



Designation: B 341/B 341M – 02

## Standard Specification for Aluminum-Coated (Aluminized) Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR/AZ)<sup>1</sup>

This standard is issued under the fixed designation B 341/B 341M; 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 round, aluminum-coated steel core wire used for mechanical reinforcement in the manufacture of aluminum conductors, steel reinforced (ACSR).

1.2 This specification covers wire of diameter from 0.0500 to 0.1900 in. or 1.60 to 4.80 mm, inclusive.

1.3 The values stated in inch-pound units or SI units are to be regarded separately as standard. The values 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 nonconformance with this specification.

### 2. Referenced Documents

2.1 The following documents of the issue in effect on date of material purchase form a part of this specification to the extent referenced herein.

#### 2.2 ASTM Standards:

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products<sup>2</sup>

A 428/A 428M Test Method for Weight [Mass] of Coating on Aluminum-Coated Iron or Steel Articles<sup>3</sup>

A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products<sup>2</sup>

B 193 Test Method for Resistivity of Electrical Conductor Materials<sup>4</sup>

### 3. Terminology

#### 3.1 Definition:

3.1.1 *lot*—unless otherwise specified in the contract or order, a lot shall consist of all coils of wire of the same diameter and unit lengths submitted for inspection at the same time.

<sup>1</sup> This specification is under the jurisdiction of Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.05 on Conductors of Ferrous Metals.

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<sup>2</sup> Annual Book of ASTM Standards, Vol 01.03.

<sup>3</sup> Annual Book of ASTM Standards, Vol 01.06.

<sup>4</sup> Annual Book of ASTM Standards, Vol 02.03.

TABLE 1 Chemical Requirements

Element	Composition, %
Carbon	0.50 to 0.95
Manganese	0.50 to 1.30
Phosphorus, max	0.040
Sulfur, max	0.050
Silicon	0.10 to 0.35

### 4. Ordering Information

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

4.1.1 Quantity of each size,

4.1.2 Wire diameter in inches or millimetres (see 1.2, 13.1),

4.1.3 Certification, if required (Section 19),

4.1.4 Test report, if required (Section 19), and

4.1.5 Package size (Section 20).

### 5. Materials and Manufacture

5.1 The base metal shall be steel produced by the open-hearth, electric-furnace, or basic-oxygen process.

5.2 The wire shall be cold drawn and coated with aluminum to produce the desired properties.

5.3 The ingot or pig aluminum used for coating shall conform to the following impurity limits:

Copper, max, % 0.10

Iron, max, % 0.50

### 6. Chemical Composition

6.1 The steel shall conform to the requirements prescribed in Table 1.

6.2 Chemical analysis shall be conducted in accordance with Test Methods, Practices, and Terminology A 751.

### 7. Tensile Test

7.1 The material, as represented by the test specimens, shall conform to the tensile properties prescribed in Table 2 or Table 3.

7.2 Tensile tests shall be conducted in accordance with Test Methods and Definitions A 370, using the initial settings for determining stress at 1 % extension given in Table 4 or Table 5 of this specification.

**TABLE 2 Tensile Requirements**

Specified Diameter	Stress at 1 % Extension, min	Tensile Strength, min	Elongation, min % in 10 in. or 250 mm
in.	ksi	ksi	
0.0500 to 0.0899, incl	170	185	3.0
0.0900 to 0.1199, incl	160	180	3.5
0.1200 to 0.1384, incl	150	175	4.0
0.1385 to 0.1489, incl	145	170	4.0
0.1490 to 0.1900, incl	135	165	4.0

**TABLE 3 Tensile Requirements**

Specified Diameter, mm	Stress at 1 % Extension, min, mPa	Tensile Strength, min, mPa	Elongation, in 250 mm, min, %
1.60 to 2.30, incl	1170	1280	3.0
Over 2.30 to 3.05, incl	1100	1240	3.5
Over 3.05 to 3.50, incl	1030	1210	4.0
Over 3.50 to 3.80, incl	1000	1170	4.0
Over 3.80 to 4.80, incl	930	1140	4.0

**TABLE 4 Initial Settings for Determining Stress at 1 % Extension**

Specified Diameter, in.	Initial Stress, Ksi	Initial Setting of Extensometer, in./in.
0.0500 to 0.0899, incl	14	0.0005 (0.05 % extension)
0.0900 to 0.1199, incl	28	0.0010 (0.10 % extension)
0.1200 to 0.1900, incl	42	0.0015 (0.15 % extension)

**TABLE 5 Initial Settings for Determining Stress at 1 % Extension**

Specified Diameter, mm	Initial Stress, MPa	Initial Setting of Extensometer, mm/mm
1.60 to 2.30, incl	100	0.0005 (0.05 % extension)
Over 2.30 to 3.05, incl	190	0.0010 (0.10 % extension)
Over 3.05 to 4.80, incl	290	0.0015 (0.15 % extension)

7.3 *Test Specimens*— The test specimens shall be free of bends or kinks other than the curvature resulting from the usual coiling operations. Any hand straightening necessary to permit insertion of the specimen in the jaws of the testing machine shall be performed by drawing between wood blocks or by some other equally satisfactory means.

## 8. Wrap Test

8.1 The material, as represented by the test specimens, shall not fracture when the aluminized wire is wrapped at a rate not exceeding 15 turns/min in a close helix of at least eight turns around a cylindrical mandrel with a diameter equal to two times the specified diameter of the wire under test,  $\pm 5\%$ .

## 9. Coating Test

9.1 The material, as represented by the test specimens, shall conform to the coating requirements of **Table 6** or **Table 7**, for the diameter specified.

9.2 The coating test shall be conducted in accordance with Test Method **A 428/A 428M**.

## 10. Adherence of Coating Test

10.1 The material, as represented by the samples, shall be capable of being wrapped in a close helix at a rate not

exceeding 15 turns/min around a cylindrical mandrel having a diameter as prescribed in **Table 8** or **Table 9**, without cracking or flaking the aluminum coating to such an extent that any aluminum can be removed by rubbing with the bare fingers.

NOTE 1—Loosening or detachment during the adhesion test of superficial, small particles of aluminum formed by mechanical polishing of the surface of aluminum-coated wire shall not be considered cause for rejection.

## 11. Joints

11.1 No joints shall be made in the finished wire.

11.2 Joints may be made at any stage of processing prior to final cold drawing by the electric butt-weld or flash-welding process.

11.3 Welding equipment and procedure shall be such that it can be demonstrated that the tensile strength of a finished wire specimen containing the welded section shall not be less than 96 % of the specified minimum stress at 1 % extension.

11.4 A welded section shall not be required to meet the stress at 1 % extension, elongation, and wrap tests.

## 12. Density and Resistivity

12.1 For the purposes of calculating mass per unit length, cross-sections, etc., the density of aluminized steel wire shall be taken as 0.281 lb/in.<sup>3</sup> (7780 kg/m<sup>3</sup>).