



Designation: B 101 – 96

Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction¹

This standard is issued under the fixed designation B 101; 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.

1. Scope

1.1 This specification establishes the requirements for lead-coated rolled copper sheet and strip in flat lengths (or in coils) in ounce-weight thicknesses for roofing, flashing, gutters, downspouts, and for the general sheet metalwork in building construction. The lead coating is applied by hot dipping.

1.2 Materials made to this specification are not intended for electrical applications.

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

NOTE 1—A companion specification for copper sheet and strip for building construction is Specification B 370.

1.4 The following hazard caveat pertains to the test method portion, Section 15, 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 on the date of material purchase form a part of this specification to the extent referenced herein.

2.2 ASTM Standards:

B 248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip and Rolled Bar²

B 370 Specification for Copper Sheet and Strip for Building Construction²

B 601 Practice for Temper Designations for Copper and Copper Alloys—Wrought and Cast²

E 37 Test Methods for Chemical Analysis of Pig Lead³

¹ This specification is under the jurisdiction of Committee B-5 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.01 on Plate, Sheet, and Strip.

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² Annual Book of ASTM Standards, Vol 02.01.

³ Annual Book of ASTM Standards, Vol 03.05.

E 46 Test Methods for Chemical Analysis of Lead- and Tin-Base Solders³

E 478 Test Methods for Chemical Analysis of Copper Alloys³

3. Terminology

3.1 Definitions:

3.1.1 *coil*—a length of the product wound into a series of connected turns.

3.1.1.1 *Discussion*—The unqualified term “coil” as applied to “flat product” usually refers to a coil in which the product is spirally wound, with the successive layers on top of one another. (Sometimes called a “roll”.)

3.1.2 *lead-coated copper sheet (for building construction)*—a rolled flat product over 24 in. (610 mm) in width and of ounce-weight thickness from 8 (226.7) to 48 oz (1361 g), furnished in flat lengths of not over 10 ft (3.1 m).

3.1.3 *lead-coated strip (for building construction)*—a rolled flat product up to and including 24 in. (610 mm) in width and of ounce-weight thickness from 8 oz (227 g) to 48 oz (1361 g).

3.1.3.1 *Discussion*—Strip shall be furnished in flat lengths of not over 10 ft (3.1 m) or in rolls of one single continuous length of not less than 25 ft (7.6 m) wound into a cylindrical spiral.

3.1.4 *lengths*—straight pieces of the product.

3.1.4.1 *ends*—straight pieces, shorter than the nominal length, left over after cutting the product into mill lengths, stock lengths or specific lengths. They are subject to minimum length and maximum weight requirements.

3.1.4.2 *lengths, mill*—straight lengths, including ends, that are conveniently manufactured in the mills.

3.1.4.3 *Discussion*—Full length pieces are usually 8, 10, or 12 ft (2.44, 3.05, or 3.66 m) and subject to established length tolerances.

3.1.4.4 *lengths, specific*—straight lengths that are uniform in length, as specified, and subject to established length tolerances.

3.1.4.5 *lengths, stock*—straight lengths that are mill cut and stored in advance of orders.

3.1.4.6 *Discussion*—They are usually 8, 10, or 12 ft (2.44, 3.05 or 3.66 m) and subject to established length tolerances.

3.1.5 *ounce-weight*—the weight of uncoated copper sheet or

strip expressed in ounces per square foot.

3.1.6 *ounce-weight thickness*—the metal thickness that corresponds to the ounce weight.

4. Ordering Information

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

- 4.1.1 Temper (Section 7 and Table 1),
- 4.1.2 How furnished: flat lengths or in coils (see 3.1.5 and 3.1.6),
- 4.1.3 Quantity: total weight or number of sheets of each size,
- 4.1.4 Ounce-weight or ounce-weight thickness of the uncoated copper sheet or strip (Table 2),
- 4.1.5 Dimensions: width and length (Section 9),
- 4.1.6 Certification, where required (Section 19),
- 4.1.7 Mill test report, where required (Section 20), and
- 4.1.8 ASTM designation and date of issue.

4.2 If the material being purchased is intended for use by agencies of the U.S. Government refer to 5.3.

5. Materials and Manufacture

5.1 Materials:

5.1.1 The lead coating shall conform to the chemical requirements of Table 3.

5.1.2 The copper sheet or strip to be lead coated shall be manufactured by any process that provides a finished product that conforms to the requirements of Specification B 370.

5.2 Manufacture:

5.2.1 The lead coating shall be applied to the copper sheet or strip by hot dipping in a bath of molten lead.

5.2.2 Unless otherwise specified, the lead coating shall be applied to the copper sheet or strip after slitting and cutting to the specified length. The coating shall be commercially acceptable in terms of thickness uniformity, freedom from pinholes, voids or unwetted areas.

5.2.3 The weight of the lead coating shall conform to the requirements of Table 2 except as may be specified in 5.2.4.

5.2.4 Other variations in coating or texture shall be furnished by agreement in writing between the purchaser and the manufacturer or supplier.

5.3 Materials purchased for agencies of the U.S. Government shall conform to the Supplementary Requirements of Specification B 248.

6. Chemical Composition

6.1 The copper sheet or strip shall have a minimum copper (including silver) content of 99.9 %.

TABLE 2 Weight of Lead Coating, lb (kg)^A

Min	Max
12 (5.4)	15 (6.8)

^A The weight of coating specified is the total weight of lead applied to two sides of 100 ft² (9.3 m²) of copper sheet, approximately one half of the coating to be on each side of the sheet.

TABLE 3 Chemical Requirements for Lead Used to Coat Copper Sheet

Element	Composition, max, %
Silver	0.020
Copper	0.08
Arsenic plus antimony	0.005 ^A
Zinc	0.002 ^A
Iron	0.002
Bismuth	0.050
Lead	remainder
Tin	4.0
Phosphorus	0.03

^A Provision for 4 % of tin makes necessary provision for possible higher amounts of these elements than generally required for pig lead.

6.1.1 Any copper that complies with 6.1 shall be acceptable.

6.2 If limits for unnamed elements are required, they shall be established and analysis required by agreement between manufacturer or supplier and purchaser.

6.3 The lead coating shall conform to the chemical requirements of Table 3.

6.4 Uncoated copper sheet and strip covered by this specification is commercially available in the following tempers as defined by Practice B 601; O60 (soft annealed), H01 (quarter hard, cold-rolled high yield), H00 (eighth hard, cold-rolled) and O60 (soft annealed) (see Table 1).

7. Physical Properties

7.1 Although no minimum grain size is specified for soft-temper material, it shall be fully recrystallized.

8. Mechanical Properties

8.1 The materials shall conform to the requirements specified in Table 1 for the tempers listed.

8.2 *Tensile Strength*—The tension test shall be the standard test for all tempers, and acceptance or rejection shall depend on the tensile requirements specified in Table 1. Tension test specimens shall be taken so that the longitudinal axis of such specimens is parallel to the direction of rolling.

8.3 *Rockwell Hardness*—Since Rockwell hardness tests offer a quick and convenient method of checking the conformity of the material to the requirements for tensile strength, approximate Rockwell hardness values are given in Table 1 for general information and assistance in testing, but the values shall not

TABLE 1 Mechanical Properties

Temper Designation		Tensile Strength, ksi ^A (MPa)		Yield Strength, at 0.5 % Extension Under Load, min, ksi (MPa)	Approximate Rockwell Hardness ^B (for information only)			
Standard	Former	Min	Max		F Scale		Superficial 30 T	
					Min	Max	Min	Max
O60	soft	30 (210)	38 (265)	65	...	31
H00	cold-rolled	32 (225)	40 (280)	20 (140)	54	82	15	49
H01	cold-rolled (high yield)	34 (240)	42 (295)	28 (195)	60	84	18	51

^A ksi = 100 psi.

^B Rockwell hardness values apply as follows: The F scale applies to metal 0.020 in. (0.508 mm) and over in thickness; the superficial 30T scale applies to metal 0.012 in. (0.305 mm) to 0.020 in. (0.508 mm) in thickness.