



Standard Specification for Concentric-Lay-Stranded Copper-Clad Steel Conductors¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers bare concentric-lay-stranded conductors made from bare round copper-clad steel wires for general use for electrical purposes.

1.2 For the purpose of this specification, conductors are classified as follows: Grade 40 HS, Grade 30 HS, and Grade 30 EHS.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are in SI units.

2. Referenced Documents

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

2.2 *ASTM Standards:*

B 227 Specification for Hard-Drawn Copper-Clad Steel Wire²

B 354 Terminology Relating to Uninsulated Metallic Electrical Conductors²

2.3 *ANSI Standards:*

C 42 Definitions of Electrical Terms³

2.4 *National Institute of Standards and Technology:*

NBS *Handbook 100—Copper Wire Tables*⁴

3. Ordering Information

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

3.1.1 Quantity of each size and grade,

3.1.2 Conductor size: approximate diameter in fractions of an inch, or number and AWG size of individual wires (Section 7 and Table 1),

3.1.3 Grade (see 1.2 and Table 1),

3.1.4 Direction of lay of outer layer, if other than left-hand (see 6.3),

3.1.5 When physical tests shall be made (see 8.2),

3.1.6 Package size (see 13.1),

3.1.7 Special package marking, if required (Section 12),

3.1.8 Lagging, if required (see 13.2), and

3.1.9 Place of inspection (Section 14).

3.2 In addition, Supplementary Requirements shall apply only when specified by the purchaser in the inquiry, contract, or purchase order for direct procurement by agencies of the U. S. Government (S1, S2, and S3).

4. Material for Wires

4.1 The purchaser shall specify the grade of wire to be used in the conductor.

4.2 Before stranding, the copper-clad steel wire shall meet all the requirements of Specification B 227.

4.3 All wires in the conductor shall be of the same grade and quality.

5. Joints

5.1 Joints or splices may be made in the finished individual copper-clad steel wires composing concentric-lay-stranded conductors, using more than three wires provided that such joints or splices have a protection equivalent to that of the wire itself and that they do not decrease the strength of the finished stranded conductor below the minimum breaking strength shown in Table 1. Such joints or splices shall be not closer than 50 ft (15 m) to any other joint in the same layer in the conductor (Note 1).

NOTE 1—Joints or splices in individual copper-clad steel wires in their finished size are made by electrical butt welding. Two types of joints are used and are described as follows:

(a) *Weld-Annealed Joints*—After butt welding, the wire is annealed for a distance of approximately 5 in. (127 mm) on each side of the weld. The weld is then protected from corrosion with a snug fitting seamless copper sleeve which extends at least $\frac{3}{8}$ in. (9.5 mm) on each side of the weld and which is thoroughly sealed to the wire with solder. The wall thickness of the sleeve is at least 10 % of the radius of the wire.

This joint has a tensile strength of approximately 60 000 psi (415 MPa). This is less than the strength of the individual wires, but an allowance is made for this in the rated strength of the conductor as a whole. The completed conductor when containing such joints is required to have the full rated strength.

This type of joint is but slightly larger than the wire itself and is applicable for 7, 12, and 19-wire stranded conductors.

(b) *Compression-Weld Joints*—Compression-weld joints differ from weld-annealed joints in that the wire is not annealed after the butt-welding operation but is reinforced with a hard-drawn, seamless, silicon-tin bronze

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

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² *Annual Book of ASTM Standards*, Vol 02.03.

³ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁴ Available from National Institute of Standards and Technology, (NIST), Gaithersburg, MD 20899.