Designation: B 121/B 121M – 95

Standard Specification for Leaded Brass Plate, Sheet, Strip, and Rolled Bar[1]

This standard is issued under the fixed designation B 121/B 121M; 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 covers copper-zinc-lead alloys (leaded brass) plate, sheet, strip, and rolled bar. The following alloys are covered:[2]

Copper Alloy UNS No.[2]	Previously Used Designation	Nominal Composition, % Copper	Zinc	Lead	Iron
C33500	2	65.0	34.5	0.5	...
C34000	3	65.0	34.0	1.0	...
C34200	5	65.0	33.0	2.0	...
C35000	...	61.5	37.4	1.1	...
C35300	4	61.2	37.0	1.8	...
C35340	...	61.2	36.8	1.8	0.2
C35600	6	61.2	36.3	2.5	...

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

2. Referenced Documents

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

2.2 *ASTM Standards:*

B 248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar[3]

B 248M Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar [Metric][3]

B 601 Practice for Temper Designations for Copper and Copper Alloys—Wrought and Cast[3]

E 8 Test Methods for Tension Testing of Metallic Materials[4]

E 8M Test Methods for Tension Testing of Metallic Materials [Metric][4]

E 527 Practice for Numbering Metals and Alloys (UNS)[5]

3. Ordering Information

3.1 Orders for material under the specification should include the following information:

3.1.1 Copper Alloy UNS number (Section 1),

3.1.2 Temper (Section 5),

3.1.3 Dimensions: thickness and width (see 9.1.1 and 9.1.2),

3.1.4 Type of edge, if required: slit, sheared, sawed, square corners, rounded corners, rounded edges, or full-rounded edges (see 9.1.5),

3.1.5 How furnished (straight lengths or coils),

3.1.6 Lengths (see 9.1.3),

3.1.7 Weight: total for each size, and

3.1.8 ASTM Specification B 121/B 121M, year of issue, and whether inch-pound or SI units are applicable (see 1.2).

3.2 In addition, when material is purchased for agencies of the U. S. Government, it shall conform to the Supplementary Requirements as defined in Specification B 248 or B 248M when specified in the contract or purchase order.

4. Chemical Composition

4.1 The materials shall conform to the compositions prescribed in Table 1.

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

4.3 Either copper or zinc may be taken as the difference between the sum of all elements analyzed and 100 %. When all

[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] The UNS system for copper and copper alloys (see Practice E 527) is a simple expansion of the former standard designation system accomplished by the addition of a prefix "C" and a suffix "00." The suffix can be used to accommodate composition variations of the base alloy.

[3] *Annual Book of ASTM Standards*, Vol 02.01.

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

[5] *Annual Book of ASTM Standards*, Vol 01.01.

TABLE 1 Chemical Requirements

Copper Alloy UNS No.	Composition			
	Copper	Lead	Iron	Zinc
C33500	62.0–65.0	0.25–0.7	0.10 max	remainder
C34000	62.0–65.0	0.8–1.5	0.10 max	remainder
C34200	62.0–65.0	1.5–2.5	0.10 max	remainder
C35000	60.0–63.0	0.8–2.0	0.10 max	remainder
C35300	60.0–63.0	1.5–2.5	0.10 max	remainder
C35340	60.0–63.0	1.5–2.5	0.10–0.30	remainder
C35600	60.0–63.0	2.0–3.0	0.10 max	remainder

elements in Table 1 are analyzed, their sum shall be as shown in the table below.

Copper Alloy UNS No.	Copper Plus Named Elements, % min.
C33500	99.6
C34000	99.6
C34200	99.6
C35000	99.6
C35300	99.5
C35340	99.5
C35600	99.5

5. Temper

5.1 *Rolled Material*—The standard tempers of rolled material are as designated in Table 2 in the column entitled "Temper Standard." Special or nonstandard tempers are subject to negotiation between manufacturer or supplier and purchaser (see 3.1.2).

5.2 *Annealed Material*—The standard tempers of annealed material are as designated in Table 3 in the column entitled" Standard Temper Designation." Special or nonstandard tempers are subject to negotiation between manufacturer or supplier and purchaser (see 3.1.2).

6. Mechanical Properties

6.1 *Tensile Strength*:

6.1.1 Products ordered to this specification in inch-pound units shall be tested in accordance with Test Methods E 8, and shall conform to tensile strength requirements prescribed in ksi units in Table 2.

TABLE 3 Grain Size Requirements for Annealed Material

Copper Alloy UNS No.	Standard Temper Designation	Grain Size, mm		
		Nominal	Min	Max
C33500, C34000, C34200, C35000, C34300, C34340, and C35600	OS070	0.070	0.050	0.100
	OS050	0.050	0.035	0.070
	OS035	0.035	0.025	0.050
	OS025	0.025	0.015	0.035

6.1.2 Products ordered to this specification in SI units shall be tested in accordance with Test Methods E 8M, and shall conform to tensile strength requirements prescribed in MPa units in Table 2.

6.1.3 Acceptance or rejection based on mechanical properties shall depend only on the tensile strength.

7. Grain Size Requirements of Annealed Tempers

7.1 Grain size shall be the standard test for material of all thicknesses in annealed tempers, and acceptance or rejection shall depend only on the grain size. The average grain size of each of two samples of annealed material as determined on a plane parallel to the surface of the material shall be within the limits prescribed in Table 3.

8. Rockwell Hardness

8.1 Rockwell hardness tests offer a quick and convenient method of checking leaded brass of any temper for general conformity to the requirements for tensile strength or grain size. The approximate Rockwell hardness values for the rolled tempers are given in Table 2, and those for the annealed tempers of material 0.015 in. [0.381 mm] and over in thickness are given in Table 4 for general information and assistance in testing.

9. Dimensions and Permissible Variations

9.1 The inch-pound dimensions and tolerances for products covered by this specification shall be as prescribed in the current edition of Specification B 248, and the SI dimensions and tolerances covered by this specification shall be as prescribed in the current edition of Specification of B 248M, with

TABLE 2 Tensile Strength Requirements and Approximate Rockwell Hardness Values for Rolled Tempers

NOTE 1—Plate is generally available in only the O60 (soft), H01 (quarter-hard), and H02 (half-hard) tempers. Required properties for other tempers shall be agreed upon between the manufacturer and the purchaser at the time of placing the order.

Temper Designation[A]		Tensile Strength				Approximate Rockwell Hardness[B]	
Standard	Former	ksi[C]		MPa[D]		B Scale	Superficial 30-T
		Min	Max	Min	Max		
Copper Alloy UNS Nos. C33500, C34000, C34200, C35000, C35300, C35340, and C35600							
H01	quarter-hard	49	59	340	405	40–65	43–60
H02	half-hard	55	65	380	450	57–74	54–66
H04	hard	68	78	470	540	76–84	68–73
H06	extra-hard	79	89	545	615	83–89	73–76
H08	spring[E]	86	95	595	655	87–92	75–78
H10	extra-spring[E]	909	99	620	685	88–93	76–79

[A] Standard designations defined in Practice B 601.

[B] Rockwell Hardness values apply as follows:
The B scale hardness values apply to metal 0.020 in. (0.508 mm) and over in thickness, and
The 30-T scale hardness values apply to metal 0.012 in. (0.305 mm) and over in thickness.

[C] ksi = 1000 psi.

[D] See Appendix.

[E] Spring and extra spring temper are generally furnished only in alloy No. 353.

TABLE 4 Approximate Rockwell Hardness of Annealed Material

Nominal Grain Size, mm	Standard Temper Designation	Approximate Rockwell Hardness[A]	
		F Scale	Superficial 30-T
Copper Alloy UNS Nos. C33500, C34000, C34200, C35000, C35300, C35340, and C35600			
0.070	OS070	54–67	12–27
0.050	OS050	61–73	20–35
0.035	OS035	65–76	25–38
0.025	OS025	67–69	27–42

[A] Rockwell hardness values apply as follows:
The F scale hardness values apply to metal 0.020 in. (0.508 mm) and over in thickness, and
The 30-T scale hardness values apply to metal 0.015 in. (0.381 mm) and over in thickness.

particular reference to Section 4 and the following tables of those specifications:

9.1.1 *Thickness*—See 4.2, Table 1.

9.1.2 *Width:*

9.1.2.1 *Slit Metal and Slit Metal with Rolled Edges*—See 5.3, Table 4.

9.1.2.2 *Square-Sheared Metal*—See 5.3, Table 5.

9.1.2.3 *Sawed Metal*—See 5.3, Table 6.

9.1.3 *Length:*

9.1.3.1 *Specific and Stock Lengths With and Without Ends*—See 5.4, Table 7.

9.1.3.2 *Schedule of Lengths (Specific and Stock) with Ends*—See 5.4, Table 8.

9.1.3.3 *Length Tolerances for Square-Sheared Metal*—See 5.4, Table 9.

9.1.3.4 *Length Tolerances for Sawed Metal*— 5.4, Table 10.

9.1.4 *Straightness:*

9.1.4.1 *Slit Metal or Slit Metal Either Straightened or Edge-Rolled*—See 5.5, Table 11.

9.1.4.2 *Square-Sheared Metal*—See 5.5, Table 12.

9.1.4.3 *Sawed Metal*—See 5.5, Table 13.

9.1.5 *Edges*—See 5.6.

9.1.5.1 *Square Edges*—See 5.6.1, Table 14.

9.1.5.2 *Rounded Corners*—See 5.6.2, Table 15.

9.1.5.3 *Rounded Edges*—See 5.6.3, Table 16.

9.1.5.4 *Full-Rounded Edges*—See 5.6.4, Table 17.

10. General Requirements

10.1 Products furnished under this specification in inch-pound units shall conform to the applicable requirements of the current edition of Specification B 248.

10.2 Products furnished under this specification in SI units shall conform to the applicable requirements of the current edition of Specification B 248M.

APPENDIX

(Nonmandatory Information)

X1. METRIC EQUIVALENTS

X1.1 The SI unit for strength properties now shown is in accordance with the International System of Units (SI). The derived SI unit for force is the newton (N), which is defined as that force which when applied to a body having a mass of one kilogram gives it an acceleration of one metre per second squared ($N = kg \cdot m/s^2$). The derived SI unit for pressure or stress is the newton per square metre (N/m^2), which has been named the pascal (Pa) by the General Conference on Weights and Measures. Since 1 ksi = 6 894 757 Pa the metric equivalents are expressed as megapascal (MPa), which is the same as MN/m^2 and N/mm^2.