



Designation: B131 – 22

Standard Specification for Copper Alloy Bullet Jacket Cups ¹

This standard is issued under the fixed designation B131; 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 the requirements for bullet jacket preform cups produced of Copper Alloy UNS No. C22000 for processing into bullet jackets of the following types and classes:

- 1.1.1 *Type I*—Caliber 0.30.
- 1.1.2 *Type II*—Caliber 0.45.
- 1.1.3 *Type III*—Caliber 0.50.
- 1.1.4 *Type IV*—As specified in the contract or order.
- 1.1.5 *Class I*—Not annealed.
- 1.1.6 *Class II*—Annealed.

1.2 *Units*—The values stated in inch-pound units are to be regarded as standard, except for grain size, which is given in SI units. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *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
 - 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
 - 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

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 Oct. 1, 2022. Published October 2022. Originally approved in 1940. Last previous edition approved in 2017 as B131-17. DOI: 10.1520/B0131-22.

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.

the Determination of Chemical Composition
E478 Test Methods for Chemical Analysis of Copper Alloys

3. Terminology

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

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *cup (cupping), n*—a shallow cylindrical shell closed at one end, normally intended for further fabrication, formed from a blank.

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 Type and class (Section 1),
- 4.1.3 Grain size (Section 8),
- 4.1.4 Dimensions and tolerances (Subsection 9.1),
- 4.1.5 Drawing number to which order applies (Subsection 9.1),
- 4.1.6 Work test requirements, if required (Section 12), and
- 4.1.7 If product is purchased for agencies of the U.S. Government (see the Supplementary Requirements section of this specification for additional requirements, if specified).

5. Materials and Manufacture

5.1 *Materials:*

5.1.1 The material of manufacture shall be annealed plate, sheet, strip, or disks of wrought Copper Alloy UNS No. C22000 processed to produce even-topped cups.

5.2 *Manufacture:*

5.2.1 The product shall be manufactured by such blanking and cupping to meet the cup dimensions specified, and subsequently annealed, if required. The annealed cups shall be cleaned to provide a surface suitable for subsequent redrawing into bullet jackets.

6. Chemical Composition

6.1 The product shall conform to the chemical composition requirements in Table 1.

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

TABLE 1 Chemical Requirements

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 Because 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 %. When all elements in **Table 1** are determined, the sum of the results shall be 99.8 % min.

7. Temper

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

7.1.1 Annealed tempers OS025 and OS040.

8. Grain Size for Annealed Tempers

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

8.1.1 Unless there is a prior agreement between the purchaser and supplier, the grain size of class II cups shall be produced to the grain size requirements specified in **Table 2**.

8.1.2 Grain size ranges other than those specified in **Table 2** shall be established by agreement between the manufacturer and purchaser.

8.1.3 Grain size ranges for other cups shall be established by agreement between the manufacturer and purchaser.

8.1.4 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, and each specimen shall be within the limits prescribed in **Table 2** when determined in accordance with Test Methods **E112**.

9. Dimensions, Mass, and Permissible Variation

9.1 All dimensions and tolerances of cups shall be as indicated on the drawings furnished with the purchase order or contract.

10. Workmanship, Finish, and Appearance

10.1 The cups shall be uniform in quality and shall be free of conditions which would interfere with the purpose for which the cups are intended.

TABLE 2 Grain Size Requirements

Standard Temper Designation (B601)	Grain Size, mm		
	Nominal	Min	Max
OS025	0.025	0.015	0.035
OS040	0.040	0.025	0.050

11. Sampling

11.1 The lot size, portion size, and selection of pieces shall be as follows:

11.1.1 *Lot Size*—40 000 lb (18 144 kg) or fraction thereof.

11.1.2 *Portion Size*:

11.1.2.1 For chemical analysis—5 cups. In accordance with Practice **E255**, drillings, millings, etc., shall be taken in approximately equal weight from each of the sample cups selected and combined into one composite sample. The minimum weight of the composite sample that is divided into three equal parts shall be 150 g. Each of the three equal parts shall be placed in a package and sealed: one for the seller, one for the purchaser, and one for an umpire.

11.1.2.2 For grain size—20 cups.

11.1.2.3 For determination of dimensions—200 cups.

11.1.2.4 For the visual inspection—2000 cups.

11.1.2.5 For work tests—500 cups or 5000 cups, when and as required.

12. Number of Tests and Retests

12.1 *Test*:

12.1.1 *Chemical Analysis*—See **11.1.2.1**.

12.2 *Other Tests*:

12.2.1 *Visual Inspection*—Each cup in the sample shall be visually inspected.

12.2.1.1 *Major Defects*—Not more than 0.25 % of the cups in the sample shall contain the following major defects—scaly metal, deep scratches, laminations, slivers, laps, cracks, and wrinkles.

12.2.1.2 *Minor Defects*—Not more than 2 % of the cups in the sample shall contain the following minor defects—oily cup, greasy cup, dirty or gritty cup, oxidized cup, dented or bent edges, and scratches.

12.2.2 *Grain Size*—Each cup in the sample shall be tested.

12.2.3 *Work Test*—If required by the purchase order or contract, one of the following work tests may be performed by the purchaser before approval of a lot for shipment:

12.2.3.1 Five hundred cups or more shall be subjected to a working test by processing them through the first drawing operation. The cups shall draw satisfactorily without showing defects that will cause them to be unsuitable for the purpose intended.

12.2.3.2 Five thousand cups shall be subjected to a working test by processing them satisfactorily into bullet jackets.

12.3 *Retest*:

12.3.1 When requested by the manufacturer or supplier, a retest shall be permitted when results of tests obtained by the purchaser fail to conform to the requirements of the product specification.

12.3.2 If the material fails to pass the visual inspection examination or a work test, or if more than one specimen fails the grain size test, a retest shall be permitted on a sample double that of the original sample. The result of the retest or retests shall meet the specified requirements.

12.3.3 *Chemical Analysis*—An additional sample in accordance with **11.1.2.1** is permitted to be made and tested.

13. Specimen Preparation

13.1 For grain size measurements, either tangential grinding and polishing, or cutting, mounting, and polishing methods may be used to reach the zone (Fig. 1).

13.1.1 The test specimen shall be prepared in accordance with Guide E3.

13.2 Specimens for chemical analysis shall be prepared in accordance with Practice E255.

14. Test Methods

14.1 Chemical Analyses:

14.1.1 In cases of disagreement, test methods for chemical analysis shall be subject to agreement between the manufacturer or supplier and the purchaser. The following table is a list of published methods, some of which may no longer be viable, which along with others not listed, may be used subject to agreement.

Test	Method
Copper	E478
Lead	E478 (AA)
Iron	E478
Zinc	E478 (Titrimetric)

14.1.2 The test method(s) to be followed for the determination of element(s) resulting from contractual or purchase order agreement shall be as agreed upon between the manufacturer or supplier and purchaser.

14.1.2.1 Since no recognized test method is known to be published, the determination of bismuth shall be subject to agreement between the manufacturer and the purchaser.

14.2 Other Tests:

14.2.1 The product furnished shall conform to specified requirements when subjected to test in accordance with the following table:

Test	Method
Grain Size	E3, E112

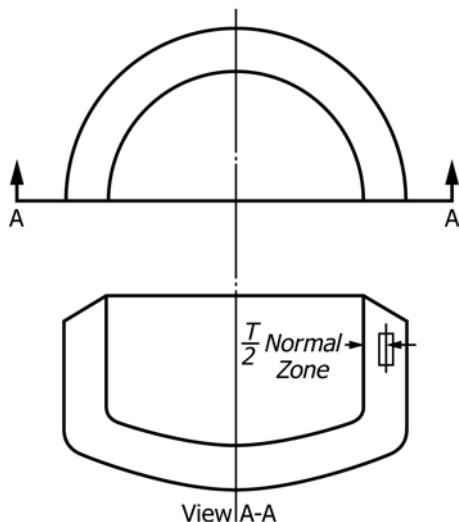


FIG. 1 Location of Areas to Be Examined for Grain Size in Bullet Jacket Cups

14.2.2 Grain size measurements shall be made in a zone that is the approximate mid-point of the side-wall length and thickness of the cups as shown in Fig. 1. At least three measurements shall be made, averaged, and recorded for each grain size determination.

15. Significance of Numerical Limits

15.1 For the purpose of determining compliance with the specified limits for requirements of the properties listed in the following table and for dimensional tolerances, an observed value or a calculated value shall be rounded as indicated in accordance with the rounding method of Practice E29.

Property	Rounded Unit for Observed or Calculated Value
Chemical Composition	Nearest unit in the last right-hand significant digit used in expressing the limiting value
Grain size	Nearest multiple of 0.005 mm

16. Inspection

16.1 The manufacturer or supplier shall inspect and make tests necessary to verify the furnished product conforms to specification requirements.

16.2 *Measurement of Dimensions*—Each sample cup shall be gaged for compliance with all the dimensions shown on the applicable drawing. In addition, each cup in the sample shall be measured for side wall thickness at two or more opposite points at the same distance from the mouth or base. The variation in wall thickness of any cup so measured shall be within the limits as shown on the drawing.

16.3 Source inspection of the product by the purchaser may be agreed upon between the manufacturer, or supplier, and the purchaser as part of the purchase order. In such case, the nature of the facilities needed to satisfy the inspector, representing the purchaser, that the product is being furnished in accordance with the specification, shall be included in the agreement. All testing and inspection shall be conducted so as not to interfere unnecessarily with the operation of the works.

16.4 When mutually agreed upon, the manufacturer, or supplier, and the purchaser shall conduct the final inspection simultaneously.

17. Rejection and Rehearing

17.1 Rejection:

17.1.1 Product that fails to conform to the specification requirements when tested by the purchaser or purchaser’s agent shall be subject to rejection.

17.1.2 Rejection shall be reported to the manufacturer or supplier promptly. In addition, a written notification of rejection shall follow.

17.1.3 In case of dissatisfaction with results of the test upon which rejection is based, the manufacturer or supplier shall have the option to make claim for rehearing.

17.2 Rehearing:

17.2.1 As a result of product rejection, the manufacturer or supplier shall have the option to make claim for a retest to be conducted by the manufacturer, or supplier, and the purchaser. Samples of the rejected product shall be taken in accordance