Designation: ~~B169/B169M – 10~~ B169/B169M – 15

Standard Specification for Aluminum Bronze Sheet, Strip, and Rolled Bar[1]

This standard is issued under the fixed designation B169/B169M; 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[2] establishes the requirements for Copper Alloy UNS Nos. C61300 and C61400 aluminum bronze sheet, strip, and rolled bar.

1.2 The products made to this specification are commonly used for drawing, forming, stamping, and bending applications and are not intended for electrical applications.

NOTE 1—The products produced under this general specification may be used in many applications in which the individual requirements may be too specific to be determined by normal physical or mechanical testing. Therefore, it may be advisable for the purchaser to submit samples or drawings to the manufacturer to be assured that the product furnished is suitable for the intended application.

NOTE 2—Refer to Specification B171/B171M for plate product.

1.3 *Units*—Values stated in either SI units or inch-pound units are to be regarded separately as standard. Within the text, SI units are shown in brackets. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

~~1.3.1 Within the text, SI Units are shown in brackets.~~

2. Referenced Documents

~~2.1 The following documents in the current *Book of Standards* form a part of this specification to the extent referenced herein:~~

2.1 *ASTM Standards:*[3]

B171/B171M Specification for Copper-Alloy Plate and Sheet for Pressure Vessels, Condensers, and Heat Exchangers

B248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar

B248M Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar (Metric)

B601 Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast

B846 Terminology for Copper and Copper Alloys

~~E8~~E8/E8M Test Methods for Tension Testing of Metallic Materials

~~E8M Test Methods for Tension Testing of Metallic Materials [Metric] (Withdrawn 2008)[4]~~

~~E54 Test Methods for Chemical Analysis of Special Brasses and Bronzes (Withdrawn 2002)[4]~~

~~E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)[4]~~

E290 Test Methods for Bend Testing of Material for Ductility

~~E478 Test Methods for Chemical Analysis of Copper Alloys~~

3. General Requirements

3.1 The following sections of Specifications B248 or B248M form a part of this specification:

3.1.1 Terminology,

3.1.2 Workmanship, Finish and Appearance,

3.1.3 Sampling,

3.1.4 Number of Tests and Retests,

3.1.5 Specimen Preparation,

[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] For *ASME Boiler and Pressure Vessel Code* applications, see related Specification SB-169 in Section II of that code.

[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**

3.1.6 Significance of Numerical Limits,
3.1.7 Inspection,
3.1.8 Rejection and Rehearing,
3.1.9 Certification,
3.1.10 Mill Test Reports,
3.1.11 Packaging and Package Marking,
3.1.12 Supplementary Requirements.

3.2 In addition, when a section with a title identical to that referenced in 3.1, above, appears in this specification, it contains additional requirements which supplement those appearing in Specifications B248 or B248M.

4. Terminology

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

5. Ordering Information

5.1 Include the following ~~information~~ specified choices when placing orders for product under this specification, as applicable.
5.1.1 ASTM designation and year of ~~issue (for example,~~ issue,~~B169/B169M – 05),~~
5.1.2 Copper ~~Alloy~~[Alloy] UNS No. ~~(for example, C61300),~~designation,
5.1.3 ~~Temper (for example, Section~~ Temper, (Section 8),
5.1.4 Dimensions, thickness, and width ~~(for example, Section~~ (Section 12),
5.1.5 Length,
5.1.6 How furnished, ~~flat~~ straight lengths or ~~rolls,~~coils,
5.1.7 ~~Total weight,~~ Quantity—total weight or total length or number of pieces of each size,
5.1.8 When product is ~~purchased~~ordered for *ASME Boiler and Pressure Vessel Code* Application, and
5.1.9 When product is ~~purchased~~ordered for agencies of the U.S. government.

5.2 The following options are available ~~and should be specified~~ but may not be included unless specified at the time of placing the order when required:
5.2.1 Type of edge (for example, slit, sheared, sawed, and so forth),
5.2.2 Heat identification or traceability details,
5.2.3 Bend test,
5.2.4 Certification, and
5.2.5 Mill ~~test report.~~ Test Report.

6. Materials and Manufacture

6.1 *Materials:*
6.1.1 The material of manufacture shall be ~~from cast slabs (also termed cakes or ingots)~~ a form (cast bar, cake, slab, etc.) of Copper Alloy UNS ~~Numbers~~No. C61300 or C61400 of such purity and soundness as to be suitable for processing into the products prescribed herein.

6.2 *Manufacture:*
6.2.1 The ~~products~~product shall be manufactured by such hot-working, cold-working, and annealing processes as to produce a uniform wrought structure in the finished product. The product shall be hot or cold rolled to finish gage and subsequently annealed, if required, to meet the temper properties ~~invoked.~~specified.
6.2.2 The product shall be hot or cold worked to the finished size, and subsequently annealed when required, to meet the temper properties specified.

6.3 *Edges:*
6.3.1 Slit edges shall be furnished unless otherwise specified in the contract or purchase order.

7. Chemical Composition

7.1 The material shall conform to the chemical ~~compositional~~composition requirements in Table 1 for the Copper ~~alloy~~ [alloy] UNS No. designation specified in the ordering information.
7.1.1 These composition limits do not preclude the presence of ~~unnamed elements. Limits~~ other elements. By agreement between the manufacturer and purchaser, limits may be established and analysis required for unnamed ~~elements by agreement between the supplier and the purchaser.~~elements.

7.2 For alloys in which copper is listed as "remainder," copper is the difference between the sum of results of all elements determined and 100 %. When all elements in Table 1 for the specified alloy are determined, the sum of the results shall be:

TABLE 1 Chemical Requirements

Element	Composition,%	
	Copper Alloy UNS No.	
	C61300[A]	C61400
Copper (including silver)	remainder	remainder
Lead, max	0.01	0.01
Iron	2.0–3.0	1.5–3.5
Zinc, max	0.10	0.20
Aluminum	6.0–7.5	6.0–8.0
Manganese, max	0.20	1.0
Phosphorus, max	0.015	0.015
Silicon, max	0.10	...
Tin	0.20–0.50	...
Nickel (including cobalt), max	0.15	...

[A] When the product is for subsequent welding applications and is so specified by the purchaser, chromium shall be 0.05 % max, cadmium 0.05 % max, zirconium 0.05 % max, and zinc 0.05 % max.

Copper Alloy UNS No.	Sum of Results % min.
C61300	99.8
C61400	99.5

8. Temper

8.1 ~~Products in both alloys are available in the~~The standard tempers for products described in this specification are given in Table 2 ~~following tempers as defined in Classification B601: annealed tempers O25, O60,~~ and Table 3~~hot-rolled temper M20.~~.

~~NOTE 3—Inquiry should be made to the supplier concerning the availability of the specific temper required.~~

8.1.1 Hot-rolled temper M20.

8.1.2 Annealed-to-temper O25 or O60.

NOTE 3—Inquiry should be made to the supplier concerning the availability of the specific temper required.

9. Mechanical Property Requirements

9.1 ~~The product furnished shall conform to the requirements of Table 2 or Table 3 for the specified alloy, temper, and dimensions prescribed.~~*Tensile Strength Requirements:*

9.1.1 Product furnished under this specification shall conform to the tensile requirements prescribed in Table 2 or Table 3 when tested in accordance with Test Methods E8/E8M. The test specimens shall be taken so the longitudinal axis of the specimen is parallel to the direction of rolling.

10. Bending Requirements

10.1 When specified in the contract or purchase order, the test specimen shall withstand being bent cold perpendicular to the direction of rolling (rightway bend) through 120° around a mandrel whose radius is equal to the thickness of the product. When the outside surface of the bend is examined with an unaided eye, no sign of fracturing shall be observed.

TABLE 2 Tensile Requirements (Inch-Pound)

Copper Alloy UNS No.	Temper Designation[A]		Thickness, in.	Width, in.	Tensile Strength min, ksi[B]	Yield Strength at 0.5 % Extension Under Load, min, ksi[B]	Yield Strength at 0.2 % Extension Under Load, min, ksi[B]	Elongation in 2 in., min, %
	Standard	Former						
C61300	O25, O60, or M20	soft	½ and under	all widths	75	36	34	35
			Over ½ to 2, incl	all widths	72	32	30	35
			Over 2 to 5, incl	all widths	65	28	26	35
C61400	O25, O60, or M20	soft	½ and under	all widths	72	32	30	35
			Over ½ to 2, incl	all widths	70	30	28	35
			Over 2 to 5, incl	all widths	65	28	26	35

[A] Standard designations defined in Classification B601.
[B] ksi = 1000 psi.