



Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes¹

This standard is issued under the fixed designation B33; 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 U.S. Department of Defense.

1. Scope

1.1 This specification covers tin-coated, round, soft, or annealed copper wire for electrical purposes.

1.2 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.

1.2.1 *Exceptions*—The SI values for density, resistivity, and volume are to be regarded as standard.

1.3 *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 *ASTM Standards:*²

B49 Specification for Copper Rod Drawing Stock for Electrical Purposes

B193 Test Method for Resistivity of Electrical Conductor Materials

B258 Specification for Nominal Diameters and Cross-Sectional Areas of AWG Sizes of Solid Round Wires Used as Electrical Conductors

2.2 *Other Document:*³

NBS Handbook 100 Copper Wire Tables

3. Ordering Information

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

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

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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.

³ Available from National Technical Information Service (NTIS), 5301 Shawnee Rd., Alexandria, VA 22312, <http://www.ntis.gov>.

3.1.1 Quantity of each size,

3.1.2 Wire size-diameter in inches (see **5.3** and **Table 1**),

3.1.3 Type of copper, if special (see **4.2**),

3.1.4 Package size (see **10.1**),

3.1.5 Special packaging marking, if required, and

3.1.6 Place of inspection (see **7.1**).

4. Material

4.1 *Tin for Coating*—The tin used for coating shall be commercially pure (Explanatory **Note 1**). For purposes of this specification, the tin shall be considered commercially pure if the total of other elements, exclusive of copper, does not exceed 1 %. Notwithstanding the previous sentence, chemical analysis of the tin coating or of the tin used for coating shall not be required under this specification. Adequacy of the tin coating is assured by the continuity of coating and adherence of coating requirements (see **5.4** and **5.5**, respectively).

4.2 *Copper-Base Metal*—The base metal shall be copper of such quality and purity that the finished product shall have properties and characteristics prescribed in this specification.

NOTE 1—Specification **B49** defines copper suitable for use.

4.3 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 8)

5.1 *Tensile Strength and Elongation* (Explanatory **Note 2** and **Note 3**)—The tinned wire shall conform to the requirements for elongation prescribed in **Table 1**. No requirements for tensile strength are specified. For wire whose nominal diameter is more than 0.001 in. (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 *Resistivity* (Explanatory **Note 1** and **Note 4**)—The electrical resistivity of tinned wire at a temperature of 20°C shall not exceed the values prescribed in **Table 2**.

5.3 *Dimensions and Permissible Variations* (Explanatory **Note 2**)—The wire sizes shall be expressed as the diameter of the wire in decimal fractions of an inch to the nearest 0.0001 in.