~~Designation:B502–02 (Reapproved 2007)~~ Designation: B502 – 10

Standard Specification for ~~Aluminum-Clad Steel Core Wire for Aluminum Conductors, Aluminum-Clad Steel Reinforced~~Aluminum-Clad Steel Core Wire for Use in Overhead Electrical Aluminum Conductors[1]

This standard is issued under the fixed designation B502; 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-clad steel core wire ~~used for mechanical reinforcement in the manufacture of aluminum conductors, aluminum-clad steel reinforced.~~with two designations of tensile strengths, AW2 (Normal Strength) and AW3 (High Strength).

1.2 The values stated in ~~inch-pound~~ either SI units or ~~SI~~inch-pound units are to be regarded separately as ~~the~~ standard. ~~Each~~ The values stated in each system may not be 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. For~~standard.

1.2.1 For conductor sizes designated by AWG, the requirements in SI units have been numerically converted from corresponding values stated or derived in inch-pound units. For conductor sizes designated by SI units only, the requirements are stated or derived in SI units.

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:*[2]

B193 Test Method for Resistivity of Electrical Conductor Materials

E8 Test Methods for Tension Testing of Metallic Materials

3. Ordering Information

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

3.1.1 Quantity of each size,

3.1.2 Wire size: diameter in inches (see 6.1~~)~~

~~3.1.3Package size: (see),~~

3.1.3 Core Wire Strength, AW2 (Normal Strength) or AW3 (High Strength) (see Table 1 and Table 2),

3.1.4 Package size: (see 17.1),

3.1.~~4~~5 Special packaging and package marking if required (see 16.1), and

3.1.~~5~~6 Place of inspection if other than place of manufacture (see 14.1).

4. Materials and Manufacture

4.1 The base metal shall be steel produced by the open-hearth, electric-furnace, or basic-oxygen process and shall be of such composition that the finished clad wire shall have the properties and characteristics prescribed in this specification.

4.2 The aluminum used for cladding shall have a purity and quantity sufficient to meet thickness and resistance requirements of this specification (see 7.1 and 9.1).

5. Tensile Properties

5.1 *Requirements*—The aluminum-clad steel core wire shall conform to the tensile requirements prescribed in Table 1 ~~. In~~

[1] This specification is under the jurisdiction of ASTM Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.06 on Composite Conductors.

~~Current edition approved Oct. 1, 2007. Published October 2007. Originally approved in 1970. Last previous edition approved in 2002 as B502–02. DOI: 10.1520/B0502-02R07.~~

Current edition approved April 1, 2010. Published May 2010. Originally approved in 1970. Last previous edition approved in 2007 as B502 – 02 (2007). DOI: 10.1520/B0502-10.

[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.

TABLE 1 Tensile Requirements for Normal Strength (AW2) For ACSR/AW2, ACSR/TW/AW2 and ACSS/AW2, ACSR/TW/AW2 Type Conductors

Nominal Diameter, in. (mm)	Stress at 1.0 % Extension min, psi (MPa)	Ultimate Tensile Strength, min, psi (MPa)	Elongation, min, %, 10 in. (250 mm)
0.0770 to 0.1289 (1.956 to 3.274), incl	175 000 (1206)	195 000 (1344)	1.5
0.1290 to 0.1369 (3.275 to 3.477), incl	170 000 (1172)	190 000 (1310)	1.5
0.1370 to 0.1443 (3.478 to 3.665), incl	165 000 (1137)	185 000 (1275)	1.5
0.1444 to 0.1549 (3.666 to 3.934), incl	160 000 (1103)	180 000 (1241)	1.5
0.1550 to 0.1620 (3.935 to 4.115), incl	160 000 (1103)	175 000 (1206)	1.5
0.1621 to 0.1729 (4.116 to 4.392), incl	155 000 (1068)	170 000 (1172)	1.5
0.1730 to 0.1819 (4.393 to 4.620), incl	150 000 (1034)	165 000 (1137)	1.5
0.1820 to 0.1880 (4.621 to 4.775), incl	145 000 (1000)	160 000 (1103)	1.5

TABLE 2 Tensile Requirements for High Strength (AW3) For ACSS/AW3 and ACSS/TW/AW3 Type conductors

Nominal Diameter, in. (mm)	Stress at 1.0 % Extension min, psi (MPa)	Ultimate Tensile Strength, min, psi (MPa)	Elongation, min, %, 10 in. (250 mm)
0.0770 to 0.0899 (1.956 to 2.283), incl	190 000 (1310)	210 000 (1450)	1.5
0.0900 to 0.1199 (2.284 to 3.045), incl	185 000 (1280)	205 000 (1410)	1.5
0.1200 to 0.1399 (3.046 to 3.553), incl	180 000 (1240)	200 000 (1380)	1.5
0.1400 to 0.1880 (3.554 to 4.775), incl	170 000 (1170)	195 000 (1340)	1.5

~~computing stress at 1% extension and ultimate tensile strength, the actual diameter of the finished wire shall be used.~~ and Table 2. Purchasers of core intended for use in conductor constructions with annealed aluminum wires, such as ACSS/AW3, ACSS/TW/AW3 may request the stranded steel core be compliant only with ultimate tensile strength and may waive compliance with the 1 % extension tensile requirement. This use of the ultimate tensile requirement as an alternate to the 1 % extension requirement shall be by agreement between the purchaser and producer and shall be noted on product compliance documentation. In computing stress at 1 % extension and ultimate tensile strength, the actual diameter of the finished wire shall be used.

5.2 *Elongation Test*—The elongation shall be determined by an extensometer suitable for measuring elongation in 10.0 in. (250 mm) and equipped with a vernier or other instrument reading to 0.001 in. (0.025 mm). It shall be attached to the test specimen at a load equal to the initial tensile stress shown in ~~Table 2~~Table 3 and Table 4. At this load the extensometer shall be adjusted to the initial setting shown in ~~Table 2~~Table 3 and Table 4. Upon application of further load, the tension shall be read at an extensometer reading of 1.0 % to determine conformance with the requirement in Table 1 and Table 2. Further elongation shall be observed while applying a tension load to the specimen. The elongation thus determined shall be not less than 1.5 % in 10.0 in. (250 mm). A test in which the extensometer reading is less than 1.5 % shall be disregarded if the fracture occurs less than 1.0 in. (25 mm) from either attachment. In this case, another specimen from the same reel or coil shall be tested.

5.3 The tension tests shall be made in accordance with Test Methods E8. The method for determining elongation is described in the Procedures Section of Test Methods E8.

TABLE ~~2~~ 3 Initial Settings for Determining at 1 % Extension for Normal Strength (AW2)

Nominal Diameter, in. (mm)	Initial Stress, psi (MPa)	Initial Setting of Extensometer, % in./in. (cm/cm)
0.0770 to 0.0999 (1.956 to 2.537), incl	11 800 (81)	0.0005 (0.05 % extension)
0.1000 to 0.1299 (2.538 to 3.299), incl	23 500 (162)	0.0010 (0.10 % extension)
0.1300 to 0.1880 (3.300 to 4.775), incl	35 300 (243)	0.0015 (0.15 % extension)