



Designation: B101 – 12

# Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction<sup>1</sup>

This standard is issued under the fixed designation B101; 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 ( $\epsilon$ ) 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 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 Products produced to this specification are not intended for electrical applications.

1.3 *Units*—Values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units, which are provided for information only and are not considered standard.

NOTE 1—A companion specification for copper sheet and strip for building construction is Specification B370.

1.4 The following hazard caveat pertains to the test method portion, Section 17, 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 ASTM Standards:<sup>2</sup>

- B248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar
- B370 Specification for Copper Sheet and Strip for Building Construction
- B846 Terminology for Copper and Copper Alloys

<sup>1</sup> This specification is under the jurisdiction of Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.01 on Plate, Sheet, and Strip.

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<sup>2</sup> 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.

- B950 Guide for Editorial Procedures and Form of Product Specifications for Copper and Copper Alloys
- E8/E8M Test Methods for Tension Testing of Metallic Materials
- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E37 Test Methods for Chemical Analysis of Pig Lead
- E46 Test Methods for Chemical Analysis of Lead- and Tin-Base Solders<sup>3</sup>
- E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods)
- E112 Test Methods for Determining Average Grain Size
- E478 Test Methods for Chemical Analysis of Copper Alloys

## 3. General Requirements

3.1 The following sections of Specification B248 constitute a part of this specification:

- 3.1.1 Significance of numerical limits,
- 3.1.2 Inspection,
- 3.1.3 Rejection and reheating,
- 3.1.4 Certification,
- 3.1.5 Mill test reports, and
- 3.1.6 Packaging and package marking.

3.2 In addition, when a section with a title identical to that referenced in 3.1, above, appears in this specification, it contains additional requirements that supplement those appearing in Specification B248.

## 4. Terminology

4.1 For definitions of terms related to copper and copper alloys, refer to Terminology B846.

### 4.2 Definitions of Terms Specific to This Standard:

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

4.2.1.1 *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.”)

4.2.2 *lead-coated copper sheet (for building construction), n*—a rolled flat product over 24 in. (610 mm) in width and of ounce-weight thickness from 8 oz (227 g) to 48 oz (1361 g).

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

4.2.3 *lead-coated strip (for building construction)*, *n*—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).

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

4.2.4.1 *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.

4.2.5 *ounce-weight*—the weight of uncoated copper sheet or strip expressed in ounces per square foot.

4.2.6 *thickness, ounce-weight, n*—the metal thickness that corresponds to the ounce weight.

## 5. Ordering Information

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

- 5.1.1 ASTM designation and year of issue.
- 5.1.2 Temper (Section 8 and Table 1),
- 5.1.3 How furnished: flat lengths or in coils,
- 5.1.4 Quantity: total weight or sheets of each size,
- 5.1.5 Ounce-weight or ounce-weight thickness of the uncoated copper sheet or strip (Table 2),
- 5.1.6 Dimensions: width and length (Section 12),
- 5.1.7 Certification, where required (see 5.1.4),
- 5.1.8 Mill test report, where required (see 5.1.5), and
- 5.1.9 If the material being purchased is intended for use by agencies of the U.S. government, refer to Section 11.
- 5.1.10 Other variations in coating or texture shall be furnished by agreement in writing between the purchaser and the manufacturer or supplier.

## 6. Materials and Manufacture

### 6.1 Materials:

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

6.1.2 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 B370.

### 6.2 Manufacture:

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

6.2.2 Unless otherwise specified, the lead coating shall be applied to the copper sheet or strip after slitting and cutting to the specified length.

TABLE 2 Sheet Weights

Nominal Weights and Thickness of Bare Copper Sheets		Minimum Weight of Lead-Coated Copper Sheet
Ounce-Weight, oz/ft <sup>2</sup>	Ounce-Weight Thickness <sup>A</sup> , in. (mm)	oz/ft <sup>2</sup> (g/m <sup>2</sup> )
24	0.0323 (0.820)	25.0 (7625)
20	0.0270 (0.686)	21.2 (6466)
16	0.0216 (0.549)	17.3 (5276)
12	0.0162 (0.411)	13.2 (4026)

<sup>A</sup>Based upon a density of 0.322 lb/in.<sup>3</sup> (8.91 g/cm<sup>3</sup>).

TABLE 3 Chemical Requirements for Lead Used to Coat Copper Sheet

Element	Composition, % (Maximum unless shown as range or remainder)
Silver	0.02
Copper	0.08
Arsenic plus antimony	0.10
Zinc	0.005
Iron	0.01
Bismuth	0.08
Lead	remainder
Tin	3.0-4.0
Phosphorus	0.03

## 7. Chemical Composition

7.1 The copper sheet or strip shall have a minimum copper, including silver, content of 99.5 %.

7.2 Any copper that complies with 7.1 shall be acceptable.

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

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

## 8. Temper

8.1 The standard tempers of the uncoated copper sheet and strip described in this specification are given in Table 1.

8.1.1 Annealed Temper O60.

8.1.2 Cold rolled tempers H00 (eighth hard, cold-rolled); and H01 (quarter hard, cold-rolled high yield).

## 9. Physical Property Requirements

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

TABLE 1 Mechanical Properties of Uncoated Sheet

Temper Designation		Tensile Strength, ksi <sup>A</sup> (MPa)		Yield Strength, at 0.5 % Extension Under Load, min, ksi (MPa)	Approximate Rockwell Hardness <sup>B</sup> (for Information Only)			
Standard	Former	Min	Max		F Scale		Superficial 30 T	
					Min	Max	Min	Max
O60	soft	30 (205)	38 (260)	...	...	65	...	31
H00	cold-rolled	32 (220)	40 (275)	20 (140)	54	82	15	49
H01	cold-rolled (high yield)	34 (235)	42 (290)	28 (195)	60	84	18	51

<sup>A</sup> ksi = 100 psi.

<sup>B</sup> 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.