3.1.1 *convoluted wire*—plain wire for welded wire reinforcement that is formed into a sinusoidal wave shape; deformed wire is not subject to convolution unless agreed upon by the purchaser and manufacturer.

3.1.1.1 *Discussion*—The wire is used in the manufacture of cages for certain applications of concrete pipe reinforcement.

3.1.2 *deformed wire and deformed welded wire reinforcement*—a material composed of cold-worked deformed steel wire as cold-drawn or cold-rolled from hot-rolled steel rod.

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

<sup>3</sup> Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://www.dodssp.daps.mil>.

<sup>4</sup> Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333-9094, <http://www.concrete.org>.

<sup>5</sup> Available from ASTM International Headquarters. Order Adjunct No. ADJA0185. Original adjunct produced in 1967.

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

**TABLE 1 Dimensional Requirements for Plain Wire—Inch-Pound Units<sup>A</sup>**

Size Number <sup>B,C,D</sup>	Nominal Diameter in. [mm] <sup>E</sup>	Nominal Area in. <sup>2</sup> [mm <sup>2</sup> ]
W 0.5	0.080 [2.03]	0.005 [3.23]
W 1.2	0.124 [3.14]	0.012 [7.74]
W 1.4	0.134 [3.39]	0.014 [9.03]
W 2	0.160 [4.05]	0.020 [12.9]
W 2.5	0.178 [4.53]	0.025 [16.1]
W 2.9	0.192 [4.88]	0.029 [18.7]
W 3.5	0.211 [5.36]	0.035 [22.6]
W 4	0.226 [5.73]	0.040 [25.8]
W 4.5	0.239 [6.08]	0.045 [29.0]
W 5	0.252 [6.41]	0.050 [32.3]
W 5.5	0.265 [6.72]	0.055 [35.5]
W 6	0.276 [7.02]	0.060 [38.7]
W 8	0.319 [8.11]	0.080 [51.6]
W 10	0.357 [9.06]	0.100 [64.5]
W 11	0.374 [9.50]	0.110 [71.0]
W 12	0.391 [9.93]	0.120 [77.4]
W 14	0.422 [10.7]	0.140 [90.3]
W 16	0.451 [11.5]	0.160 [103]
W 18	0.479 [12.2]	0.180 [116]
W 20	0.505 [12.8]	0.200 [129]
W 22	0.529 [13.4]	0.220 [142]
W 24	0.553 [14.0]	0.240 [155]
W 26	0.575 [14.6]	0.260 [168]
W 28	0.597 [15.2]	0.280 [181]
W 30	0.618 [15.7]	0.300 [194]
W 31	0.628 [16.0]	0.310 [200]
W 45	0.757 [19.2]	0.450 [290]

<sup>A</sup> Table 1 should be used on projects that are designed using inch-pound units; Table 2 should be used on projects that are designed using SI units.

<sup>B</sup> The number following the prefix indicates the nominal cross-sectional area of the wire in square inches multiplied by 100.

<sup>C</sup> For sizes other than those shown above, the Size Number shall be the number of one hundredth of a square inch in the nominal area of the wire cross section, prefixed by the W.

<sup>D</sup> These sizes represent the most readily available sizes in the welded wire reinforcement industry. Other wire sizes are available and many manufactures can produce them in 0.0015 in.<sup>2</sup> increments.

<sup>E</sup> The nominal diameter is based on the nominal area of the wire.

**TABLE 2 Dimensional Requirements for Plain Wire—SI Units<sup>A</sup>**

Size Number <sup>B, C, D</sup>	Nominal Diameter mm [in.] <sup>E</sup>	Nominal Area mm <sup>2</sup> [in. <sup>2</sup> ]
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]

<sup>A</sup> The wire sizes in Table 1 should be used on projects that are designed using inch-pound units; the wire sizes in Table 2 should be used on projects that are designed using SI units.

<sup>B</sup> The number following the prefix indicates the nominal cross-sectional area of the wire in square millimetres.

<sup>C</sup> For sizes other than those shown above, the Size Number shall be the number of square millimetres in the nominal area of the wire cross section, prefixed by the MW.

<sup>D</sup> These sizes represent the most readily available sizes in the welded wire reinforcement industry. Other wire sizes are available and many manufactures can produce them in 1 mm<sup>2</sup> increments.

<sup>E</sup> The nominal diameter is based on the nominal area of the wire.

### 3.1.2.1 Discussion—Deformations can be either indented or

**TABLE 3 Dimensional Requirements for Deformed Wire—Inch-Pound Units**

Deformed Wire Size <sup>A, B, C, D</sup>	Nominal Dimensions			Deformation Requirements
	Unit Weight, lb/ft	Diameter, in. <sup>E</sup>	Cross-Sectional Area, in. <sup>2</sup> <sup>F</sup>	Minimum Average Height of Deformations, in. <sup>G, H</sup>
D 1	0.034	0.113	0.010	0.0045
D 2	0.068	0.160	0.020	0.0063
D 3	0.102	0.195	0.030	0.0078
D 4	0.136	0.226	0.040	0.0101
D 5	0.170	0.252	0.050	0.0113
D 6	0.204	0.276	0.060	0.0124
D 7	0.238	0.299	0.070	0.0134
D 8	0.272	0.319	0.080	0.0143
D 9	0.306	0.339	0.090	0.0152
D 10	0.340	0.357	0.100	0.0160
D 11	0.374	0.374	0.110	0.0187
D 12	0.408	0.391	0.120	0.0195
D 13	0.442	0.407	0.130	0.0203
D 14	0.476	0.422	0.140	0.0211
D 15	0.510	0.437	0.150	0.0218
D 16	0.544	0.451	0.160	0.0225
D 17	0.578	0.465	0.170	0.0232
D 18	0.612	0.479	0.180	0.0239
D 19	0.646	0.492	0.190	0.0245
D 20	0.680	0.505	0.200	0.0252
D 21	0.714	0.517	0.210	0.0259
D 22	0.748	0.529	0.220	0.0265
D 23	0.782	0.541	0.230	0.0271
D 24	0.816	0.553	0.240	0.0277
D 25	0.850	0.564	0.250	0.0282
D 26	0.884	0.575	0.260	0.0288
D 27	0.918	0.586	0.270	0.0293
D 28	0.952	0.597	0.280	0.0299
D 29	0.986	0.608	0.290	0.0304
D 30	1.02	0.618	0.300	0.0309
D 31	1.05	0.628	0.310	0.0314
D 45	1.53	0.757	0.450	0.0379

<sup>A</sup> The wire sizes in Table 3 should be used on projects that are designed using inch-pound units; the wire sizes in Table 4 should be used on projects that are designed using SI units.

<sup>B</sup> The number following the prefix indicates the nominal cross-sectional area of the deformed wire in square inches multiplied by 100.

<sup>C</sup> For sizes other than those shown above, the Size Number shall be the number of one hundredths of a square inch in the nominal area of the deformed wire cross section, prefixed by the D.

<sup>D</sup> These sizes represent the most readily available sizes in the welded wire reinforcement industry. Other wire sizes are available and many manufacturers can produce them in 0.0015 in.<sup>2</sup> increments.

<sup>E</sup> The nominal diameter of a deformed wire is equivalent to the nominal diameter of a plain wire having the same weight per foot as the deformed wire.

<sup>F</sup> The cross-sectional area is based on the weight of the wire. The area in square inches may be calculated by dividing the weight in pounds by 0.2833 (weight of 1 in.<sup>3</sup> of steel) or by dividing the weight per lineal foot of specimen in pounds by 3.4 (weight of steel 1 in. square and 1 foot long).

<sup>G</sup> Measurements shall be made as described in 7.2.4.7.

<sup>H</sup> See 7.2.4.3 for average number of deformations per unit length.

raised transverse ribs (protrusions). The deformations and the welded intersections provide bond strength and anchorage.

3.1.3 *plain wire and plain welded wire reinforcement*—a material composed of cold-worked plain steel wire, as cold-drawn or cold-rolled from hot-rolled steel rod.

3.1.3.1 *Discussion*—The welded intersections provide anchorage.

#### 4. Ordering Information

4.1 Orders for wire or welded wire reinforcement under this specification shall contain the following information:

4.1.1 Quantity (weight [mass]) or square area for welded wire reinforcement,

4.1.2 Name of material (cold-drawn or rolled steel wire, or welded wire reinforcement, plain or deformed, for concrete),

4.1.3 Wire size number, wire spacing, and sheet or roll width and length for welded wire reinforcement,

4.1.4 Minimum yield strength or Grade,

4.1.5 Packaging (see Section 15), and

4.1.6 ASTM designation and year of issue.

4.2 The purchaser shall have the option to specify additional requirements, including but not limited to, the following:

4.2.1 Exclusion of over-steeling (see 10.4.2 and 10.5.1),

4.2.2 Report on tests performed on the steel wire or welded wire reinforcement being furnished (see 14.1), and

4.2.3 Special requirements (if desired).

#### 5. Materials

5.1 The steel shall be made by any commercially accepted process.

5.2 Unless otherwise specified, the wire shall be supplied uncoated. When plain wire is specified as galvanized, it shall be galvanized at finish size as described in Specification A641/A641M.

5.3 Wire used in the manufacture of welded wire reinforcement shall conform to this specification either solely or in combination of plain or deformed wire, or both.