



Designation: B508 – 22

Standard Specification for Copper Alloy Strip for Flexible Metal Hose¹

This standard is issued under the fixed designation B508; 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 establishes the requirements for annealed copper-alloy strip for the manufacture of flexible metal hose produced from Copper Alloy UNS Nos. C41100 and C50500.

1.1.1 The nominal compositions are as follows:

Copper Alloy UNS No.	Copper	Zinc	Tin
C41100	91.0	8.5	0.5
C50500	98.7	...	1.3

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. Grain size is given in SI units.

1.3 The following safety hazard caveat pertains only to the test methods portion, Section 14, described in 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*:²

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

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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.

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

B846 Terminology for Copper and Copper Alloys

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)³

E112 Test Methods for Determining Average Grain Size

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

E478 Test Methods for Chemical Analysis of Copper Alloys

3. Terminology

3.1 *Definitions*:

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

4. Ordering Information

4.1 Include the following specific 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 designation (see Section 1 and Table 1),

4.1.3 Temper (Section 7 and Table 2),

4.1.4 Quantity, number of pieces or total weight of each alloy and size, and

4.1.5 *Dimensions*—Thickness and width; and length, if applicable (see 9.2 and 9.3).

4.1.6 *How furnished*—Coils (inside and outside diameters), pounds per inch of width; stock or specific lengths, with or without ends;

4.1.7 *Packing*—Type of pallet, skid, or box: interleaving, banding, maximum weight, and so forth;

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

4.2.1 Heat identification and traceability details;

4.2.2 Certification;

4.2.3 Test Report;

³ The last approved version of this historical standard is referenced on www.astm.org.

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

TABLE 1 Chemical Requirements

Element	Composition, %	
	Copper Alloy UNS Nos.	
	C41100	C50500
Copper	89.0–92.0	remainder
Tin	0.30–0.7	1.0–1.7
Phosphorus	...	0.03–0.35
Iron, max	0.05	0.10
Lead, max	0.09	0.05
Zinc	remainder	0.30 max

TABLE 2 Grain Size Requirements

Temper Codes ^A	Grain Size, mm		
	Nominal	Minimum	Maximum
OS050	0.050	0.035	0.090
OS035	0.035	0.025	0.050
OS025	0.025	0.015	0.035
OS015	0.015	^B	0.025

^A Temper codes defined in Classification B601.

^B Although no minimum grain size is required, this material must be fully recrystallized.

4.2.4 Special surface condition requirements, if any (see 10.3).

5. Materials and Manufacture

5.1 Materials:

5.1.1 The materials of manufacture shall be cast bar, slab, cake, billet, or so forth of Copper Alloy UNS No. C41100 or C50500 of such purity and soundness as to be suitable for processing into the products prescribed herein.

5.1.2 When specified in the contract or purchase order, that heat identification or traceability is required, the purchaser shall specify the details desired.

NOTE 1—Due to the discontinuous nature of the processing of castings into wrought products, it is not always practical to identify specific casting analysis with a specific quantity of finished material.

5.2 Manufacture:

5.2.1 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.

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

5.2.3 Edges—Slit edges shall be furnished unless otherwise specified in the contract or purchase order.

6. Chemical Composition

6.1 The material shall conform to the chemical composition requirements in Table 1 for the copper [alloy] UNS No. specified in the 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 unnamed elements.

6.3 For alloys in which zinc is listed as “remainder,” either copper or zinc may be taken as the difference between the sum of results of all other elements determined and 100 %.

6.4 When all elements in Table 1 are determined, the sum of results for Copper Alloy UNS C41100 shall be 99.7 % minimum and 99.5 % minimum for Copper Alloy UNS C50500.

7. Temper

7.1 The standard temper for products described in this specification are given in Table 2.

7.2 Annealed tempers OS015 to OS050.

8. Grain Size of Annealed Tempers

8.1 Grain size shall be the standard requirement for all product in the annealed tempers.

8.2 Acceptance or rejection based upon grain size shall depend only on the average grain size of a test specimen taken from each of two sample portions of annealed material, as determined on a longitudinal cross section, and each specimen shall be within the limit prescribed in Table 2 when determined in accordance with Test Methods E112.

8.3 In the case of thin-gage material 0.010 in. (0.25 mm) and under, there shall exist no less than six grains per stock thickness, averaged for five locations one thickness apart.

9. Dimensions, Mass, and Permissible Variations

9.1 *General*—For the purpose of determining conformance with the dimensional requirements prescribed in this specification, any measured value outside the specified limiting values for any dimension may be cause for rejection.

9.2 *Thickness*—The standard method of specifying thickness shall be in decimal fractions of an inch. For material 0.021 in. (0.533 mm) and under in thickness, it is recommended that the nominal thickness be stated not closer than the nearest 0.0005 in. (0.013 mm). For example, specify 0.006 in. or 0.0065 in. (0.152 mm or 0.165 mm), but not 0.0063 in. (0.160 mm). For material over 0.021 (0.533 mm) in thickness, it is recommended that the nominal thickness be stated not closer than the nearest 0.001 in. (0.025 mm). For example, specify 0.128 in. or 0.129 in. (3.25 mm or 3.28 mm) but not 0.1285 in. (3.26 mm). A list of preferred thickness is shown in Appendix X1. The thickness tolerances shall be those shown in Table 3.

9.3 *Width*—The width tolerances shall be those shown in Table 4.

9.4 *Straightness*—The straightness tolerances shall be those shown in Table 5.

10. Workmanship, Finish, and Appearance

10.1 The product shall be free of defects, but blemishes of a nature that do not interfere with the intended application are acceptable.

10.2 The product shall be well cleaned and free of dirt.

10.3 A superficial film or residual light lubricant shall be permissible, unless otherwise specified in the contract or purchase order.