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Standard Specification for Aluminum-Coated Steel Wire Strand¹

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1. Scope

1.1 This specification covers five grades of aluminum-coated, steel wire strand, composed of a number of round, steel wires, with aluminum coatings, for use as guys, messengers, span wires, and for similar purposes.

1.2 The five grades covered are as follows:

- 1.2.1 Utilities,
- 1.2.2 Common,
- 1.2.3 Siemens-Martin,
- 1.2.4 High-Strength, and
- 1.2.5 Extra High-Strength.

1.3 Minimum breaking strengths of strand for each grade are specified in [Table 1](#).

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *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 Standards:*²

[A428/A428M Test Method for Weight \[Mass\] of Coating on Aluminum-Coated Iron or Steel Articles](#)

3. Description of Strand

3.1 The designation of the finished strand shall be expressed as the nominal diameter of the strand, the number of the wires in the strand, and the grade of the strand as prescribed in [Table 1](#).

¹ This specification is under the jurisdiction of ASTM Committee [A05](#) on Metallic-Coated Iron and Steel Products and is the direct responsibility of Subcommittee [A05.12](#) on Wire Specifications.

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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.

4. Ordering Information

4.1 Orders for material under this specification shall include the following information:

4.1.1 Quantity of strand in feet.

4.1.2 Nominal strand diameter (size), number of wires, grade, and minimum breaking strength of strand ([Section 8](#) and [Table 1](#)).

4.1.3 Length of strand in coils or on reels ([Section 19](#)).

5. Material and Manufacture

5.1 The base metal shall be steel made any commercially accepted steel making process and of such quality and purity that, when drawn to the size of wire specified and coated with aluminum, the finished strand and the individual wires shall be of uniform quality and have the properties and characteristics as prescribed in this specification.

5.2 The ingot or pig aluminum used for coating shall conform to the following impurity limits: copper, maximum, %, 0.10, and iron, maximum, %, 0.50.

6. Stranding

6.1 Unless otherwise specified, 3-wire strand shall have a left lay with a uniform pitch of not less than 10 nor more than 16 times the nominal diameter of the strand. Seven-wire strand shall have a left lay with a uniform pitch of not more than 16 times the nominal diameter of the strand. A left lay is defined as a counter-clockwise twist away from the observer. All wires shall be stranded with uniform tension. Stranding shall be sufficiently close to ensure no appreciable reduction in diameter when stressed to 10 % of the specified strength.

6.2 All wires in the strand shall lie naturally in their true positions in the completed strand, and when the strand is cut, the ends shall remain in position or be readily replaced by hand and then remain in position. This may be accomplished by any means or process, such as preforming, post forming, or form setting.

7. Joints and Splices

7.1 There shall be no strand joints or strand splices in any length of the completed strand unless specifically permitted by the purchaser.

7.2 In 3-wire strand, there shall be no joints in individual wires. In 7-wire strand, joints in individual wires shall be

TABLE 1 Physical Properties of Aluminum-Coated Steel Wire Strand

Nominal Diameter of Strand, in. (mm)	Number of Wires in Strand	Nominal Diameter of Coated Wires in Strand, in. (mm)	Approximate Weight of Strand, lb/1000 ft (kg/m)	Minimum Breaking Strength of Strand, lbf (kN)				
				Utilities Grade ^A	Common Grade	Siemens-Martin Grade	High-Strength Grade	Extra-High-Strength Grade
3/16 (4.76)	7	0.062 (1.57)	73 (0.108)	...	1 150 (5.1)	1 900 (8.5)	2 850 (12.7)	...
3/16 (4.76)	7	0.065 (1.65)	80 (0.118)	2 400 (10.7) (1) ^B	...	...	...	...
1/4 (6.35)	3	0.120 (3.05)	117 (0.173)	3 150 (14.0) (2)	...	...	...	...
1/4 (6.35)	3	0.120 (3.05)	117 (0.173)	4 500 (20.0) (3)	...	...	...	...
1/4 (6.35)	7	0.080 (2.03)	121 (0.179)	...	1 900 (8.5)	3 150 (14.0)	4 750 (21.1)	6 650 (29.6)
9/32 (7.14)	7	0.093 (2.36)	164 (0.243)	4 600 (20.5) (1)	...	...	...	...
5/16 (7.94)	3	0.145 (3.68)	171 (0.253)	6 500 (28.9) (3)	...	...	...	...
5/16 (7.94)	7	0.104 (2.64)	205 (0.303)	...	3 200 (14.2)	5 350 (23.8)	8 000 (35.6)	11 200 (49.8)
5/16 (7.94)	7	0.109 (2.77)	225 (0.333)	6 000 (26.7) (1)	...	...	...	...
3/8 (9.52)	3	0.165 (4.19)	220 (0.326)	8 500 (37.8) (3)	...	...	...	...
3/8 (9.52)	7	0.120 (3.05)	273 (0.404)	11 500 (51.2) (4)	4 250 (18.9)	6 950 (30.9)	10 800 (48.0)	15 400 (68.5)
7/16 (11.11)	7	0.145 (3.68)	399 (0.591)	18 000 (80.1) (4)	5 700 (25.4)	9 350 (41.6)	14 500 (64.5)	20 800 (92.5)
1/2 (12.7)	7	0.165 (4.19)	517 (0.765)	25 000 (111.2) (4)	7 400 (32.9)	12 100 (53.8)	18 800 (83.6)	26 900 (119.7)

^AThe utilities grade is used principally by communication and power and light industries.

^BThe last numbers in parentheses refer to elongation requirements specified in Section 9.

acceptable provided there is not more than one joint in any 150-ft (46-m) section of the completed strand and the location of each wire joint is marked on the strand with paint or some other distinguishing mark.

7.3 Joints in the wires composing the strand shall be of the electric-butt-welded type. Care shall be taken to prevent injury to the wire during electric-butt-welding. All joints shall be well made and shall have protection from corrosion equivalent to that of the aluminum-coated wire itself.

8. Breaking Strength and Weight

8.1 The minimum breaking strength of the finished strand shall be as specified in Table 1 and the approximate weight per 1000 ft or 305 m of strand shall be as indicated in Table 1.

8.2 A test in which the breaking strength is below the minimum specified and which may have been caused by the slipping of the specimen in the jaws of the testing machine, by breaking within the jaws or within 1 in. (25 mm) of the jaws, or by the improper socketing of a specimen shall be disregarded and another sample from the same coil or reel shall be tested. Tests shall be made on lengths of strand that do not contain wire joints or splices.

9. Elongation

9.1 The elongation of the strand in 24 in. (610 mm) shall be not less than that specified in Table 2.

TABLE 2 Elongation Requirements for Grades of Strand

Grade of Strand	Elongation in 24 in. or 610 mm, min, %
Utilities (1) ^A and common strand	10
Utilities (2) ^A and Siemens-Martin	8
Utilities (3) ^A and high-strength	5
Utilities (4) ^A and extra-high-strength	4

^ASee Table 1, Footnote B.

9.2 The elongation shall be determined as the percent increase in separation between the jaws of the testing machine from the position after application of the initial load to the position at the initial failure in the test specimen. The separation of the jaws of the testing machine shall be approximately 2 ft (0.61 m) when under an initial load equal to 10 % of the required minimum breaking strength of the strand. The elongation values shall be recorded only for specimens that break over 1 in. from the jaws of the testing machine. Additional samples shall be taken from the same coil or reel when the previous tests are to be disregarded.

9.3 Elongation tests shall be made on lengths of strand that do not contain wire joints or splices.

10. Dimensions and Permissible Variations of Wires

10.1 The diameter of the aluminum-coated wire forming the strand specified in Table 1 shall be within the limits prescribed in Table 3.

TABLE 3 Permissible Variations in Diameter of Aluminum-Coated Wires^A

Nominal Diameter of Coated Wires in the Strand, in. (mm)	Permissible Variations, plus and minus, in. (mm)
0.061 to 0.090 (1.55 to 2.29)	0.003 (0.08)
0.091 to 0.120 (2.31 to 3.05)	0.004 (0.10)
0.121 and over (3.07 and over)	0.005 (0.13)

^AIt is recognized that the surface of aluminum coatings, particularly those produced by hot dipping, is not perfectly smooth and devoid of irregularities. If the tolerances shown in this table are rigidly applied to such irregularities that are inherent to the product, unjustified rejections of wire that would actually be satisfactory for use could occur. Therefore, it is intended that these tolerances be used in gaging the uniform areas of the aluminum-coated wire.

11. Sampling

11.1 Perform sampling for determination of compliance to this specification on each lot of material. A lot shall consist of