



Standard Specification for Soft or Annealed Copper Wire¹

This standard is issued under the fixed designation B 3 ; 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.

This standard has been approved for use by agencies of the Department of Defense. Consult the DoD Index of Specifications and Standards for the specific year of issue which has been adopted by the Department of Defense.

1. Scope

1.1 This specification covers drawn and annealed or soft round bare copper wire for electrical purposes (Explanatory Note 1).

1.2 The SI values for density and resistivity are to be regarded as the standard. For all other properties the inch-pound values are to be regarded as the standard and the SI units may be approximate.

1.3 The hazard statement applies only to Section 6, Test Methods, of this specification. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 The following documents of the issue in effect at the time of reference form a part of this specification to the extent referenced herein:

2.2 ASTM Standards:

B 49 Specification for Copper Redraw Rod for Electrical Purposes²

B 193 Test Method for Resistivity of Electrical Conductor Materials³

B 258 Specification for Standard Nominal Diameters and Cross-Sectional Areas of AWG Sizes of Solid Round Wires Used as Electrical Conductors³

2.3 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,

3.1.2 Wire size: diameter in inches (see 5.4 and Table 1),

3.1.3 Type of copper, if special (Section 4),

3.1.4 Package size (see 10.1),

3.1.5 Special package marking, if required, and

3.1.6 Place of inspection (see 9.1).

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. Materials and Manufacture

4.1 The material shall be copper of such quality and purity that the finished product shall have the properties and characteristics prescribed in this specification.

NOTE 1—The following standards define the materials suitable for use: Specification B 49.

4.2 Copper bars of special qualities, forms, or types, as may be agreed upon between the manufacturer and the purchaser, and which will conform to the requirements prescribed in this specification may also be used.

5. General Requirements (see Section 7)

5.1 *Tensile Strength and Elongation*—The wire shall conform to the requirements for elongation prescribed in Table 1 (Explanatory Note 2). No requirements for tensile strength are specified. For wire whose nominal diameter is more than 0.001 in. (1 mil) (0.025 mm) greater than a size listed in Table 1, but less than that of the next larger size, the requirements of the next larger size shall apply.

5.2 *Joints*—Necessary joints in the completed wire and in the wire and rods prior to final drawing shall be made in accordance with the best commercial practice.

5.3 *Resistivity*—The electrical resistivity 20°C shall not exceed 875.20 Ω·lb/mile².

5.4 *Dimensions and Permissible Variations*—The wire sizes shall be expressed as the diameter of the wire in decimal fractions of an inch to the nearest 0.1 mil (0.0001 in.) (0.0025 mm) (Explanatory Note 3). For diameters under 0.0100 in. (0.2540 mm), the wire shall not vary from the specified diameter by more than plus and minus 0.1 mil (0.0001 in.), and for diameters of 0.0100 in. and over the wire shall not vary from the specified diameter by more than plus and minus 1 %, expressed to the nearest 0.1 mil (0.0001 in.).

5.5 *Finish*—The wire shall be free of all imperfections not consistent with the best commercial practice.

¹ This specification is under the jurisdiction of ASTM Committee B-1 on Wires for Electrical Conductors and is the direct responsibility of Subcommittee B01.04 on Conductors of Copper and Copper Alloys.

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² *Annual Book of ASTM Standards*, Vol 02.01.

³ *Annual Book of ASTM Standards*, Vol 02.03.

⁴ Available from the National Technical Information Service, 5285 Port Royal Rd, Springfield, VA 22161.