



Designation: A910/A910M – 18

Standard Specification for Uncoated, Weldless, 2-Wire and 3-Wire Steel Strand for Prestressed Concrete¹

This standard is issued under the fixed designation A910/A910M; 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 two types and two grades of 2-wire and 3-wire, uncoated steel strand for use in prestressed concrete construction. The two types of strand are low-relaxation and stress-relieved (normal-relaxation). Low-relaxation is to be regarded as the standard type. Stress-relieved (normal-relaxation) strand will not be furnished unless specifically ordered. The two grades are 250 [1725] and 270 [1860]. Grades 250 [1725] and 270 [1860] have minimum tensile strengths of 250 ksi [1725 MPa] and 270 ksi [1860 MPa] respectively, based on the nominal area of the strand.

1.2 This specification is applicable for orders in either inch-pound units (as Specification A910) or in SI units (as Specification A910M).

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

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.

2. Referenced Documents

2.1 *ASTM Standard*:²

A1061/A1061M Test Methods for Testing Multi-Wire Steel Prestressing Strand

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.

2.2 *U.S. Military Standard*:³

MIL-STD-129 Marking for Shipment and Storage

2.3 *Federal Standard*:³

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

3. Terminology

3.1 *Definition of Term Specific to This Specification*:

3.1.1 *strand, n*—either two or three wires helically wound around each other with uniform pitch not less than 12 and not more than 16 times the nominal diameter of the strand.

3.1.1.1 *Discussion*—The direction of lay is either right-handed or left-handed.

4. Ordering Information

4.1 Orders for 2-wire or 3-wire weldless steel strand under this specification shall contain the following information:

4.1.1 Quantity (feet [metres]),

4.1.2 Nominal diameter and description of strand (Table 1),

4.1.3 Number of wires (2 or 3),

4.1.4 Grade of strand,

4.1.5 Type of strand (low-relaxation or stress-relieved (normal relaxation)), and

4.1.6 ASTM designation A910 [A910M] 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 Relaxation evidence from similarly dimensioned strand of the same grade (6.5.1),

4.2.2 Specially-dimensioned strand (7.3),

4.2.3 Requirements for inspection (11.1),

4.2.4 Load-elongation curve (13.2),

4.2.5 Packaging and package marking (Section 14), and

4.2.6 Other special requirements, if any.

5. Materials and Manufacture

5.1 *Base Metal*—The base metal shall be carbon steel of such quality that when drawn to wire, fabricated into strand and then thermally treated, it shall have the properties and characteristics prescribed in this specification.

³ Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.access.gpo.gov>.

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

TABLE 1 Breaking Strength Requirements

Description and Nominal Diameter of Strand				Breaking Strength of Strand		Steel Area of Strand		Weight [Mass] of Strand	
in.		[mm]							
Description	Nominal Diameter	Description	Nominal Diameter	lbf	[kN]	in. ²	[mm ²]	lbs/1000 ft	[kg/1000 m]
GRADE 250 [1725 MPa]									
2 × 0.114	0.228	[2 × 2.90]	[5.8]	5000	[22.2]	0.020	[13.2]	69.9	[104.0]
3 × 0.089	0.189	[3 × 2.25]	[4.8]	4750	[21.1]	0.019	[12.0]	63.3	[94.2]
3 × 0.095	0.205	[3 × 2.40]	[5.2]	5250	[23.4]	0.021	[13.6]	71.9	[107.0]
3 × 0.114	0.244	[3 × 2.90]	[6.2]	7750	[34.5]	0.031	[19.8]	104.0	[155.0]
3 × 0.118	0.256	[3 × 3.00]	[6.5]	8250	[36.7]	0.033	[21.3]	112.0	[167.0]
3 × 0.138	0.295	[3 × 3.50]	[7.5]	11 250	[50.0]	0.045	[29.0]	153.0	[228.0]
3 × 0.158	0.340	[3 × 4.00]	[8.6]	14 500	[64.5]	0.058	[37.4]	200.6	[298.4]
GRADE 270 [1860 MPa]									
2 × 0.114	0.228	[2 × 2.90]	[5.8]	5400	[24.0]	0.020	[13.2]	69.9	[104.0]
3 × 0.089	0.189	[3 × 2.25]	[4.8]	5130	[22.8]	0.019	[12.0]	63.3	[94.2]
3 × 0.095	0.205	[3 × 2.40]	[5.2]	5670	[25.2]	0.021	[13.6]	71.9	[107.0]
3 × 0.114	0.244	[3 × 2.90]	[6.2]	8370	[37.2]	0.031	[19.8]	104.0	[155.0]
3 × 0.118	0.256	[3 × 3.00]	[6.5]	8910	[39.6]	0.033	[21.3]	112.0	[167.0]
3 × 0.138	0.295	[3 × 3.50]	[7.5]	12 150	[54.0]	0.045	[29.0]	153.0	[228.0]
3 × 0.158	0.340	[3 × 4.00]	[8.6]	15 660	[69.7]	0.058	[37.4]	200.6	[298.4]

TABLE 2 Yield Strength Requirements

Description and Nominal Diameter of Strand				Initial Load		Minimum Load at 1 % Extension			
in.		[mm]				Stress-Relieved (Normal-Relaxation)		Low-Relaxation	
Description	Nominal Diameter	Description	Nominal Diameter	lbf	[kN]	lbf	[kN]	lbf	[kN]
GRADE 250 [1725 MPa]									
2 × 0.114	0.228	[2 × 2.90]	[5.8]	500	[2.2]	4250	[18.9]	4500	[20.0]
3 × 0.089	0.189	[3 × 2.25]	[4.8]	475	[2.1]	4038	[18.0]	4275	[19.0]
3 × 0.095	0.205	[3 × 2.40]	[5.2]	525	[2.3]	4463	[20.0]	4725	[21.0]
3 × 0.114	0.244	[3 × 2.90]	[6.2]	775	[3.5]	6588	[29.3]	6975	[31.0]
3 × 0.118	0.256	[3 × 3.00]	[6.5]	825	[3.7]	7013	[32.2]	7425	[33.0]
3 × 0.138	0.295	[3 × 3.50]	[7.5]	1250	[5.0]	9563	[42.5]	10 125	[45.0]
3 × 0.158	0.340	[3 × 4.00]	[8.5]	1450	[6.5]	12 325	[54.8]	13 050	[11.7]
GRADE 270 [1860 MPa]									
2 × 0.114	0.228	[2 × 2.90]	[5.8]	540	[2.4]	4590	[20.4]	4860	[21.6]
3 × 0.089	0.189	[3 × 2.25]	[4.8]	513	[2.3]	4360	[19.4]	4617	[20.5]
3 × 0.095	0.205	[3 × 2.40]	[5.2]	567	[2.5]	4820	[21.4]	5103	[22.7]
3 × 0.114	0.244	[3 × 2.90]	[6.2]	837	[3.7]	7115	[31.6]	7533	[33.5]
3 × 0.118	0.256	[3 × 3.00]	[6.5]	891	[4.0]	7574	[33.7]	8019	[36.0]
3 × 0.138	0.295	[3 × 3.50]	[7.5]	125	[5.4]	10 328	[45.9]	10 125	[45.0]
3 × 0.158	0.340	[3 × 4.00]	[8.6]	566	[7.0]	13 311	[59.2]	14 094	[62.7]

5.2 *Wire*—The wire from which the strand is to be fabricated shall be round and have a dry-drawn finish.

NOTE 1—This product is a composite of two or three wires and is produced only to meet the prescribed mechanical properties, of which the chemical composition of all wires or any individual wire is not pertinent to this application, and heat identity is not necessarily maintained. It is possible that wire from more than one heat may be used in the manufacture of a reel or reelless pack. Traceability is based on the identity of reels or reelless packs as maintained and reported by the manufacturer.

5.3 *Treatment*—After stranding, low-relaxation strand shall be subjected to a continuous thermo-mechanical treatment to produce the prescribed mechanical properties. For stress-relieved (normal-relaxation) strand, only thermal treatment is necessary. Temper colors that result from the stress-relieving operation are considered normal for the finished appearance of this strand.

6. Mechanical Property Requirements

6.1 Tests for mechanical properties shall be conducted in accordance with Test Methods **A1061/A1061M**. Low-

relaxation strand shall also be tested as prescribed in Test Methods **A1061/A1061M**.

6.2 *Breaking Strength*—The breaking strength of the finished strand shall conform to the requirements prescribed in **Table 1**.

6.3 *Yield Strength*—Yield strength in lbs [kN] shall be measured at 1 % extension under load in accordance with the test procedure delineated in Test Methods **A1061/A1061M**, Section 9.1. The minimum yield strength shall be 90 % for low-relaxation strand and 85 % for stress-relieved (normal-relaxation) strand of the breaking strength listed in **Table 1**. Initial loads for the test and minimum yield strengths are listed in **Table 2**.

6.3.1 The extension under load shall be measured by an extensometer calibrated with the smallest division not larger than 0.0001 in./in. [0.0001 mm/mm] of gage length.

6.4 *Elongation*—The total elongation under load shall be determined in accordance with Test Methods **A1061/A1061M**, Section 9.2. The total elongation under load shall not be less