



Designation: B1001 – 23

Standard Specification for Copper Electrode Wire Used for Welding Seams of Steel Cans¹

This standard is issued under the fixed designation B1001; 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 the requirements for drawn, soft annealed round copper electrode wire used in welding machines for the purpose of seam welding of cans.

1.2 *Units*—The values stated in SI units are to be regarded as standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not considered 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

- B49 Specification for Copper Rod for Electrical Purposes
- B193 Test Method for Resistivity of Electrical Conductor Materials
- B250/B250M Specification for General Requirements for Wrought Copper Alloy Wire
- B258 Specification for Standard Nominal Diameters and Cross-Sectional Areas of AWG Sizes of Solid Round Wires Used as Electrical Conductors
- E8/E8M Test Methods for Tension Testing of Metallic Materials

¹ This specification is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.02 on Rod, Bar, Wire, Shapes and Forgings.

Current edition approved Oct. 1, 2023. Published October 2023. Originally approved in 2017. Last previous edition approved in 2017 as B1001 – 17. DOI: 10.1520/B1001-23.

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.

F16 Test Methods for Measuring Diameter or Thickness of Wire and Ribbon for Electronic Devices and Lamps

2.2 *NIST Document:*³

NBS Handbook 100 Copper Wire Tables

3. General Requirements

3.1 The following sections of Specification B250/B250M, as applicable, constitute a part of this specification:

- 3.1.1 Terminology,
- 3.1.2 Materials and Manufacture,
- 3.1.3 Workmanship, Finish, and Appearance,
- 3.1.4 Sampling,
- 3.1.5 Number of Tests and Retests,
- 3.1.6 Test Methods,
- 3.1.7 Significance of Numerical Limits,
- 3.1.8 Inspection,
- 3.1.9 Rejection and Rehearing,
- 3.1.10 Certification,
- 3.1.11 Test Report, and
- 3.1.12 Packaging and Package Marking.

4. Ordering Information

4.1 Include the following specified choices when placing orders for product under this specification, as applicable:

- 4.1.1 ASTM designation and year of issue,
- 4.1.2 Copper [Alloy] UNS No. designation (see Table 1),
- 4.1.3 Temper (Temper Section 7),
- 4.1.4 Form (wire) and size (diameter) (Dimensions and Permissible Variations Section 10),
- 4.1.5 How furnished: coiled,
- 4.1.6 Quantity; weight for each size and form,
- 4.1.7 Intended application, and
- 4.1.8 Package type (stem, reel, or drum).

4.1.9 The following options are available but may not be included unless specified at the time of placing the order, when required:

- 4.1.9.1 Heat identification or traceability details,
- 4.1.9.2 Electromagnetic (eddy current) examination,
- 4.1.9.3 Certification, and

³ Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.

*A Summary of Changes section appears at the end of this standard

TABLE 1 Chemical Composition

UNS Number Copper Type	C11000 ^A ETP	C11020 ^A FRHC
Copper incl silver, min	99.90 %	99.90 %
Oxygen	<650 ppm	<650 ppm

^A See Specification B49.

4.1.9.4 Mill Test Report.

5. Materials and Manufacture

5.1 Materials:

5.1.1 The material of manufacture shall be drawn wire of the designated copper UNS number of such purity to be suitable for use prescribed herein.

5.2 Manufacture:

5.2.1 The product shall be manufactured by hot-working, cold-working, and annealing processes to produce a uniform structure in the finished product.

5.2.2 The product shall be hot- or cold-worked to the finished size and subsequently annealed to meet the temper properties specified.

6. Chemical Composition

6.1 The material shall conform to the chemical composition requirements in Table 1 for the copper UNS number designation specified in ordering information.

6.2 These composition limits do not preclude the presence of other elements. By agreement between the manufacturer and purchaser, limits may be established and analysis required for specific elements.

7. Temper

7.1 The standard temper for the product described in this specification include:

7.1.1 O60 Soft Annealed.

8. Physical Properties

8.1 Electrical resistivity in annealed condition at 20 °C: 0.15328 Ω·g/m² Maximum (100.00 % IACS Minimum). (See NBS Handbook 100.)

9. Mechanical Properties

9.1 Product furnished to this specification shall conform to the tensile requirements prescribed in Table 2.

9.1.1 Tensile requirements for product diameters not covered in Table 2 shall be agreed upon by the manufacturer and the supplier.

9.2 Acceptance or rejection based upon mechanical properties shall depend upon tensile strength and elongation.

9.2.1 Tensile tests performed on samples containing a rod joint (weld) shall provide a tensile strength of at least 95 % of the minimum requirement provided in 9.2.

10. Dimensions, Mass, and Permissible Variations

10.1 Electrode wire diameter sizes shall be expressed as the nominal diameter of the wire in decimal fractions of a millimeter to the nearest 0.001 mm.

NOTE 1—This specification considers the normal range of nominal electrode wire diameters to range from 1.200 mm to 2.500 mm (0.047 in. to 0.098 in.). Dimensional requirements outside of this range shall be addressed in the purchase order or contract.

10.2 The diameter (individual measurements and the mean) of the wire shall not vary more than plus 1 % or minus 1 % from the stated nominal value of the electrode wire.

11. Workmanship, Finish, and Appearance

11.1 The surface of electrode wire shall be free of oxides visible to the eye.

11.2 The surface of electrode wire shall be free of flaws that may interfere with the welding process.

11.3 The surface of electrode wire shall be free of oils and other contaminants that may interfere with welding.

11.4 Electrode wire shall be free of flaws that may interfere with the feeding process: must be coiled in a continuous length and free of tangles.

11.5 The beginning of the container shall contain a free length of wire, of about 10 ft, required for welding to another container. The end of the wire shall be visibly attached to the top of the container so it can be easily identified by the user.

12. Sampling

12.1 For routine sampling of electrode wire for conformance, the method of sampling shall be in accordance with 13.1 unless otherwise agreed upon by the purchaser and the supplier.

12.2 *Electrode Wire Lot*—A container, or group of containers, of electrode wire with homogenous test results in a quantity of 4536 kg (10 000 lb) or less.

12.3 In case of dispute concerning chemical composition, electrical resistivity, mechanical properties, or size, the method of sampling shall be in accordance with Section 14 with a sample from each container under dispute. If the test sample passes the appropriate test(s), the product in the specific

TABLE 2 Tensile Requirements

Copper Types UNS C11000 ETP or C11020 FRHC				
Diameter ^A	Temper Designation	Tensile Strength		Elongation in 254 mm (10 in.)
		MPa	ksi ^B	%
1.20 mm–2.50 mm (0.047 in.–0.098 in.)	O60 Soft	220–285	31.9–41.3	22–28

^A See Specification B258.

^B ksi=1000 psi.