



Designation: ~~B592-01 (Reapproved 2006)~~ Designation: B592 - 11

Standard Specification for Copper-Zinc-Aluminum-Cobalt Alloy, Copper-Zinc-Tin-Iron Alloy Plate, Sheet, Strip, and Rolled Bar¹

This standard is issued under the fixed designation B592; 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 covers the requirements for plate, sheet, strip, and rolled bar in alloys C66300 and C68800.²

NOTE 1—Since alloy C68800 is frequently used in a variety of applications where yield strength and stress-corrosion resistance may be critical, it is recommended that drawings or samples of the part to be fabricated and details of application be submitted for use in establishing temper and treatment of material.

NOTE 2—Alloy C66300 is covered by a patent. Interested parties are invited to submit information regarding the identification of an alternative(s) to this patented item to the ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

~~1.2 Values stated in inch-pound units are to be regarded as the standard. Values given in parentheses are for information only.~~

1.2 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 The following documents of the issue in effect on the date of material purchase form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards*:³

B248 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

E8 Test Methods for Tension Testing of Metallic Materials

E18 Test Methods for Rockwell Hardness of Metallic Materials

E54 Test Methods for Chemical Analysis of Special Brasses and Bronzes

E75 Test Methods for Chemical Analysis of Copper-Nickel and Copper-Nickel-Zinc Alloys E76

E76 Test Methods for Chemical Analysis of Nickel-Copper Alloys

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. General Requirements

3.1 The following sections of Specification B248 constitute a part of this specification:

3.1.1 Terminology—Definitions,

~~3.1.2 Materials and Manufacturing,~~

3.1.2 Material and Manufacture,

3.1.3 Workmanship, Finish, and Appearance,

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 ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights are entirely their own.

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.

- 3.1.4 Sampling, except for chemical analysis,
- 3.1.5 Number of Tests and Retests,
- 3.1.6 Specimen Preparation,
- 3.1.7 Test Methods, except for chemical analysis,
- 3.1.8 Significance of Numerical Limits,
- 3.1.9 Inspection,
- 3.1.10 Rejection and Rehearing,
- 3.1.11 Certification,
- 3.1.12 Test Reports (Mill),
- 3.1.13 Packaging and Package Marking, and
- 3.1.14 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 Specification B248.

4. Terminology

4.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology B846.

4.2 *Definition of Term Specific to This Standard:*

4.2.1 *capable of*—having the properties necessary for conformance to specification requirements when subjected to a referenced test method.

5. Ordering Information

5.1 Contracts or purchase orders for product under this specification should include the following information:

- 5.1.1 ASTM designation and year of issue (for example, B592 – XX),
- 5.1.2 Copper Alloy UNS No. designation (for example, C68800),
- 5.1.3 Temper (see Section 8),
- 5.1.4 Dimensions, that is, thickness, width, length, and so forth. (see Section 13),
- 5.1.5 Form, that is, plate, sheet, strip, or rolled bar,
- 5.1.6 How furnished, that is, coils, specific lengths or stock lengths, with or without ends,
- 5.1.7 Quantity, that is, total weight each form, temper, and size, and
- 5.1.8 Whether material is purchased for agencies of the U.S. government (see Section 12).

5.2 The following options are available under this specification and should be specified in the contract or purchase order when required:

- 5.2.1 Type of edge, that is, slit, sheared, sawed, square corners, round corners, rounded edges, or full rounded edges, and
- 5.2.2 Width and straightness tolerances (see Section 13).

6. Material and Manufacture

6.1 *Material:*

6.1.1 The material of manufacture shall be a cast bar, cake, slab, and so forth, of Copper Alloy UNS C66300 or C68800 of such purity and soundness as to be suitable for process in to the products prescribed herein.

6.1.2 In the event heat identification or traceability is required, the purchaser shall specify the details desired.

NOTE 3—Due to 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.

6.2 *Manufacture:*

6.2.1 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.

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.

6.2.3 *Edges*—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 composition requirements specified in Table 1.

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

7.3 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 are determined, the sum of the results shall equal at least 99.5 %.

8. Temper

8.1 Products fabricated from these alloys are available in the tempers listed in Table 2 as defined in Classification B601.

TABLE 1 Chemical Requirements

Element	Composition, %		Element	Composition, %	
	Copper Alloy UNS No.			Copper Alloy UNS No.	
	C68800			C66300	
Copper, incl silver	remainder		Copper, incl silver	84.5–87.5	
Aluminum	3.0–3.8		Aluminum	...	
Zinc	21.3–24.1		Zinc	remainder	
Zinc + aluminum	25.1–27.1		Zinc + aluminum	...	
Cobalt	0.25–0.55		Cobalt	0.20 max	
Nickel	...		Nickel	...	
Lead	0.05 max		Lead	0.05 max	
Iron	0.20 max		Iron	...	
			Iron + Cobalt	1.4–2.4	
			Tin	1.5–3.0	
			Phos	.35 max	

TABLE 2 Mechanical Requirements

Temper Designation ^A		Tensile Strength, ksi ^B (MPa ^C)		Approximate Rockwell Hardness	
Standard	Former	Min	Max	B Scale 0.020 in. (0.51 mm) and Over	30T Scale 0.012 in. (0.31 mm) and Over
Copper Alloy UNS No. C68800					
O61	annealed	77 (530)	87 (600)	...	63–74
Copper Alloy UNS No. C68800					
H01	quarter-hard	87 (600)	101 (695)	86–95	75–81
H02	half-hard	97 (670)	112 (770)	93–97	80–82
H04	hard	106 (730)	120 (825)	96–98	82–83
H06	extra-hard	113 (780)	127 (875)	97–99	82–84
H08	spring	123 (850)	133 (915)	98–100	83–84
H10	extra-spring	125 (863)	...	99	84
H10	extra-spring	125 (860)	...	99	84
Copper Alloy UNS No. C66300					
O82	annealed to temper— $\frac{1}{2}$ hard	58 (400)	73 (503)	65–81	...
O82	annealed to temper— $\frac{1}{2}$ hard	58 (400)	73 (505)	65–81	...
Copper Alloy UNS No. C66300					
H04	hard	76 (524)	91 (627)	84–91	68–77
H04	hard	76 (525)	91 (630)	84–91	68–77
H06	extra-hard	88 (607)	103 (710)	87–94	75–83
H06	extra hard	88 (605)	103 (710)	87–94	75–83
H08	spring	95 (655)	110 (758)	92–96	79–87
H08	spring	95 (655)	110 (760)	92–96	79–87
H10	extra-spring	100 (689)	114 (786)	94–97	82–88
H10	extra spring	100 (690)	114 (785)	94–97	82–88
H14	super-spring	105 (724)		95 min	85 min
H14	super spring	105 (725)		95 min	85 min

^A Standard designation defined in Classification B601.

^B ksi = 1000 psi.

^C See Appendix X1.

8.1.1 *Rolled (H)*—The standard tempers for rolled material are as designated in Table 2 with the prefix “H”. Former designations and the standard designations as defined in Classification B601 are shown.

8.1.2 *Anneal to Temper (O)*—The standard tempers of annealed-to-temper material are as designated in Table 2 with the prefix “O”. Former designations and the standard designations as defined in Classification B601 are shown.

9. Grain Size for Annealed Tempers

9.1 Although no grain size has been established, the product must be fully recrystallized as determined by Test Method E112.

10. Physical Property Requirements

10.1 The electrical resistivity requirement of Copper Alloys UNS C66300 and UNS C68800 are listed in Table 3 for information only.

11. Mechanical Property Requirements

11.1 *Tensile Strength Requirements* :