



Designation: B 453M – 96
METRIC

Standard Specification for Copper-Zinc-Lead Alloy (Leaded-Brass) Rod [Metric]¹

This standard is issued under the fixed designation B 453M; 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 establishes the requirements for copper-zinc-lead alloy (leaded-brass) rod produced from Copper Alloys UNS Nos. C33500, C34000, C34500, C35000, C35300, and C35600. These alloys have the nominal composition given in Table 1.

1.1.1 This product is suitable for applications requiring extensive machining prior to such cold-forming operations as swaging, flaring, severe knurling, or thread rolling.

1.2 This specification is the companion to inch-pound Specification B 453.

1.3 The values stated in SI units are the standard.

NOTE 1—Refer to Specifications B 16M and B 140M for copper-zinc-lead (leaded-brass) rod and bar for screw machine applications.

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*:

B 16M Specification for Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines [Metric]²

B 140M Specification for Copper-Zinc-Lead (Leaded Red Brass, or Hardware Bronze) Rod, Bar, and Shapes [Metric]²

B 249M Specification for General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes, and Forgings [Metric]²

B 453 Specification for Copper-Zinc-Lead Alloy (Leaded-Brass) Rod²

B 601 Practice for Temper Designations for Copper and Copper Alloys—Wrought and Cast²

E 8M Test Methods for Tension Testing of Metallic Materials³

E 18 Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials³

¹ This specification is under the jurisdiction of ASTM Committee B-5 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.02 on Rod, Bar, Shapes, and Forgings.

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² *Annual Book of ASTM Standards*, Vol 02.01.

³ *Annual Book of ASTM Standards*, Vol 03.01.

TABLE 1 Nominal Composition, %

Copper Alloy UNS No.	Copper	Zinc	Lead
C33500	63.5	36.0	0.5
C34000	63.5	35.4	1.1
C34500	63.5	34.5	2.0
C35000	62.0	36.6	1.4
C35300	62.0	36.0	2.0
C35600	61.5	36.0	2.5

E 478 Test Methods for Chemical Analysis of Copper Alloys⁴

3. Ordering Information

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

3.1.1 ASTM designation and year of issue (for example, B453M – XX),

3.1.2 Copper Alloy UNS Number designation (Section 1 and Table 2),

3.1.3 Temper (Section 5),

3.1.4 Form (cross section such as round, hexagonal, or octagonal),

3.1.5 Dimensions (diameter or distance between parallel surfaces),

3.1.6 Length,

3.1.7 Weight: total for each form, and size, and

3.1.8 When product is purchased for agencies of the U.S. Government.

3.2 The following requirements are optional and should be specified in the ordering information when required:

3.2.1 Tensile test for product over 12 mm in diameter or distance between parallel surfaces,

3.2.2 Certification, and

3.2.3 Mill test report.

4. Chemical Composition

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

4.1.1 These specification limits do not preclude the presence of other elements. Limits may be established and analysis

⁴ *Annual Book of ASTM Standards*, Vol 03.05.

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

TABLE 2 Chemical Requirements

Copper Alloy UNS No.	Composition, %			
	Copper	Lead	Iron	Zinc
C33500	62.0–65.0	0.25–0.7	0.15 max	remainder
C34000	62.0–65.0	0.8–1.5	0.15 max	remainder
C34500	62.0–65.0	1.5–2.5	0.15 max	remainder
C35000	61.0–63.0	0.8–2.0	0.15 max	remainder
C35300	61.0–63.0	1.5–2.5	0.15 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	0.15 max	remainder

required for unnamed elements by agreement between the manufacturer and the purchaser. For copper alloys in which zinc is specified as the remainder, either copper or zinc may be taken as the difference between the sum of all elements analyzed and 100 %. When copper is so determined, that difference value shall conform to the requirements given in Table 2.

4.2 When all the named elements in Table 2 for the specified alloy are determined the sum of results shall be as follows:

Copper Alloy UNS No.	Percent, Minimum
C33500, C34000, C34500, C35000	99.6
C35300, C35600	99.5

5. Temper

5.1 The standard tempers for products described in this specification are as follows:

5.1.1 O60 (soft annealed), H01 (quarter hard), and H02 (half hard).

6. Mechanical Property Requirement

6.1 Rockwell Hardness:

6.1.1 Product with a diameter or distance between parallel surfaces of 12 mm and over shall conform to the requirements of Table 3 when tested in accordance with Test Methods E 18.

6.1.1.1 Rockwell hardness test results shall be the basis for product rejection for mechanical properties except when tensile test is specified in the ordering information.

6.2 Tensile Strength:

6.2.1 Product with diameter or distance between parallel surfaces of under 12 mm shall conform to the requirements of Table 4 when tested in accordance with Test Methods E 8M.

6.2.2 When specified in the contract or purchase order, product with diameter or distance between parallel surfaces over 12 mm shall conform to the tensile requirements pre-

TABLE 3 Hardness Requirements

Temper		Diameter or Distance Between Parallel Surfaces, mm	Rockwell B Hardness Determined on the Cross-section Midway Between Surface and Center
Standard	Name		
O60	soft anneal	12 and over	45 max
H01	quarter hard	12 to 25, both incl over 25 to 50, incl over 50	50–75 40–70 35–65
H02	half hard	12 to 25, both incl over 25 to 50, incl over 50	60–80 55–75 40–70

scribed in Table 4 for the specified temper and size when tested in accordance with Test Methods E 8M.

7. Purchases for U.S. Government

7.1 When specified in the contract or purchase order, product purchased for agencies of the U.S. Government shall conform to the special government requirements stipulated in the Supplementary Requirements section.

8. Dimensions, Mass, and Permissible Variations

8.1 The dimensions and tolerances for material covered by this specification shall be as prescribed in the current edition of Specification B 249M with particular reference to Section 7 and the following tables in that specification:

8.1.1 *Diameter or Distance Between Parallel Surfaces*—See 7.2, Table 1.

8.1.2 *Length*—See 7.3, Tables 13 and Tables 14, and

8.1.3 *Straightness*—See 7.4, Table 16.

8.2 *Angles*—All regular polygonal sections shall have substantially exact angles and, unless otherwise specified, sharp corners.

9. Test Methods

9.1 Chemical Analysis:

9.1.1 Composition shall be determined, in case of disagreement, as follows:

Element	Method
Copper	E 478
Iron	E 478
Lead	E 478 (AA)
Zinc	E 478 (Titrimetric)

9.1.2 Test method(s) to be used for the determination of element(s) required by contractual or purchase order agreement shall be as agreed upon between the manufacturer or supplier and the purchaser.

10. General Requirements

10.1 The following sections of Specification B 249M are a part of this specification:

- 10.1.1 Terminology,
- 10.1.2 Materials and Manufacture,
- 10.1.3 Sampling,
- 10.1.4 Number of Tests and Retests,
- 10.1.5 Specimen Preparation,
- 10.1.6 Test Methods,
- 10.1.7 Significance of Numerical Limits,
- 10.1.8 Inspection,
- 10.1.9 Rejection and Rehearing,
- 10.1.10 Certification,
- 10.1.11 Test Report,
- 10.1.12 Packaging and Package Marking, and
- 10.1.13 Supplementary Requirements.

10.2 In addition, when a section with a title identical to one of those referenced in 10.1 appears in this specification, it contains additional requirements which supplement those appearing in Specification B 249M.

11. Keywords

- 11.1 copper-zinc-lead alloy rod; leaded-brass rod