Designation: A1064/A1064M – 09

Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete[1]

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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers 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 Supplement S1 describes high-strength wire, which manufacturers furnish when specifically ordered. Manufacturers 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 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.

1.4 *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] 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 Aug. 15, 2009. Published September 2009. DOI: 10.1520/A1064_A1064M-09.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A641/A641M Specification for Zinc–Coated (Galvanized) Carbon Steel Wire

A700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Shipment

E83 Practice for Verification and Classification of Extensometer Systems

2.2 *U.S. Military Standard:*[3]

MIL-STD-129 Marking for Shipment and Storage

2.3 *U.S. Military Standard:*[3]

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

2.4 *American Concrete Institute (ACI) Standard:*[4]

ACI 318 Building Code Requirements for Structural Concrete

2.5 *Adjuncts:*

Weld Tester Drawing [5]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *convoluted wire*—when wire for welded wire reinforcement is formed into a sinusoidal wave shape, it is commonly referred to as convoluted wire. The wire is used in the manufacture of cages for certain applications of concrete pipe reinforcement. Deformed wire is not subject to convolution unless agreed upon by the purchaser and manufacturer.

[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, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, http://www.dodssp.daps.mil.

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

[5] Available from ASTM International Headquarters. Order Adjunct No. ADJA0185. Original adjunct produced in 1967.

TABLE 1 Dimensional Requirements for Plain Wire—Inch-Pound Units[A]

Size Number[B,C,D]	Nominal Diameter in. [mm][E]	Nominal Area in.^{2} [mm^2]
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]	1.014 [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]

[A] 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.
[B] The number following the prefix indicates the nominal cross-sectional area of the wire in square inches multiplied by 100.
[C] 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.
[D] These sizes represent the most readily available sizes in the welding wire reinforcement industry. Other wire sizes are available and many manufactures can produce them in 0.0015 in.^{2} increments.
[E] The nominal diameter is based on the nominal area of the wire.

TABLE 2 Dimensional Requirements for Plain Wire—SI Units[A]

Size Number[B,C,D]	Nominal Diameter mm [in.][E]	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]

[A] 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.
[B] The number following the prefix indicates the nominal cross-sectional area of the wire in square milimetres.
[C] 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.
[D] These sizes represent the most readily available sizes in the welding wire reinforcement industry. Other wire sizes are available and many manufactures can produce them in 1 mm^2 increments.
[E] The nominal diameter is based on the nominal area of the wire.

3.1.2 *deformed wire and welded deformed wire reinforcement*—as used within the scope and intent of this specification, designates a material composed of cold-worked

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

Deformed Wire Size[A,B,C,D]	Nominal Dimensions			Deformation Requirements
	Unit Weight, lb/ft	Diameter, in.[E]	Cross-Sectional Area, in.^{2} [F]	Minimum Average Height of Deformations, in.[G,H,I]
D1	0.034	0.113	0.01	0.0045
D2	0.068	0.159	0.02	0.0063
D3	0.102	0.195	0.03	0.0078
D4	0.136	0.225	0.04	0.0101
D5	0.170	0.252	0.05	0.0113
D6	0.204	0.276	0.06	0.0124
D7	0.238	0.299	0.07	0.0134
D8	0.272	0.319	0.08	0.0143
D9	0.306	0.338	0.09	0.0152
D10	0.340	0.356	0.10	0.0160
D11	0.374	0.374	0.11	0.0187
D12	0.408	0.390	0.12	0.0195
D13	0.442	0.406	0.13	0.0203
D14	0.476	0.422	0.14	0.0211
D15	0.510	0.437	0.15	0.0218
D16	0.544	0.451	0.16	0.0225
D17	0.578	0.465	0.17	0.0232
D18	0.612	0.478	0.18	0.0239
D19	0.646	0.491	0.19	0.0245
D20	0.680	0.504	0.20	0.0252
D21	0.714	0.517	0.21	0.0259
D22	0.748	0.529	0.22	0.0265
D23	0.782	0.541	0.23	0.0271
D24	0.816	0.553	0.24	0.0277
D25	0.850	0.564	0.25	0.0282
D26	0.884	0.575	0.26	0.0288
D27	0.918	0.586	0.27	0.0293
D28	0.952	0.597	0.28	0.0299
D29	0.986	0.608	0.29	0.0304
D30	1.020	0.618	0.30	0.0309
D31	1.054	0.628	0.31	0.0314
D45	1.530	0.757	0.45	0.0379

[A] 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.

[B] The number following the prefix indicates the nominal cross-sectional area of the deformed wire in square inches multiplied by 100.

[C] 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.

[D] 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.^{2} increments.

[E] 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.

[F] 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.^{3} 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).

[G] The minimum average height of the deformations shall be determined from measurements made on not less than two typical deformations from each line of deformations on the wire. Measurements shall be made at the center of indentation or between two raised ribs as described in 7.2.4.7.

[H] Spacing of deformations shall not be greater than 0.285 in. nor less than 0.182 in. for all wire sizes.

[I] See 7.2.4.3 for average number of deformations per unit length.

deformed steel wire as cold-drawn or cold-rolled from hot-rolled steel rod. Deformations can be indented or raised rib (protrusion) types. The deformations and the welded intersections provide bond strength for shear resistance.

3.1.3 *plain wire and welded plain wire reinforcement*—as used within the scope and intent of this specification, designates a material composed of cold-worked steel wire, as cold-drawn or cold-rolled from hot-rolled steel rod. The welded intersections provide the bond strength for shear resistance.

4. Ordering Information

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

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 (see Section 7), wire spacing, and sheet or roll width and length for welded wire reinforcement;

4.1.4 Minimum yield strength if Supplement S1 applies;

4.1.5 Yield strength measurement. The purchaser has the options described in 12.3;

4.1.6 Request for outside inspection (if not requested, 14.1 applies);

4.1.7 Exclusion of over-steeling, if required (see 10.4.2 and 10.5.1);

4.1.8 Packaging (see Section 15);

4.1.9 ASTM designation and year of issue; and

4.1.10 Special requirements, if any. (See Supplement SI.)

5. Materials

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

TABLE 4 Dimensional Requirements for Deformed Wire—SI Units

Deformed Wire Size[A,B,C,D]	Nominal Dimensions			Cross-Sectional Area, mm^2 [F]	Deformation Requirements
	D [in.^{2} × 100]	Unit Mass, kg/m	Diameter, mm[E]		Minimum Average Height of Deformations, mm[G,H,I]
MD 25	[D 3.9]	0.1962	5.60	25	0.25
MD 30	[D 4.6]	0.2355	6.20	30	0.28
MD 35	[D 5.4]	0.2747	6.70	35	0.30
MD 40	[D 6.2]	0.3140	7.10	40	0.32
MD 45	[D 7.0]	0.3532	7.60	45	0.34
MD 50	[D 7.7]	0.3925	8.00	50	0.36
MD 55	[D 8.5]	0.4317	8.40	55	0.38
MD 60	[D 9.3]	0.4709	8.70	60	0.39
MD 65	[D 10.1]	0.5102	9.10	65	0.46
MD 70	[D 10.8]	0.5494	9.40	70	0.47
MD 80	[D 12.4]	0.6279	10.10	80	0.50
MD 90	[D 13.9]	0.7065	10.70	90	0.54
MD 100	[D 15.5]	0.7849	11.30	100	0.57
MD 120	[D 18.6]	0.9419	12.40	120	0.62
MD 130	[D 20.1]	1.0204	12.90	130	0.64
MD 200	[D 31.0]	1.5700	15.95	200	0.80
MD 290	[D 45.0]	2.2700	19.22	290	0.96

[A] 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.

[B] The number following the prefix indicates the nominal cross-sectional area of the deformed wire in square millimetres.

[C] For sizes other than those shown above, the Size Number shall be the number of square millimetres in the nominal area of the deformed wire cross section, prefixed by the MD.

[D] 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 1 mm^2 increments.

[E] The nominal diameter of a deformed wire is equivalent to the nominal diameter of a plain wire having the same weight per metre as the deformed wire.

[F] The cross-sectional area is based on the mass of the wire. The area in square millimetres may be calculated by dividing the unit mass in kg/mm by 7.849 × 10^{-6}(mass of 1 mm^3 of steel) or by dividing the unit mass in kg/m by 0.007849 (mass of steel 1 mm square and 1 m long).

[G] The minimum average height of the deformations shall be determined from measurements made on not less than two typical deformations from each line of deformations on the wire. Measurements shall be made at the center of indentation or between two raised ribs as described in 7.2.4.7.

[H] Spacing of deformations shall not be greater than 7.24 mm nor less than 4.62 mm for all wire sizes.

[I] See 7.2.4.3 for average number of deformations per unit length.

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 and its Supplement SI if so ordered, either solely or in combination of plain or deformed wire, or both.

6. Manufacture

6.1 The wire shall be cold-worked, drawn or rolled, from rods that have been hot-rolled from billets.

6.2 For welded wire reinforcement, the wires shall be assembled by automatic machines or by other suitable mechanical means which will assure accurate spacing and alignment of all wires of the finished product. The finished welded wire reinforcement shall be furnished in flat or bent sheets or in rolls as specified by the purchaser.

6.3 Longitudinal and transverse wires shall be securely connected at every intersection by a process of electrical resistance welding which employs the principle of fusion combined with pressure.

6.4 Welded wire reinforcement of proper yield strength and quality when manufactured in the manner herein required shall result in a strong, serviceable mat-type product having substantially square or rectangular openings, and shall conform to this specification.

NOTE 2—A variation of manufacturing includes the application of one or more longitudinal convoluted wires at one edge of welded wire reinforcement for concrete pipe reinforcing cages. This shape allows the cage ends to be expanded to a larger diameter to accommodate the bell-shaped ends of concrete pipe.

7. Mechanical Property Requirements—Wire, Plain and Deformed

7.1 *General Requirements for Plain Wire*:

7.1.1 The relation between size number, diameter, and area shown in Table 1 or Table 2 shall apply, whichever is applicable.

7.1.2 Specimens for mechanical properties testing shall be full wire sections and shall be obtained from ends of wire coils as drawn or rolled. The specimens shall be of sufficient length to perform testing described in Test Methods and Definitions A370.

7.1.3 If any test specimen exhibits obvious isolated imperfections not representative of the product, it shall be discarded and another specimen substituted.

7.1.4 *Tension Test*:

7.1.4.1 When tested as described in Test Methods and Definitions A370, the material, except as specified in 7.1.4.2, shall conform to the tensile property requirements in Table 5 or Table 6, whichever is applicable, based on the nominal area of the wire.

TABLE 5 Tension Test Requirements—Plain Wire

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

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

TABLE 6 Tension Test Requirements—Plain Wire for Welded Wire Reinforcement

	Size W 1.2 [MW 7.7] and Larger	Smaller than Size W 1.2 [MW 7.7]
Tensile strength, min, ksi [MPa]	75 [515]	70 [485]
Yield strength, min, ksi [MPa]	65 [450]	56 [385]
Reduction of area, min, %	30[A]	30[A]

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

TABLE 7 Permissible Variation in Plain Wire Diameter

Size Number	Nominal Diameter in. [mm]	Permissible Variation Plus and Minus, in. [mm]
Smaller than W 5 [MW 32]	under 0.252 [6.40]	0.003 [0.08]
W 5 [MW 32] to W 12 [MW 77], incl	0.252 [6.40] to 0.391 [9.93] incl	0.004 [0.10]
Over W 12 [MW 77] to W 20 [MW 129], incl	over 0.391 [9.93] to 0.505 [12.83], incl	0.006 [0.15]
Over W 20 [MW 129]	over 0.505 [12.83]	0.008 [0.20]

TABLE 8 Bend Test Requirements—Plain Wire

Size Number of Wire	Pin Diameter for Bend Tests[A]
W 7 [MW 45] and smaller	1d[B]
Larger than W 7 MW 45]	2d

[A] Bend specimen 180° unless noted otherwise.
[B] d = nominal wire diameter.

TABLE 9 Tension Test Requirements—Deformed Wire

	psi [MPa] min
Tensile strength	85 000 [585]
Yield strength	75 000 [515]

7.1.4.2 When required by the purchaser, yield strength shall be determined as described using a Class B-1 extensometer as described in Practice E83. The yield strength shall be determined as described in Test Methods and Definitions A370 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 5 or Table 6, whichever is applicable.

7.1.4.3 For wire to be used in the manufacture of welded wire reinforcement, the tensile and yield strength properties shall conform to the requirements given in Table 6, based on the nominal area of the wire.

7.1.4.4 The wire shall not be required to 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. The purchaser shall have the option to accept this feature as sufficient evidence of compliance with the specified minimum yield strength tests covered in this specification.

7.1.5 *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 8.

7.1.6 *Reduction of Area Test*—The reduction of area shall be determined as described in Test Methods and Definitions A370. The wire shall conform to the reduction of area requirements in Table 5 or Table 6, whichever is applicable.

7.1.7 *Permissible Variation in Wire Diameter*:

7.1.7.1 The permissible variation in wire diameter shall conform to the requirements in Table 7.

7.1.7.2 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 7 for the given wire size.

7.2 *General Requirements for Deformed Wire*:

7.2.1 The relation between size number, diameter, and area shown in Table 3 or Table 4 shall apply, whichever is applicable.

7.2.2 Specimens for mechanical properties testing shall be full wire sections and shall be obtained from ends of wire coils as rolled. The specimens shall be of sufficient length to perform testing described in Test Methods and Definitions A370.

7.2.3 If any test specimen exhibits obvious isolated imperfections not representative of the product, it shall be discarded and another specimen substituted.

7.2.4 *Deformation Criteria*:

7.2.4.1 Deformations shall be spaced along the wire at a substantially uniform distance and shall be symmetrically dispersed around the perimeter. The deformations on all longitudinal lines of the wire shall be similar in size and shape. A minimum of 25 % of the total surface area shall be deformed by measurable deformations.

7.2.4.2 Deformed wire shall have two or more lines of deformations.

7.2.4.3 The average longitudinal spacing of deformations shall be not less than 3.5 nor more than 5.5 deformations per inch [25 mm] in each line of deformations on the wire.

7.2.4.4 The minimum average height of the center of typical deformations based on the nominal wire diameters shown in Table 3 or Table 4 shall be as follows:

Wire Sizes	Minimum Average Height of Deformations Percent of Nominal Wire Diameter
D3 [MD 20] and smaller	4
Larger than D3 [MD 20] through D10 [MD 65]	4½
Larger than D10 [MD 65]	5

7.2.4.5 The deformations shall be placed with respect to the axis of the wire so that the included angle is not less than 45°; or if deformations are curvilinear, the angle formed by the transverse axis of the deformation and the wire axis shall be not less than 45°. Where the line of deformations forms an included angle with the axis of the wire from 45° to 70° inclusive, the deformations shall alternately reverse in direction on each side, or those on one side shall be reversed in direction from those on the opposite side. Where the included angle is over 70°, a reversal in direction is not required.

7.2.4.6 The average spacing of deformations shall be determined by dividing a measured length (10 in. [250 mm] min) of the wire specimen by the number of individual deformations in any one row of deformations on any side of the wire specimens. A measured length of the wire specimen shall be considered the distance from a point on a deformation to a corresponding point on any other deformation in the same line of deformations on the wire.

TABLE 10 Tension Test Requirements—Deformed Wire (Material for Welded Wire)

	psi [MPa] min
Tensile strength	80 000 [550]
Yield strength	70 000 [485]

TABLE 11 Bend Test Requirements—Deformed Wire

Size Number of Wire	Pin Diameter for Bend Tests[A]
D6 [MD 39] and smaller	2d[B]
Larger than D6 [MD 39]	4d

[A] Bend specimen 90° unless noted otherwise.
[B] d = nominal wire diameter.

7.2.4.7 The minimum average height of deformations shall be determined from measurements made on not less than two typical deformations from each line of deformations on the wire. Measurements shall be made at the center of indentations or raised ribs.

7.2.5 *Tension Test*:

7.2.5.1 When tested as described in Test Methods and Definitions A370, the material, except as specified in 7.2.5.2, shall conform to the tensile property requirements in Table 9, based on the nominal area of wire.

7.2.5.2 When required by the purchaser, the yield strength shall be determined as described in Test Methods and Definitions A370 at an extension of 0.5 % of gage length. For determining the yield strength, use a Class B-l extensometer as described in Practice E83. It shall be permissible to remove the extensometer after the yield strength has been determined. The wire shall meet the requirements of Table 9 or Table 10, whichever is applicable.

7.2.5.3 For material to be used in the manufacture of welded wire reinforcement, the tensile and yield strength properties shall conform to the requirements given in Table 10, based on the nominal area of the wire.

7.2.5.4 The material shall not be required to 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. The purchaser shall have the option to accept this feature as sufficient evidence of compliance with the specified minimum yield strength tests covered in this specification.

7.2.6 *Bend Test*—The bend test specimen shall be bent at room temperature through 90° without cracking on the outside of the bent portion, as prescribed in Table 11.

7.2.7 *Permissible Variation in Weight [Mass]*:

7.2.7.1 The permissible variation in weight [mass] of any deformed wire is ±6 % of its nominal weight [mass]. The theoretical weight [mass] shown in Table 3 or Table 4, or similar calculations on unlisted sizes, shall be used to establish the variation.

7.3 *Number of Tests*—One tension and one bend test shall be made from each 10 tons [9000 kg] or less of each size of wire or fraction thereof in a lot, or a total of seven samples, whichever is less. A lot shall consist of all the coils of a single size offered for delivery at the same time.

7.4 *Quality, Finish, and Appearance*:

7.4.1 The wire shall be free of detrimental imperfections and shall meet the requirements of this specification.

7.4.2 Rust, surface seams, or surface irregularities shall not be a cause for rejection provided the requirements of 7.4.3 are met, and the minimum dimensions and mechanical properties of a hand wire-brushed test specimen meet the requirements of this specification.

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

8. Mechanical Property Requirements—Wire for Welded Wire Reinforcement

8.1 *Tensile Test*:

8.1.1 Wire for the production of welded wire reinforcement, plain and deformed, is described in Section 7. Tensile tests shall be made on wire cut from the welded wire reinforcement and tested either across or between the welds; no less than 50 % shall be across welds. Tensile tests across a weld shall have the welded intersection located approximately at the center of the wire being tested and the transverse wire forming the welded intersection shall extend approximately 1 in. [25 mm] beyond each side of the intersection.

8.1.2 When required by the purchaser, the yield strength shall be determined as described in Test Methods and Definitions A370 at an extension of 0.5 % of gage length. For determining the yield strength use a Class B-l extensometer as described in Practice E83. It shall be permissible to remove the extensometer from the specimen after yield strength has been determined.

8.2 *Bend Test*—The wire shall withstand the bend test as described in 7.1.5 or 7.2.6, whichever is applicable, and shall be performed on a specimen taken from between the welds.

8.3 *Weld Shear Strength*:

8.3.1 The weld shear strength between longitudinal and transverse wires shall be tested as described in Section 9. The minimum average shear value in pounds-force shall not be less than 35 000 multiplied by the nominal area of the larger wire in square inches [in Newtons shall not be less than 241 multiplied by the nominal area of the larger wire in square millimetres], where the smaller wire has an area of 40 % or more of the area of the larger wire. For deformed welded wire reinforcement, the smaller wire shall not be less than D4 [MD 26].

8.3.2 Deformed welded wire reinforcement having a relationship of larger and smaller wires other than that covered in 8.3.1 shall meet an average weld shear strength requirement of not less than 800 lbf [3.6 kN], provided that the smaller wire is not smaller than D4 [MD 26]. Plain welded wire reinforcement having a relationship of larger and smaller wires other than those covered in 8.3.1 shall not be subject to the weld shear requirement.

8.3.3 Weld-shear tests for determination of conformance to the requirements of 8.3 shall be conducted using a weld tester as described in Section 9.

8.3.4 Four welds selected at random from the specimen described in 11.2 shall be tested for weld shear strength. The