~~Designation:B169/B169M–01~~ Designation: B 169/B 169M – 05

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

This standard is issued under the fixed designation B 169/B 169M; 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.

This standard has been approved for use by agencies of the Department of Defense.

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 B 171/B 171M for plate product.

1.3 The values stated in ~~inch-pound~~ either SI units or ~~SI~~inch-pound units are to be regarded separately as standard. The values stated in each system ~~are~~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 ~~specification.~~ standard.

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:

2.2 *ASTM Standards:* [3]

B 171/B 171M Specification for Copper Alloy Plate and Sheet for Pressure Vessels, Condensers and Heat Exchangers

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

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

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

B 846 Terminology for Copper and Copper Alloys

E 8 Test Methods for Tension Testing of Metallic Materials

E 8M Test Methods for Tension Testing of Metallic Materials [Metric]

E 54 Test Methods for Chemical Analysis of Special Brasses and Bronzes[4]

E 62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods)

E 290 Test Methods for Bend Testing of Material for Ductility

E 478 Test Methods for Chemical Analysis of Copper Alloys

3. General Requirements

3.1 The following sections of Specifications B 248 or B 248M form a part of this specification:

3.1.1 Terminology,

3.1.2 Workmanship, Finish and Appearance,

3.1.3 Sampling,

3.1.4 Significance of Numerical Limits,

3.1.5 Inspection,

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[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 10, 2001. Published August 2001. Originally published as B169–41T. Last previous edition B169–95.~~

Current edition approved Oct. 1, 2005. Published November 2005. Originally approved in 1941. Last previous edition approved in 2001 as B 169/B 169M – 01.

[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* ~~, Vol 02.01.~~volume information, refer to the standard's Document Summary page on the ASTM website.

~~[4] Annual Book of ASTM Standards, Vol 03.01.~~

[4] Withdrawn.

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

3.1.6 Rejection and Rehearing,
3.1.7 Certification,
3.1.8 Mill Test Reports,
3.1.9 Packaging and Package Marking,
3.1.10 Supplementary Requirements.

3.2 In addition, when a section with a title identical to that referenced in 3.1 appears in this specification, it contains additional requirements which supplement those appearing in Specifications B 248 or B 248M.

4. Terminology

4.1 For definitions of terms related to copper and copper alloys, refer to Terminology B 846.

5. Ordering Information

5.1 Orders for products under this specification should include the following information:
5.1.1 ASTM designation and year of issue (for example, B 169/B 169M – 0~~0~~5),
5.1.2 Copper Alloy UNS No. (for example, C61300),
5.1.3 Temper (for example, Section 8),
5.1.4 Dimensions, thickness, and width (for example, Section 12),
5.1.5 Length,
5.1.6 How furnished, flat or rolls,
5.1.7 Total weight, each size,
5.1.8 When product is purchased for *ASME Boiler and Pressure Vessel Code* Application, and
5.1.9 When product is purchased for agencies of the U.S. government.

5.2 The following options are available and should be specified 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
~~5.2.5Mill Test Report.~~
5.2.5 Mill test report.

6. Materials and Manufacture

6.1 *Material*:
~~6.1.1The~~—The material of manufacture shall be from cast slabs (also termed cakes or ingots) of Copper Alloy UNS Numbers C61300 or C61400 of such purity and soundness as to be suitable for processing into the products prescribed herein.

6.2 *Manufacture*:
~~6.2.1The~~— The products 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.

~~6.2.2~~6.2.1 *Edges*:
~~6.2.2.1Slit~~—Slit edges shall be furnished unless otherwise specified in the contract or purchase order.

7. Chemical Composition

7.1 The specified copper alloy shall conform to the requirements of Table 1.

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.

7.1.1 These composition limits do not preclude the presence of unnamed elements. Limits may be established and analysis required for unnamed elements by agreement between the supplier and the purchaser.

7.2 When all elements in Table 1 for the specified alloy are determined, the sum of the results shall be:

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 following tempers as defined in ~~Practice~~Classification B 601: annealed tempers O25, O60, and hot-rolled temper M20.

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.

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.

11. Purchases for U.S. Government Agencies

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 stipulations in the Supplementary Requirements section of Specifications B 248 or B 248M.

12. Dimensions, Mass, and Permissible Variations

12.1 The dimensions and tolerances for material described by this specification shall be as specified in the current edition of Specifications B 248 or B 248M.

12.1.1 *Thickness*

12.1.2 *Width*:

TABLE 2 Tensile Requirements

Copper Alloy UNS No.	Temper Designation[A]		Thickness, in. ~~[mm]~~	Width, in.	Tensile Strength min, ksi[B] ~~[MPa]~~	Yield Strength at 0.5 % Extension Under Load, min, ksi[B] ~~[MPa]~~	Yield Strength at 0.2 % Extension Under Load, min, ksi[B] ~~[MPa]~~	Elongation in 2 in., min, %
	Standard	Former						
~~C61300~~	~~O25, O60, or M20~~	~~soft~~	~~½ and under [12.0 and under]~~	~~all widths~~	~~75 [515]~~	~~36 [255]~~	~~34 [235]~~	~~35~~
C61300	O25, O60, or M20	soft	½ and under	all widths	75	36	34	35
			~~Over ½ to 2, incl [Over 12.0 to 50.0, incl]~~	~~all widths~~	~~72 [495]~~	~~32 [220]~~	~~30 [210]~~	~~35~~
			Over ½ to 2, incl	all widths	72	32	30	35
			~~Over 2 to 5, incl [Over 50.0 to 140 incl]~~	~~all widths~~	~~65 [450]~~	~~28 [195]~~	~~26 [180]~~	~~35~~
			Over 2 to 5, incl	all widths	65	28	26	35
~~C61400~~	~~O25, O60, or M20~~	~~soft~~	~~½ and under [12.0 and under]~~	~~all widths~~	~~72 [495]~~	~~32 [220]~~	~~30 [205]~~	~~35~~
C61400	O25, O60, or M20	soft	½ and under	all widths	72	32	30	35
			~~Over ½ to 2, incl [Over 12.0 to 50.0, incl]~~	~~all widths~~	~~70 [485]~~	~~30 [205]~~	~~28 [195]~~	~~35~~
			Over ½ to 2, incl	all widths	70	30	28	35
			~~Over 2 to 5, incl [Over 50.0 to 140 incl]~~	~~all widths~~	~~65 [450]~~	~~28 [195]~~	~~26 [180]~~	~~35~~
			Over 2 to 5, incl	all widths	65	28	26	35

[A] Standard designations defined in ~~Pr~~ Classificatiee~~on~~ B 601.

[B] ksi = 1000 psi.