



Designation: ~~B130-02~~ Designation: **B 130 – 08**

Standard Specification for Commercial Bronze Strip for Bullet Jackets¹

This standard is issued under the fixed designation B 130; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope*

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

~~1.2 Values stated in inch-pound units are to be regarded as the standard except for grain size which is stated in metric units. SI values given in parentheses are for information only.~~

1.2 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 The following documents of the issue in effect on date of material purchase form a part of this specification to the extent referenced herein:~~

~~2.2~~

2.1 ASTM Standards:³

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

B 601 Classification for Temper Designations For Copper and Copper Alloys—Wrought and Cast

B 846 Terminology for Copper and Copper Alloys

E 3 Guide for Preparation of Metallographic Specimens

E 8 Test Methods for Tension Testing of Metallic Materials

~~E 18 Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials⁴~~ Test Methods for Rockwell Hardness of Metallic Materials

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E 112 Test Methods for Determining Average Grain Size

E 255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition

E 478 Test Methods for Chemical Analysis of Copper Alloys

~~E 527 Practice for Numbering Metals and Alloys (UNS)~~ Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

3. Terminology

3.1 For definition of terms related to copper and copper alloys, refer to Terminology B 846.

4. Ordering Information

4.1 Order for product under this specification should include the following information:

4.1.1 Specification 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 9),

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,

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 E 527 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.

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

- 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~~ Material and Manufacture

5.1 ~~Materials~~ Material:

5.1.1 The material of manufacture shall be a cast bar, cake, slab, and so forth of copper alloy UNS No. C22000 as specified in the ordering information.

5.1.2 In the event 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 ~~Manufacturer~~ 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.

6.2 These composition limits do not preclude the presence of other elements. Limits for unnamed elements may be established and determination required by agreement between manufacturer or supplier and purchaser.

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 Tempers available under this specification, as defined in Classification B 601, are as follows:

7.1.1 *Cold-Rolled Tempers*—For cold rolled strip, a temper designation from Table 2 shall be specified.

7.1.2 *Annealed Tempers*—For annealed tempered strip, a temper designation from Table 3 shall be specified.

8. Mechanical Property Requirements

8.1 *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.

8.1.1 *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.

8.2 *Tensile Strength of Annealed Tempers*—Annealed strip shall conform to the tensile property requirements prescribed in Table 4. Tension test specimens shall be taken so the longitudinal axis is parallel to the direction of rolling.

9. Grain Size of Annealed Tempers

9.1 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 \times , 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.

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.

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

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 (365)	62 (425)	59–74	55–64
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.

TABLE 3 Grain Size Requirements of Annealed Strip

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

^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 (240)	25
	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 (240)	35
	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 (240)	38
	Over 0.050 to 0.100 (1.27 to 2.54), incl	34 (235)	38
	Over 0.100 (2.54)	34 (240)	40
	Over 0.100 (2.54)	34 (235)	40

^A ksi = 1000 psi.

^B See Appendix X1

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.

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 0.013 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)	0.0025 (0.064)
Over 0.017 to 0.021, incl	0.0013 (0.033)	0.0018 (0.046)	0.0025 (0.064)
Over 0.021 to 0.026, incl	0.0015 (0.038)	0.0020 (0.051)	0.0025 (0.064)
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)	0.0025 (0.064)	0.0030 (0.076)
Over 0.026 to 0.037, incl	0.0020 (0.051)	0.0025 (0.064)	0.0030 (0.076)
Over 0.037 to 0.050, incl	0.0025 (0.064)	0.0030 (0.076)	0.0035 (0.089)
Over 0.037 to 0.050, incl	0.0025 (0.064)	0.0030 (0.076)	0.0035 (0.089)
Over 0.050 to 0.073, incl	0.0030 (0.076)	0.0035 (0.089)	0.0040 (0.102)
Over 0.050 to 0.073, incl	0.0030 (0.076)	0.0035 (0.089)	0.0040 (0.102)
Over 0.073 to 0.130, incl	0.0035 (0.089)	0.0040 (0.102)	0.0045 (0.114)
Over 0.073 to 0.130, incl	0.0035 (0.089)	0.0040 (0.102)	0.0045 (0.114)
Over 0.130 to 0.188, incl	0.0040 (0.102)	0.0045 (0.114)	0.0050 (0.127)
Over 0.130 to 0.188, incl	0.0040 (0.102)	0.0045 (0.114)	0.0050 (0.127)

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

TABLE 6 Width Tolerances

Slit Metal and Slit Metal with Rolled Edges			
Width, in. (mm)	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 1/8 in. (1.59 to 3.18 mm) incl, in Thicknesses	Over 1/8 in. (3.18 mm) in Thickness
	20 (508) and under	1/32 (0.79)	3/64 (1.2)

^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.

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.