



Designation: B 130 – 02

## Standard Specification for Commercial Bronze Strip for Bullet Jackets<sup>1</sup>

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 approval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 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.<sup>2</sup>

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.

### 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 ASTM Standards:

B 248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar<sup>3</sup>

B 601 Classification for Temper Designations For Copper and Copper Alloys—Wrought and Cast<sup>3</sup>

B 846 Terminology for Copper and Copper Alloys<sup>3</sup>

E 3 Guide for Preparation of Metallographic Specimens<sup>4</sup>

E 8 Test Methods for Tension Testing of Metallic Materials<sup>4</sup>

E 18 Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials<sup>4</sup>

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specification<sup>5</sup>

E 112 Test Method for Determining Average Grain Size<sup>4</sup>

E 255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition<sup>6</sup>

E 478 Test Methods for Chemical Analysis of Copper Alloys<sup>6</sup>

E 527 Practice for Numbering Metals and Alloys (UNS)<sup>7</sup>

### 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,

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 Materials:

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:

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.

<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.

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<sup>2</sup> Refer to Practice E 527 for an explanation of the unified numbering system (UNS).

<sup>3</sup> Annual Book of ASTM Standards, Vol 02.01.

<sup>4</sup> Annual Book of ASTM Standards, Vol 03.01.

<sup>5</sup> Annual Book of ASTM Standards, Vol 14.02.

<sup>6</sup> Annual Book of ASTM Standards, Vol 03.06.

<sup>7</sup> Annual Book of ASTM Standards, Vol 01.01.

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

## 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.

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 B 248.

## 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 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 application. Superficial films of discoloration, or lubricants, or tarnish inhibitors are permissible unless otherwise specified.

## 13. Sampling

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

13.1.1 *Lot Size*—40 000 lb (18 144 kg) or less material of the same mill form, temper, and thickness, subject to inspection at one time.

13.1.2 *Portion Size*—Sample pieces shall be selected from eight individual pieces and shall be taken so as to be representative of those pieces. If the lot consists of less than eight pieces, a sample shall be taken from each individual piece.

13.2 *Chemical Analysis*:

13.2.1 The sample for chemical analysis shall be taken in accordance with Practice E 255 for product in its final form taken from the pieces selected in 13.1.2 and combined into one

**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 <sup>A</sup> (MPa <sup>B</sup> )		Approximate Rockwell Hardness <sup>C</sup>	
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 (355)	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

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

<sup>B</sup> See Appendix X1.

<sup>C</sup> 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	Max
OS015		0.015	<sup>A</sup>	0.025
OS025		0.025	0.015	0.040
OS035		0.035	0.025	0.050

<sup>A</sup> 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 <sup>A</sup> (MPa <sup>B</sup> )	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
	Over 0.010 to 0.050 (0.254 to 1.27), incl	34 (240)	35
	Over 0.050 to 0.100 (1.27 to 2.54), incl	34 (240)	38
	Over 0.100 (2.54)	34 (240)	40

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

<sup>B</sup> See Appendix X1

composite sample. The minimum weight of the composite sample shall be 150 g.

13.2.2 Instead of sampling as directed in 13.2.1, the manufacturer shall have the option of sampling at the time the castings are poured or samples taken from the semifinished product. If the manufacturer determines the chemical composition of the material during the course of manufacture, he shall not be required to sample and analyze the finished product.

13.2.2.1 When samples are taken at the time the castings are poured, at least one sample shall be taken from each group of castings poured from the same source of molten metal.

13.2.2.2 When samples are taken from semifinished product, a sample shall be taken to represent each 10 000 lbs (5000 kg) or fraction thereof, except that no more than one sample shall be required per piece.

13.2.2.3 Only one sample need be taken from the semifinished product of one cast bar from a single melt charge continuously processed.

13.3 *Samples for All Other Tests*—Samples for all other tests shall be taken from the sample portions selected in 13.1.2 and be of a convenient size to accommodate the test and comply with the requirements of the appropriate product specification and test method.

## 14. Number of Tests and Retests

### 14.1 Test:

#### 14.1.1 Chemical Requirements:

14.1.2 When samples are taken at the time the castings are poured, at least one sample shall be analyzed for each group of castings poured simultaneously from the same source of molten metal.

14.1.3 When samples are taken from the semifinished or finished product, at least one sample representative of the product of each cast bar from a single melt charge continuously processed with heat identity maintained shall be analyzed.

14.2 *Mechanical Properties and Grain Size*—Unless otherwise provided in the product specification, test specimens shall be taken from two of the sample pieces selected in accordance with 13.1.2. The required tests shall be made on each of the specimens so selected.

14.3 *Other Tests*—For other tests, test specimens shall be taken from four of the sample pieces selected in accordance with 13.1.2. The required tests shall be made on each of the specimens so selected.

### 14.4 Retests:

14.4.1 If the chemical analysis of the specimens prepared from samples selected in accordance with 13.1.2 fails to conform to the specified limits, analysis shall be made on a new composite sample prepared from the pieces selected in accordance with 13.1.2.

14.4.2 If one of the two tests made to determine any of the mechanical or grain size requirements fails to meet a specified limit, this test shall be repeated on the remaining pieces, maximum of two, selected in accordance with 13.1.2, and the results of both of these tests shall comply with the specified requirements.