



# Standard Specification for Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes<sup>1</sup>

This standard is issued under the fixed designation B 455; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope \*

1.1 This specification establishes the requirements for extruded leaded-brass angles, channels, and other architectural shapes of solid cross section produced in Copper Alloy UNS Nos. C38000 and C38500.

1.1.1 Pipe, tube, or other hollow section products are not included in this specification.

1.2 *Units*—The values stated in inch-pound units are the standard. The values given in parentheses are mathematical conversions to SI units, which are provided for information only and are not considered standard.

## 2. Referenced Documents

### 2.1 *ASTM Standards:*

B 249/249M Specification for General Requirements for Wrought Copper and Copper Alloy Rod, Bar, Shapes, and Forgings<sup>2</sup>

B 601 Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast<sup>2</sup>

B 846 Terminology for Copper and Copper Alloys<sup>2</sup>

E 8 Test Methods for Tension Testing of Metallic Materials<sup>3</sup>

E 54 Test Methods for Chemical Analysis of Special Brasses and Bronzes<sup>4</sup>

E 255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition<sup>4</sup>

E 478 Test Methods for Chemical Analysis for Copper Alloys<sup>5</sup>

## 3. General Requirements

3.1 The following sections of Specification B 249/249M constitute a part of this specification:

- 3.1.1 Terminology,
- 3.1.2 Materials and Manufacture,
- 3.1.3 Workmanship, Finish, and Appearance,
- 3.1.4 Sampling,
- 3.1.5 Number of Tests and Retests,

- 3.1.6 Specimen Preparation,
- 3.1.7 Test Methods,
- 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 Report, and
- 3.1.13 Packaging and Package Marking.

3.2 In addition, when a section with a title identical to that referenced in 3.1 appears in this specification, it contains additional information which supplements that appearing in Specification B 249/249M. In case of conflict this specification shall prevail.

## 4. Terminology

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

## 5. Ordering Information

5.1 When placing orders for products under this specification include the following information:

5.1.1 ASTM designation and year of issue (for example, B 455 – 01),

5.1.2 Copper alloy UNS No. designation (for example, C38000),

5.1.3 Temper (Section 7),

5.1.4 Form, dimensions, and tolerances (Section 9), and

5.1.5 Quantity; total weight or number of pieces for each form, temper, size, and copper alloy.

5.2 The following options are available in this specification and shall be included in the contract or purchase order when required:

5.2.1 Intended end use or application,

5.2.2 Heat identification or traceability details (Specification B 249/249M),

5.2.3 Certification (Specification B 249/249M), and

5.2.4 Mill test report (Specification B 249/249M).

## 6. Chemical Composition

6.1 The material shall conform to the chemical compositional requirements in Table 1 for the copper alloy UNS No. designated in the ordering information.

6.1.1 These composition limits do not preclude the presence of other elements. When required, limits shall be established and analysis required for unnamed elements by agreement

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 02.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 03.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 03.05.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 03.06.

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



TABLE 1 Chemical Requirements

Element	Composition, %	
	Copper Alloy UNS No. C38000	Copper Alloy UNS No. C38500
Copper	55.0–60.0	55.0–59.0
Lead	1.5–2.5	2.5–3.5
Zinc	remainder	remainder
Iron, max	0.35	0.35
Tin, max	0.30	...
Aluminum, max	0.50	...

between the manufacturer and the purchaser.

6.2 For copper alloys in which zinc is specified as the remainder, either copper or zinc is permitted to be taken as the difference between the sum of results for all elements analyzed and 100 %. When copper is so determined, that difference value shall conform to the requirements given in Table 1.

6.3 When all elements specified in Table 1 are determined for the copper alloy UNS No. designated in the ordering information, the sum of the results shall be 99.5 % minimum.

7. Temper

7.1 The temper of the product furnished to this specification, as defined in Classification B 601, shall be M20 (as hot extruded).

8. Mechanical Property Requirements

8.1 Tensile Strength Requirements:

8.1.1 The product furnished shall conform to the requirements of Table 2 when tested in accordance with Test Methods E 8.

8.1.2 The tension test results shall be the basis for purchaser acceptance or rejection based upon mechanical properties.

8.1.2.1 When product is intended for strictly decorative purposes and so stated in the purchase order or contract, it is permitted under this specification for the mechanical property requirements to be waived by the purchaser.

8.2 Rockwell Hardness:

8.2.1 A Rockwell hardness test offers a quick and convenient method of checking general conformity to temper and tensile requirements.

NOTE 1—For assistance in testing, the minimum Rockwell B hardness of M30 (as hot-extruded) temper shapes to this specification is approximately 42.

TABLE 2 Mechanical Requirements

	Copper Alloy UNS Nos. C38000 and C38500
Tensile strength, min, ksi <sup>A</sup> (MPa) <sup>B</sup>	48 (330)
Yield strength at 0.5 % extension under load, min, ksi (MPa) <sup>B</sup>	16 (110)
Elongation <sup>B</sup> in 2 in. (50.8 mm), min, %	15

<sup>A</sup>ksi = 1000 psi.

<sup>B</sup>See Appendix X1.

9. Dimensions, Mass, and Permissible Variations

9.1 The dimensions, contours, and tolerances shall be provided by the purchaser, by means of a drawing or other medium, and shall be a part of the contract or purchase order.

9.2 Straightness tolerances shall be subject to agreement between the manufacturer and the purchaser and such agreement shall be part of the purchase order.

10. Sampling

10.1 Lot size, portion size, and selection of sample pieces shall be as follows:

10.1.1 Lot Size—An inspection lot shall be 5000 lb (2275 kg) or fraction thereof, of the same mill form, alloy, and nominal dimensions, subject to inspection at one time.

10.1.2 Portion Size—The portion shall be two individual pieces of the lot selected as to be representative of the lot.

10.2 Chemical Analysis:

10.2.1 The sample for chemical analysis shall be taken in accordance with Practice E 255 for the product in its final form from the pieces selected in 10.1.2 and combined into one composite sample. The minimum weight of the composite sample shall be 150 g.

10.2.2 Instead of sampling in accordance with Practice E 255, the manufacturer shall have the option of determining conformance to chemical composition by analyzing samples taken at the time the castings are poured.

10.2.2.1 When samples are taken at the time of casting, at least one sample shall be taken from each group of castings poured from the same source of molten metal.

10.3 Samples for All Other Tests—Samples taken for all other tests shall be taken from the sample portions selected in 10.1.2 and be of a convenient size to accommodate the test and comply with the requirements of the appropriate test method.

11. Test Methods

11.1 Product composition shall be determined, in case of dispute, as follows:

Element	ASTM Test Method
Aluminum	E 54
Copper	E 478
Iron	E 478
Lead	E 478 (AA)
Tin	E 478 (photometric)
Zinc	E 478 (titrimetric)

11.1.1 Test method(s) to be followed for the determination of element(s) resulting from contractual or purchase order agreement shall be as agreed upon between the supplier and the purchaser.

12. Keywords

12.1 architectural extruded shapes; extruded shapes; leaded brass extruded shapes

**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 square ( $N = \text{kg}\cdot\text{m}/\text{s}^2$ ). The derived SI unit for pressure or stress

is the newton per square metre ( $\text{N}/\text{m}^2$ ), which has been named the pascal (Pa) by the General Conference on Weights and Measures. Since  $1 \text{ ksi} = 6\,894\,757 \text{ Pa}$ , the metric equivalents are expressed as megapascal (MPa), which is the same as  $\text{MN}/\text{m}^2$  and  $\text{N}/\text{mm}^2$ .

**SUMMARY OF CHANGES**

Committee B05 has identified the location of selected changes to this standard since the last issue, B 455-96, that may impact the use of this standard.

- (1) The addition of Section 4 on Terminology.
- (2) Minor editing of 5.1.

- (3) Minor editing of 6.1 and 6.1.1 to conform to *Outline of Form*.

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