



Designation: B370 – 22

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

This standard is issued under the fixed designation B370; 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 U.S. Department of Defense.*

## 1. Scope\*

1.1 This specification establishes the requirements for rolled copper sheet and strip in flat lengths or coils in ounce-weight thicknesses for roofing, cladding, flashings, gutters, downspouts, and general sheet metal work for building construction.

1.1.1 Products produced to this specification are not intended for electrical applications.

1.2 *Units*—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.

NOTE 1—Specification B101 is an associated specification for lead-coated copper sheets and strip for building construction.

1.3 The following hazard caveat pertains to the test methods portion, Section 16, of this specification

1.3.1 *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:*<sup>2</sup>

**B101 Specification for Lead-Coated Copper Sheet and Strip for Building Construction**

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

Current edition approved May 1, 2022. Published May 2022. Originally approved in 1961. Last previous edition approved in 2019 as B370–12 (2019). DOI: 10.1520/B0370-22.

<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.

**B248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar**

**B601 Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast**

**B846 Terminology for Copper and Copper Alloys**

**E8/E8M Test Methods for Tension Testing of Metallic Materials**

**E112 Test Methods for Determining Average Grain Size**

**E255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition**

## 3. General Requirements

3.1 The following sections of Specification B248 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 Specimen Preparation;

3.1.5 Test Methods;

3.1.6 Significance of Numerical Limits;

3.1.7 Inspection;

3.1.8 Certification;

3.1.9 Test Report;

3.1.10 Packaging and Package Marking; and

3.1.11 Supplementary Requirements.

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, which supplement those appearing in Specification B248.

## 4. Terminology

4.1 *Definitions:*

4.1.1 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, n*—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”).

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

4.2.2 *flashings, n*—an impervious copper or layered copper composite sheet or strip used in a building envelope to create a barrier to prevent water penetration or direct the flow of moisture.

4.2.2.1 *Discussion*—This can include, but is not limited to, the heads of windows and doors, the edge components of roof systems, changes in building planes, around chimneys, roof vents, skylights, decks and other penetrations, and other conditions requiring a watertight or water-shedding solution.

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

4.2.3.1 *Discussion*—Full length pieces usually are 8 ft or 10 ft (2.4 m or 3.0 m) and subject to established length tolerances.

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

4.2.4.1 *Discussion*—They usually are 8 ft or 10 ft (2.4 m or 3.0 m) and subject to established length tolerances.

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

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

4.2.7 *strip, for building construction, n*—a rolled flat product up to 24 in. (610 mm), inclusive, in width and of ounce-weight thickness from 8 oz to 48 oz.

NOTE 2—In 4.2.6 and 4.2.7, the 8 oz to 48 oz refers to the names commonly used in the building industry for the sizes used. The respective sizes that correspond to these names are listed in Table 2.

## 5. Ordering Information

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

5.1.1 ASTM designation and year of issue (for example, B370–XX);

5.1.2 Temper (Section 8);

5.1.3 Dimensions: tolerances (Section 12);

5.1.4 How furnished: flat lengths or coils (4.2.1 – 4.2.3);

5.1.5 Quantity: total weight or number of pieces of each form and size; and

5.1.6 When product is purchased for agencies of the U.S. Government (Section 11).

5.2 The following are options available under this specification and should be specified in the contract or purchase order when required:

5.2.1 Heat identification or traceability details,

5.2.2 Certification, and

5.2.3 Test Report.

## 6. Materials and Manufacture

6.1 *Materials*—The material of manufacture shall be a cast bar, cake, or slab of any copper conforming with the chemical composition requirements (Section 7) that is suitable for processing into products listed in 1.1.

6.2 *Manufacture:*

6.2.1 The product shall be manufactured by such hot working, cold working, and annealing processes as to produce a uniform wrought structure in the finished product.

6.2.2 The product shall be hot or cold worked to the finished size, and subsequently annealed when required, to meet the temper properties specified in Table 3.

6.2.3 *Sheet*—The product shall be manufactured in flat sheets.

6.2.4 *Strip*—The product shall be manufactured in flat lengths or in coils (rolls) of one single continuous length not less than 25 ft (7.5 m) wound into a cylindrical spiral.

## 7. Chemical Composition

7.1 The material shall be any copper with a minimum copper content, including silver, of 99.5 %.

7.1.1 Limits shall be established and analysis required for unnamed elements by agreement between the manufacturer and the purchaser.

## 8. Temper

8.1 The standard tempers for products described in this specification are given in Table 1.

8.1.1 Annealed temper as defined in Classification B601: O60 (soft).

8.1.2 Cold Rolled tempers as defined in Classification B601: H00 (cold-rolled), H01 (cold-rolled, high yield), H02 (half hard), H03 (three-quarter hard), and H04 (hard).

NOTE 3—The purchaser should confer with the manufacturer or supplier concerning the availability of a specific temper and form.

**TABLE 1 Mechanical Properties**

Temper Designation		Tensile Strength, ksi <sup>A</sup> (MPa)		Yield Strength, at 0.5 % Extension Under Load, min ksi <sup>A</sup> (MPa)	Approximate Rockwell Hardness <sup>B</sup> (For Information Only) Scale	
Standard	Former	Min	Max		F	Superficial 30 T
O60	soft	30 (205)	38 (260)	...	up to 65	up to 31
H00	cold-rolled	32 (220)	40 (275)	20 (135)	54–82	15–49
H01	cold-rolled, high yield	34 (235)	42 (290)	28 (190)	60–84	18–51
H02	half hard	37 (255)	46 (315)	30 (205)	77–89	43–57
H03	three-quarter hard	41 (285)	50 (345)	32 (220)	82–91	47–59
H04	hard	43 (295)	52 (360)	35 (240)	86–93	54–62

<sup>A</sup> ksi = 1000 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.

NOTE 4—H00 temper is commonly known in the building industry as cold-rolled temper.

NOTE 5—H01 temper is commonly known in the building industry as cold-rolled, high yield temper.

**9. Grain Size for Annealed Tempers**

*9.1 Grain Size Requirements:*

9.1.1 The soft annealed temper uncoated product furnished under this specification shall have a minimum grain size of 0.010 mm when tested to Test Methods E112.

9.1.2 Acceptance or rejection for the soft temper based upon the physical properties shall depend on the grain size.

**10. Mechanical Property Requirements**

*10.1 Tensile and Yield Strength Requirements:*

10.1.1 The product shall conform to the requirements specified in Table 1 for the specific temper when subjected to test in accordance with Test Methods E8/E8M.

10.1.2 Acceptance or rejection for mechanical properties shall be based upon the results of the tensile and yield strength tests.

10.2 Rockwell Hardness Requirement—The approximate Rockwell values given in Table 1 are for general information and assistance in testing and shall not be a basis for product rejection.

NOTE 6—The Rockwell hardness test offers a quick and convenient method of checking for general conformity to the specification requirements for temper and tensile strength.

**11. Purchases for U.S. Government Agencies**

11.1 When identified in the contract or purchase order, product purchased for agencies of the U.S. Government shall conform to the special government requirements stipulated in the Supplemental Requirements.

**12. Dimensions, Mass, and Permissible Variations**

12.1 The product shall conform to the following requirements:

*12.1.1 Thickness:*

12.1.1.1 Tolerances of Sheet and Strip—The standard method for specifying thickness shall be by ounce-weight. The theoretical thickness for standard ounce-weights and the minimum and maximum thickness, measured at any point, shall be as specified in Table 2.

**TABLE 2 Thickness Tolerances of Sheet and Strip**

Ounce-Weight/ft <sup>2</sup>	Theoretical Thickness, <sup>A</sup> in. (mm)	Tolerances, Plus and Minus in. (mm)
6	0.0081 (0.206)	0.001 (0.026)
8	0.0108 (0.274)	0.0011 (0.028)
10	0.0135 (0.343)	0.0011 (0.028)
12	0.0162 (0.411)	0.0012 (0.030)
16	0.0216 (0.549)	0.0012 (0.031)
20	0.0270 (0.686)	0.0012 (0.031)
24	0.0323 (0.820)	0.0015 (0.038)
32	0.0431 (1.09)	0.002 (0.05)
48	0.0646 (1.64)	0.0025 (0.06)

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

**TABLE 3 Thickness Tolerances of Sheet and Strip to be Coated for Flashing**

Ounce-Weight/ft <sup>2</sup>	Theoretical Thickness, <sup>A</sup> in. (mm)	Tolerances, Plus and Minus in. (mm)
2	0.0027 (0.068)	0.0004 (0.010)
3	0.004 (0.103)	0.0005 (0.013)
4	0.0054 (0.138)	0.0006 (0.0152)
5	0.0067 (0.171)	0.0006 (0.0152)

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

*12.1.2 Thickness for Coated Copper for Flashing:*

12.1.2.1 Tolerances for Sheet and Strip to be Subsequently Bonded with Rubber, Fibreglass or Other Material for Flashing—The standard method for specifying thickness shall be by ounce-weight. The theoretical thickness for standard ounce-weights and the minimum and maximum thickness, measured at any point, shall be as specified in Table 3.

*12.1.3 Weight:*

12.1.3.1 Weight tolerances shall be as specified in Table 2.

*12.1.4 Width:*

12.1.4.1 Tolerances for Slit Metal—Table 4.

12.1.4.2 Tolerance for Square-Sheared Metal—Table 5.

*12.1.5 Length.*

12.1.5.1 Tolerances for Specific and Stock—Table 6.

12.1.5.2 Tolerances for Square-Sheared Metal—Table 7.

*12.1.6 Straightness.*

12.1.6.1 Tolerances for Slit Metal—Table 8.

12.1.6.2 Tolerances for Square-Sheared Metal—Table 9.

**13. Sampling**

13.1 Sampling—The lot size, portion size, and selection of sample pieces shall be as follows.

13.1.1 Lot Size—An inspection lot shall be 10 000 lb (4540 kg) or less of product of the same mill form, alloy, temper, and nominal dimensions, subject to inspection at one time, or shall be the product of one cast bar from a single melt charge whose weight shall not exceed 25 000 lb (11 340 kg) that has been processed continuously and subject to inspection at one time.

13.1.2 Portion Size—A portion shall be four or more pieces selected as to be representative of the lot. When the lot consist of less than four pieces, representative samples shall be taken from each piece.

*13.2 Chemical Analysis:*

13.2.1 The sample for chemical analysis shall be taken from the pieces selected and combined into one composite sample in accordance with Practice E255 for product in its final form. The minimum weight of the composite sample shall be 150 g.

13.2.2 Instead of sampling in accordance with Practice E255, the manufacturer shall have the option of taking samples at the time the castings are poured or by taking samples from the semifinished product.

**TABLE 4 Width Tolerances for Slit Metal**

Width, in. (mm)	Width Tolerances, Plus and Minus, in. (mm)
Up to 24 (610), incl	1/64 (0.40)
Over 24 to 48 (610 to 1219), incl	3/64 (1.2)