



Designation: A779/A779M – 05

# Standard Specification for Steel Strand, Seven-Wire, Uncoated, Compacted, Stress- Relieved for Prestressed Concrete<sup>1</sup>

This standard is issued under the fixed designation A779/A779M; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

## 1. Scope\*

1.1 This specification describes three grades of compacted, seven-wire, uncoated, stress-relieved strand for use in pre-tensioned and post-tensioned prestressed concrete construction.

1.2 Supplement I describes low-relaxation strand and low-relaxation testing.

1.3 The values stated in either inch-pound or SI units are to be regarded as standard. Within the text, the inch-pound units are shown in parentheses. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other, without combining values in any way.

## 2. Referenced Documents

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

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

E328 Test Methods for Stress Relaxation for Materials and Structures

## 3. Terminology

3.1 *Definitions of Terms Specific to This Standard*:

3.1.1 *compacted strand*—strand that has been compacted by drawing through a die or a similar compacting process and subsequently stress-relieved prior to winding into coils or reelless packs.

3.1.2 *lot*—all of the compacted strand of the same grade and package size produced on the same production equipment and submitted for inspection at the same time.

<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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<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.

3.1.3 *strand*—a group of wires having a center wire enclosed tightly by six helically placed outer wires with a uniform pitch of not less than 14 and not more than 18 times the nominal diameter of the strand.

## 4. Classification

4.1 *Grade 1700 (245)*—Nominal diameter of 18.0 mm (0.7 in.) with tensile failure stress of 1705 MPa (247 ksi) based on nominal area of the strand.

4.2 *Grade 1800 (260)*—Nominal diameter of 15.2 mm (0.6 in.) with tensile failure stress of 1815 MPa (263 ksi) based on nominal area of the strand.

4.3 *Grade 1860 (270)*—Nominal diameter of 12.7 mm (0.5 in.) with tensile failure stress of 1860 MPa (270 ksi) based on nominal area of the strand.

## 5. Ordering Information

5.1 It shall be the responsibility of the purchaser to specify all requirements that are necessary for material ordered to this specification. Such requirements shall include, but are not limited to, the following:

5.1.1 Quantity (meters (feet)),

5.1.2 Grade of strand (Section 4),

5.1.3 Special inspection requirements, if desired (see Section 13),

5.1.4 Packaging,

5.1.5 ASTM designation and date of issue, and

5.1.6 Special requirements, if any.

NOTE 1—A typical ordering description is as follows: 100 000 m Grade 260 compacted low-relaxation strand in approximately 3700 m reelless packs to ASTM A779/A779M (328 000 ft Grade 1800 compacted low-relaxation strand in approximately 12 000 ft-reelless packs to ASTM A779/A779M.)

## 6. Materials and Manufacture

6.1 The steel shall be of such quality that, when processed, the finished wire shall be free of detrimental flaws and undue segregation.

6.2 Wire from which the strand is to be fabricated shall be in the cold-drawn condition and have a common dry-drawn finish.

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

**TABLE 1 Breaking Strength Requirements**

Nominal Diameter of Strand		Specified Minimum Breaking Strength of Strand, kN (lbf)	Nominal Steel Area of Strand		Nominal Mass (Weight) of Strands kg/1000 m (lb/1000 ft)
mm	(in.)		mm <sup>2</sup>	(in.) <sup>2</sup>	
12.7	(0.5)	Grade 1860 (270) 209 (47 000)	112	(0.174)	890 (600)
15.2	(0.6)	Grade 1800 (260) 300 (67 440)	165	(0.256)	1295 (873)
18.0	(0.7)	Grade 1700 (245) 380 (85 430)	223	(0.346)	1750 (1176)

6.3 After stranding and compacting, all strand shall be subjected to a stress-relieving continuous thermal treatment to produce the desired mechanical properties. Temper colors which result from the stress-relieving operation are considered normal for the finished appearance of this strand.

## 7. Chemical Requirements

7.1 The chemical analysis of each heat shall be determined in accordance with Test Methods, Practices, and Definitions **A751**.

7.2 Variations in production processes and equipment necessitates the individual selection of an appropriate chemical composition at the discretion of the producer.

7.3 Phosphorus and sulfur values shall not exceed the following:

- Phosphorus 0.040 % max
- Sulfur 0.050 % max

## 8. Mechanical Requirements

8.1 *Breaking Strength*—The breaking strength of the finished strand shall conform to the values specified in **Table 1** and shall be determined using methods and procedures described in Annex A7 of Test Methods and Definitions **A370**.

8.2 *Load at 1 % Extension*—The minimum load at 1 % extension shall conform to the specified values shown in **Table 2** when tested using methods and procedures described in Annex A7 of Test Methods and Definitions **A370**.

8.3 *Elongation*—The total elongation of the strand under maximum load shall not be less than 3.5 % measured in a gage length of not less than 600 mm (24 in.) when tested using methods and procedures described in Annex A7 of Test Methods and Definitions **A370**.

8.3.1 Strand specimens that break outside of the extensometer or in the testing machine grips and meet the minimum specified value, shall be considered as meeting the elongation requirements of this specification.

8.4 If any strand specimen breaking within the grips of the testing machine results in test values below those specified, those results shall be considered invalid and retesting shall be required.

## 9. Dimensions and Permissible Variations

9.1 The size of the finished strand shall be expressed as the nominal diameter of the strand in fractions or decimal fractions of an inch.

9.2 Prior to compacting, the diameter of the center wire of any strand shall be larger than the diameter of any outer wire by a minimum of 2 %.

**TABLE 2 Yield Strength Requirements**

Nominal Strand Diameter		Initial Load, kN (lbf)	Specified Minimum Load at 1 % Extension, kN (lbf)
mm	(in.)		
12.7	(0.5)	Grade 1860 (270) 20.9 (4700)	182 (40 900)
15.2	(0.6)	Grade 1800 (260) 30.0 (6740)	261 (58 700)
18.0	(0.7)	Grade 1700 (245) 38.0 (8540)	330 (74 300)

9.3 After compacting, the strand shall conform to a size tolerance of plus 0.4 mm (0.016 in.) or minus 0.2 mm (0.008 in.) from the nominal diameter when measured across the crowns of the wire.

## 10. Workmanship

### 10.1 Joints:

10.1.1 There shall be no strand joints or strand splices in any length of the completed strand.

10.1.2 During the process of manufacture of individual wires for stranding, welding shall be permitted only prior to the start of wire drawing.

10.2 The finished compacted strand shall be uniform in diameter and shall be free of imperfections not consistent with good commercial drawing and stranding practice.

10.3 When the strand is cut without seizings, the wires shall not fly out of position. If a wire or wires flies out of position and can be replaced by hand, the strand will be considered satisfactory.

10.4 The strand shall not be oiled or greased. Slight rusting, provided it is not sufficient to cause pits visible to the unaided eye, shall not be cause for rejection.

10.5 Curvature of the finished compact strand shall be not more than 75 mm (3 in.) in a length of 1 m (3 ft) when lying on a flat surface.

## 11. Sampling

11.1 One specimen for test shall be taken from each 18 Mg (20 ton) or fraction thereof from the lot of compacted strand. The test specimen shall be cut from the outside ends of reels or either end of coils or reelless packs.

## 12. Test Methods

12.1 Test specimens obtained in 11.1 shall be tested for dimensions (Section 9), breaking strength (8.1), load at 1 % extension (8.2), elongation (8.3), and workmanship (Section 10).