



Designation: B130 – 13

Standard Specification for Commercial Bronze Strip for Bullet Jackets¹

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1. Scope*

1.1 This specification establishes the requirements for commercial bronze strip for manufacture of bullet jacket cups and ammunition components from Copper Alloy UNS No. C22000.²

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.

2. Referenced Documents

2.1 ASTM Standards:³

[B248/B248M 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](#)

[E3 Guide for Preparation of Metallographic Specimens](#)

[E8/E8M Test Methods for Tension Testing of Metallic Materials](#)

[E18 Test Methods for Rockwell Hardness of Metallic Materials](#)

[E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications](#)

[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](#)

[E527 Practice for Numbering Metals and Alloys in the Unified Numbering System \(UNS\)](#)

¹ 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.

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² Refer to Practice [E527](#) for an explanation of the unified numbering system (UNS).

³ 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.

3. Terminology

3.1 For definition of terms related to copper and copper alloys, refer to Terminology [B846](#).

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 Quantity or weight for each size,

4.1.3 Temper (Section 7),

4.1.4 Grain size of annealed temper (optional) (Section 8),

4.1.5 Dimensions: thickness, width, length, (Section 10),

4.1.6 How furnished: straight lengths or coils,

4.1.7 Heat identification or traceability, when required,

4.1.8 Certification, when required, and

4.1.9 Mill test report, when required.

4.1.10 When material is purchased for agencies of the U.S. government, see Section 11.

5. Materials and Manufacture

5.1 Material:

5.1.1 The material of manufacture shall be a form (cast bar, cake, slab, et cetera) of Copper Alloy UNS No. C22000 of such purity or soundness as to be suitable for processing into 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—Because of the discontinuous nature of the processing of castings into wrought products, it is not always practical to identify a 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 in the ordering information.

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

6. Chemical Composition

6.1 The product shall conform to the composition prescribed in [Table 1](#).

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

TABLE 1 Chemical Requirements

Copper Alloy UNS No. C22000	
Element	Composition
Copper	89.0–91.0
Lead, max	0.05
Iron, max	0.05
Bismuth, max	0.006
Zinc	remainder

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 Either copper or zinc may be taken as the difference between the sum of all elements analyzed and 100 %. Copper, when determined by difference, must conform to the requirements of **Table 1**. When all elements are analyzed, their sum shall be 99.8 % min.

7. Temper

7.1 The standard tempers for products described in this specification are given in **Tables 2-4**:

7.1.1 *Cold-Rolled Tempers*—H01 to H10.

7.1.2 *Annealed Tempers*—OS015 to OS035.

8. Grain Size of Annealed Tempers

8.1 In addition to the tensile properties prescribed in **Table 4** for strip, grain size may also be specified by the purchaser. When grain size is specified, the average grain size of the annealed strip shall be within the limits prescribed in **Table 3**. At a magnification of 75×, the average grain size of selected areas 79.8 mm in diameter of each of two samples of annealed strip shall be determined on a plane parallel to the surface of the strip.

9. Mechanical Property Requirements

9.1 *Tensile Strength of Rolled Tempers*—The tension test shall be the standard test for all tempers of cold-rolled strip, and the acceptance or rejection, based upon mechanical properties, shall depend only on the tensile strength which shall conform to the requirements prescribed in **Table 2**. Tension test specimens shall be taken so the longitudinal axis is parallel to the direction of rolling.

TABLE 3 Grain Size Requirements of Annealed Strip

Annealed Temper Designation	Grain Size, mm			
	Standard	Nominal Average	Min	Max
OS015		0.015	^A	0.025
OS025		0.025	0.015	0.040
OS035		0.035	0.025	0.050

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

TABLE 4 Tension Test Requirements of Annealed Strip

Annealed Temper Designation	Thickness of Annealed Tempers, in. (mm)	Tensile Strength min. ksi ^A (MPa ^B)	Elongation in 2 in. (50.8 mm), min, %
OS015	0.005 to 0.010 (0.127 to 0.254), incl	38 (260)	15
	Over 0.010 to 0.050 (0.254 to 1.27), incl	38 (260)	25
	Over 0.050 to 0.100 (1.27 to 2.54), incl	38 (260)	27
	Over 0.100 (2.54)	38 (260)	30
OS025	0.005 to 0.010 (0.127 to 0.254), incl	36 (250)	20
	Over 0.010 to 0.050 (0.254 to 1.27), incl	36 (250)	30
	Over 0.050 to 0.100 (1.27 to 2.54), incl	36 (250)	32
	Over 0.100 (2.54)	36 (250)	35
OS035	0.005 to 0.010 (0.127 to 0.254), incl	34 (235)	25
	Over 0.010 to 0.050 (0.254 to 1.27), incl	34 (235)	35
	Over 0.050 to 0.100 (1.27 to 2.54), incl	34 (235)	38
	Over 0.100 (2.54)	34 (235)	40

^A ksi = 1000 psi.

^B See **Appendix X1**

9.2 *Rockwell Hardness of Rolled Tempers*—Since a Rockwell hardness test offers a quick and convenient method of checking commercial bronze for general conformity to the requirements for tensile strength, the approximate Rockwell hardness values for each of the cold-rolled tempers are given in **Table 2** for general information and assistance in testing.

9.3 *Tensile Strength of Annealed Tempers*—The tension test shall be the standard test for all tempers of annealed strip, and

TABLE 2 Tensile Strength Requirements and Approximate Rockwell Hardness Values for Cold-Rolled Strip

Rolled Temper Designation		Tensile Strength, ksi ^A (MPa ^B)		Approximate Rockwell Hardness ^C	
Standard	Former	Min	Max	B Scale	Superficial 30-T
H01	Quarter-hard	40 (275)	50 (345)	27–56	34–54
H02	Half-hard	47 (325)	57 (395)	50–66	50–61
H03	Three-quarter hard	52 (360)	62 (425)	59–71	55–64
H04	Hard	57 (395)	66 (455)	65–75	60–67
H06	Extra-hard	64 (440)	72 (495)	72–79	64–69
H08	Spring	69 (475)	77 (530)	76–81	67–70
H10	Extra-spring	72 (495)	80 (550)	78–83	68–71

^A ksi = 1000 psi.

^B See **Appendix X1**.

^C Rockwell hardness values apply as follows: The B scale applies to metal 0.020 in. (0.058 mm) in thickness and over; the 30-T scale applies to metal 0.012 in. (0.305 mm) in thickness and over.

the acceptance or rejection based upon mechanical properties, shall depend only on the tensile strength which shall conform to the requirements prescribed in Table 4. Tension test specimens shall be taken so the longitudinal axis is parallel to the direction of rolling.

10. Dimensions, Mass, and Permissible Variations

10.1 *Thickness*—The standard method of specifying thickness shall be in decimal fractions of an inch. The tolerances shall be as shown in Table 5.

10.2 *Width*—The width tolerances of strip metal shall be as prescribed in Table 6.

10.3 *Length*—The strip shall be furnished in straight lengths or in coils (rolls), as specified. Rolls shall consist of not more than three lengths, no one of which shall be less than 10 ft (3.05 m) in length. The tolerances for straight lengths shall be as prescribed in Table 7.

10.3.1 *Stock Lengths*—When furnished in stock lengths with short lengths included, the schedule of short lengths shall be as prescribed in Table 8.

10.3.2 *Special Length*—When special lengths are required, they shall be specified in the order.

NOTE 2—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.

10.4 *Straightness Tolerances*—The straightness tolerances shall be as prescribed in Table 9.

11. Purchases for the U.S. Government

11.1 When specified in the contract or purchase order, product purchased for agencies of the U.S. Government shall conform to the special government regulations specified in the Supplemental Requirements section as defined in the current issue of Specification B248/B248M.

12. Workmanship, Finish, and Appearance

12.1 The material shall be free of defects, but blemishes of a nature that do not interfere with normal commercial operations are acceptable. It shall be well-cleaned and free of dirt. A

TABLE 6 Width Tolerances

Width, in. (mm)	Slit Metal and Slit Metal with Rolled Edges	
	Width Tolerances ^A Plus and Minus, in. (mm)	
	0.004 to 0.032 in. (0.102 to 0.813 mm), incl, in Thickness	Over 0.032 to 0.188 in. (0.813 to 4.78 mm), incl, in Thickness
2 (50.8) and under	0.005 (0.13)	0.010 (0.25)
Over 2 to 8 (50.8 to 203), incl	0.008 (0.20)	0.013 (0.33)
Over 8 to 14 (203 to 356), incl	0.010 (0.25)	0.015 (0.38)
Over 14 to 20 (356 to 508), incl	0.013 (0.33)	0.018 (0.46)
Square Sheared Metal (All Lengths up to 120 in. (3.05 m), incl)		

Width, in. (mm)	Width Tolerances, ^A Plus and Minus, in. (mm)		
	1/16 in. (1.59 mm) and Under in Thickness	Over 1/16 to 3/16 in. (1.59 to 3.18 mm) incl, in Thicknesses	Over 3/16 in. (3.18 mm) in Thickness
20 (508) and under	1/32 (0.79)	3/64 (1.2)	1/16 (1.6)

^A When tolerances are specified as all plus or all minus, double the values given.

TABLE 7 Length Tolerances for Straight Lengths

NOTE 1—The following length tolerances are all plus; if all minus tolerances are desired, use the same values; if tolerances are desired plus and minus, halve the values given.

Length, ft (m)	Length Tolerances	
	in.	mm
Specific lengths, mill lengths, multiple lengths, and specific lengths with ends	1/4	64
10 (3.05) and under		
Over 10 to 20 (3.05 to 6.10), incl	1/2	13
Stock lengths and stock lengths with ends	1 ^A	25 ^A

^A As stock lengths are cut and placed in stock in advance of orders, departure from this tolerance is not practicable.

superficial film or residual light lubricant is normally present and is acceptable unless otherwise specified.

12.2 The surface finish and appearance shall be the normal commercial quality for the alloy, thickness, and temper ordered. When application information is provided with purchase order, the surface shall be that commercially producible for the

TABLE 5 Thickness Tolerances

Thickness, in.	Thickness Tolerances, plus and minus, ^A in.		
	8 in. and under in Width	Over 8 to 14 in., incl, in Width	Over 14 to 20 in., incl, in Width
0.004 and under	0.0003 (0.008)	0.0006 (0.015)
Over 0.004 to 0.006, incl	0.0004 (0.010)	0.0008 (0.020)	0.0013 (0.033)
Over 0.006 to 0.009, incl	0.0006 (0.015)	0.0010 (0.025)	0.0015 (0.038)
Over 0.009 to 0.013, incl	0.0008 (0.020)	0.0013 (0.033)	0.0018 (0.046)
Over 0.013 to 0.017, incl	0.0010 (0.025)	0.0015 (0.038)	0.0020 (0.051)
Over 0.017 to 0.021, incl	0.0013 (0.033)	0.0018 (0.046)	0.0020 (0.051)
Over 0.021 to 0.026, incl	0.0015 (0.038)	0.0020 (0.051)	0.0025 (0.064)
Over 0.026 to 0.037, incl	0.0020 (0.051)	0.0020 (0.051)	0.0025 (0.064)
Over 0.037 to 0.050, incl	0.0020 (0.051)	0.0025 (0.064)	0.0030 (0.076)
Over 0.050 to 0.073, incl	0.0025 (0.064)	0.0030 (0.076)	0.0035 (0.089)
Over 0.073 to 0.130, incl	0.0030 (0.076)	0.0035 (0.089)	0.0040 (0.102)
Over 0.130 to 0.188, incl	0.0035 (0.089)	0.0040 (0.102)	0.0045 (0.114)

^A When tolerances are specified as all plus or all minus, double the values given.