**Designation: ~~B130 – 08~~ B130 – 13**

# Standard Specification for Commercial Bronze Strip for Bullet Jackets[1]

This standard is issued under the fixed designation B130; 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.

## 1. Scope*

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

1.2 ~~The~~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~~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~~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)

## 3. Terminology

3.1 For definition of terms related to copper and copper alloys, refer to Terminology B846.

## 4. Ordering Information

4.1 ~~Order~~ Include the following specified choices when placing orders for product under this ~~specification should include the following information:~~specification, as applicable:

4.1.1 ~~Specification~~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 ~~9~~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.

[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.

Current edition approved ~~April 1, 2008~~April 1, 2013. Published ~~May 2008~~April 2013. Originally approved in 1940. Last previous edition approved in ~~2002~~2008 as ~~B130 – 02.~~B130 – 08. DOI: ~~10.1520/B0130-08.~~10.1520/B0130-13.

[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.

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

## 5. ~~Material~~Materials and Manufacture

5.1 *Material:*

5.1.1 The material of manufacture shall be a ~~cast~~ form (cast bar, cake, slab, ~~and so forth of copper alloy~~et cetera) of Copper Alloy UNS No. C22000 ~~as specified in the ordering information.~~of such purity or soundness as to be suitable for processing into products prescribed herein.

5.1.2 ~~In the event~~ 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.

6.2 These composition limits do not preclude the presence of other elements. ~~Limits for unnamed elements~~ By agreement between the manufacturer and purchaser, limits may be established and ~~determination required by agreement between manufacturer or supplier and purchaser.~~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 ~~Tempers available under this specification, as defined~~The standard tempers for products described in this specification are given in Tables 2-4~~Classification~~ :~~B601~~, are as follows:

7.1.1 *Cold-Rolled Tempers*—~~For cold rolled strip, a temper designation from~~ H01 to H10.~~Table 2 shall be specified.~~

7.1.2 *Annealed Tempers*—~~For annealed tempered strip, a temper designation from~~ OS015 to OS035.~~Table 3 shall be specified.~~



## 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.

~~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.~~

**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 (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 | 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.

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*—~~Annealed strip shall~~ The tension test shall be the standard test for all tempers of annealed strip, and the acceptance or rejection based upon mechanical properties, shall depend only on the tensile strength which 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.



**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, % |
|---|---|---|---|
| Standard | | | |
| 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. 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×, 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 ~~B248~~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 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:*

**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.