



Designation: B 100 – 03a

Standard Specification for Wrought Copper-Alloy Bearing and Expansion Plates and Sheets for Bridge and Other Structural Use¹

This standard is issued under the fixed designation B 100; 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 wrought copper-alloy bearing plate and bearing sheets for application in bridges and other structures. Specifically, the plates and sheets are to be used for fixed or expansion bearings where the motion is slow and intermittent with pressures not exceeding 3 ksi (20 MPa).

1.2 *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*:²

- B 248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet Strip, and Rolled Bar
- B 846 Terminology for Copper and Copper Alloys
- E 8 Test Methods for Tension Testing of Metallic Materials
- E 9 Compression Testing of Metallic Materials at Room Temperature
- E 10 Test Method for Brinell Hardness of Metallic Materials
- E 18 Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E 54 Test Methods for Chemical Analysis of Special Brasses and Bronzes
- E 62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric)
- E 255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition

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 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.

E 478 Test Methods for Chemical Analysis of Copper Alloys

3. General Requirements

3.1 The following sections of Specification B 248 constitute 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,
- 3.1.6 Test Methods,
- 3.1.7 Significance of Numerical Limits,
- 3.1.8 Inspection,
- 3.1.9 Rejection and Reheating,
- 3.1.10 Certification,
- 3.1.11 Test Reports,
- 3.1.12 Packaging and Package Marking, and
- 3.1.13 Supplementary Requirements.

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

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 product to this specification should include the following information:

- 5.1.1 ASTM specification designation and year of issue,
- 5.1.2 Copper Alloy UNS No. designation (for example, C51000),
- 5.1.3 Dimensions: length, width, thickness (Section 11 and Table 1),
- 5.1.4 Quantity or weight for each size,
- 5.1.5 Temper (Section 8),
- 5.1.6 When product produced of Copper Alloy UNS No. C61300 is to be used in applications requiring welding (Table 2, footnote A), and

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

TABLE 1 Thickness and Weight Tolerances

Ordered Weight lb/ft ² (kg/m ²) ^A	Weight Tolerance,%		Ordered Thickness, in. (mm)	Thickness Tolerance, %	
	Over	Under		Over	Under
Plates and Sheets 20 in. (508 mm) and Under in Width					
5.0 to 7.5 (24.4 to 36.6), excl	4.5	3.5	Under 1/8 (3.18)	9	0
7.5 to 10.0 (36.6 to 48.8), excl	4	3	1/8 to 3/16 (3.18 to 4.76), excl	8	0
10.0 to 12.5 (48.8 to 61.0), excl	4	2.5	3/16 to 1/4 (4.76 to 6.35), excl	7	0
12.5 to 15.0 (61.0 to 73.2), excl	3.5	2.5	1/4 to 5/16 (6.35 to 7.94), excl	6	0
15.0 to 17.5 (73.2 to 85.4), excl	2.5	2.5	5/16 to 3/8 (7.94 to 9.52), excl	5	0
17.5 to 20.0 (85.4 to 97.6), excl	2.5	2.0	3/8 to 7/16 (9.52 to 11.1), excl	4.5	0
20 (97.6) or over	2.5	2.0	7/16 to 1/2 (11.1 to 12.7), excl	4 ^B	0
			1/2 to 5/8 (12.7 to 15.9), excl	3.5 ^B	0
			5/8 to 3/4 (15.9 to 19.0), excl	3 ^B	0
			3/4 to 1 (19.0 to 25.4), excl	2.5 ^B	0
			1 (25.4) or over	2.5 ^B	0
Plates and Sheets Over 20 in. (508 mm) in Width					
All weights	5.0	5.0	All thicknesses	10.0	0

^A For purposes of calculating weights, cross section, etc., the density of rolled phosphor bronze (Copper Alloy UNS Nos. C51000 and C51100) shall be taken as 0.320 lb/in.³(8.86 g/cm³) and the density of rolled copper silicon alloy (Copper Alloy UNS No. C65500) as 0.308 lb/in.³ (8.53 g/cm³).

^B These "Over" thickness tolerances apply to plates and sheets 10 in. (254 mm) and under in width. For plates and sheets over 10 to 20 in. (254 to 508 mm), incl. in width the "Over" thickness tolerances shall be as follows:

Ordered Thickness, in. (mm).....Thickness Tolerance, Over, %

7/16 to 5/8 (11.1 to 15.9), excl.....4.5

5/8 to 3/4 (15.9 to 19.0), excl.....4.0

3/4 (19.0) or over.....3.5

TABLE 2 Chemical Requirements

Element	Composition %				
	C51000	C51100	C61300	C61400	C65500
Copper (incl Silver)	remainder	remainder	remainder	remainder	remainder
Phosphorus	0.03–0.35	0.03–0.35	0.015 max.	0.015 max.	...
Tin	4.2–5.8	3.5–4.9	0.20–0.50	...	...
Silicon	...	...	0.10 max.	...	2.8–3.8
Aluminum	...	...	6.0–7.5	6.0–8.0	...
Iron	0.10 max.	0.10 max.	2.0–3.0	1.5–3.5	0.8 max.
Manganese	...	...	0.20 max.	1.0 max.	0.5–1.3
Zinc, max.	0.30	0.30	0.10	0.20	1.5 max.
Lead, max.	0.05	0.05	0.01	0.01	0.05
Nickel, max.	...	...	0.15 ^A	...	0.6 ^A
Other named elements	...	...	...	...	...

^A Ni value includes Co.

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

5.1.7 When product is purchased for agencies of the U.S. government (Section 10).

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 Heat identification or traceability (Section 6.1.2),

5.2.2 Certification (Specification B 248), and

5.2.3 Test Report (Specification B 248).

6. Material and Manufacture

6.1 Material:

6.1.1 The material of manufacture shall be cast bar, slab, cake, billets, and so forth of Copper Alloy UNS No. C51000, C51100, C61300, C61400, or C65500 of such purity and soundness as to be suitable for processing into the products prescribed herein.

6.1.2 When heat identification or traceability is required, the purchaser shall specify the details desired in the contract or purchase order.

6.2 Manufacture:

6.2.1 The product shall be manufactured by hot or cold working and annealing processes as deemed necessary in order 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 properties specified.

7. Chemical Composition

7.1 The material shall conform to the chemical requirements prescribed in Table 2 for the Copper Alloy UNS No. designation specified in the contract or purchase order.

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

7.3 Copper, given as the remainder, may be taken as the difference between the sum of results of all elements analyzed and 100 %.