



Designation: B929 – 23

# Standard Specification for Copper-Nickel-Tin Spinodal Alloy Rod and Bar<sup>1</sup>

This standard is issued under the fixed designation B929; 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 copper-nickel-tin alloy UNS No. C72900 rod and bar.

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.

1.3 The following safety hazard caveat pertains only to the test methods described in this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

**B249/B249M** Specification for General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes and Forgings

**B601** Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast

**B846** Terminology for Copper and Copper Alloys

**B950** Guide for Editorial Procedures and Form of Product Specifications for Copper and Copper Alloys

**E8/E8M** Test Methods for Tension Testing of Metallic Materials

**E10** Test Method for Brinell Hardness of Metallic Materials

**E18** Test Methods for Rockwell Hardness of Metallic Materials

**E23** Test Methods for Notched Bar Impact Testing of Metallic Materials

**E53** Test Method for Determination of Copper in Unalloyed Copper by Gravimetry (Withdrawn 2022)<sup>3</sup>

**E75** Test Methods for Chemical Analysis of Copper-Nickel and Copper-Nickel-Zinc Alloys (Withdrawn 2010)<sup>3</sup>

**E140** Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness

**E478** Test Methods for Chemical Analysis of Copper Alloys

**E1823** Terminology Relating to Fatigue and Fracture Testing

## 3. General Requirements

3.1 The following sections of Specification **B249/B249M** constitute a part of this specification:

3.1.1 Dimensions, Mass, and Permissible Variations

3.1.2 Number of Tests and Retests

3.1.3 Specimen Preparation

3.1.4 Significance of Numerical Limits

3.1.5 Inspection

3.1.6 Rejection and Rehearing

3.1.7 Certification

3.1.8 Test Report

3.1.9 Packaging and Package Marking

3.1.10 Supplementary Requirements

3.2 In addition, when a section with a title identical to that referenced in 3.1 appears in this specification, it contains additional requirements which supplement those appearing in Specification **B249/B249M**.

## 4. Terminology

4.1 For definitions of terms related to copper and copper alloys, refer to Terminology **B846**.

## 5. Ordering Information

5.1 Include the following specified choices when placing orders for products under this specification, as applicable:

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.02 on Rod, Bar, Wire, Shapes and Forgings.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto: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

- 5.1.1 ASTM designation and year of issue,
- 5.1.2 Copper Alloy UNS No. C72900,
- 5.1.3 Temper (Section 8),
- 5.1.4 Dimensions—diameter or distance between parallel surfaces, width, thickness, and length,
- 5.1.5 How furnished—stock lengths or specific lengths, with or without ends, and
- 5.1.6 Quantity—total weight or total length or number of pieces of each size.

5.2 The following options are available and, when required, shall be specified at the time of placing the order:

- 5.2.1 Heat identification or traceability details,
- 5.2.2 Certification,
- 5.2.3 Test Report,
- 5.2.4 Type of edge on bar (square corners, rounded corners, rounded edge, full-rounded edge), and
- 5.2.5 If product is purchased for agencies of the U.S. Government see the Supplementary Requirements section of Specification **B249/B249M** for additional requirements, if specified.

## 6. Materials and Manufacture

### 6.1 Materials:

6.1.1 The material of manufacture shall be a cast and hot worked form of Copper Alloy UNS No. C72900, of such purity and soundness as to be suitable for processing into the products prescribed herein.

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

NOTE 1—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, with intermediate heat treatments, when required, and final spinodal hardening to meet the temper properties specified.

## 7. Chemical Composition

7.1 The material shall conform to the chemical composition requirements in **Table 1** for the Copper Alloy UNS No. C72900.

7.1.1 Results of analysis on a check sample shall conform to the composition requirements within the permitted analytical variance specified in **Table 1**.

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

7.3 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 results shall be 99.7 % minimum.

## 8. Temper

8.1 The standard tempers for products described in this specification are given in **Table 2**. (See Classification **B601**.)

8.1.1 *TX00, TX02*—Spinodally Hardened (AT). Solution annealed and spinodally hardened to different minimum yield strength levels, respectively.

8.1.2 *TS02, TS04, TS06, TS08*—Suitably cold worked and spinodally hardened to respectively increasing strength levels.

## 9. Mechanical Property Requirements

### 9.1 Tensile Strength Requirements:

9.1.1 Products furnished under this specification shall conform to the tensile requirements prescribed in **Table 2**, when tested at room temperature in accordance with Test Methods **E8/E8M**.

### 9.2 Rockwell Hardness Requirement:

9.2.1 The approximate Rockwell hardness values given in **Table 2** are for general information and assistance in testing and shall not be used as a basis for product rejection.

NOTE 2—The Rockwell hardness test offers a quick and convenient method of checking for general conformity to the specification requirements for temper and tensile strength.

### 9.3 Charpy V-Notch (CVN) Impact Requirements:

9.3.1 When specified by the contract or purchase order, products furnished under this specification shall conform to the minimum average absorbed energy values prescribed in **Table 3** when tested at room temperature using averaged results of triplicate full-size Charpy (simple-beam) (Type A) impact specimens tested in accordance with Test Methods **E23**.

9.3.2 Any temper not represented in **Table 3** may be impact tested when requested by the purchaser; however, the average CVN absorbed energy value shall be for information only.

## 10. Dimensions, Mass, and Permissible Variation

10.1 The dimensions and tolerances for products described by this specification shall be as specified in Specification **B249/B249M** with particular reference to the following tables and related paragraphs:

**TABLE 1 Chemical Requirements**

| Copper Alloy<br>UNS No. | Designation | Copper,<br>incl. silver | Lead,<br>max | Composition, % |              |              |                         |                   |                   |                 |
|-------------------------|-------------|-------------------------|--------------|----------------|--------------|--------------|-------------------------|-------------------|-------------------|-----------------|
|                         |             |                         |              | Tin            | Zinc,<br>max | Iron,<br>max | Nickel,<br>incl. Cobalt | Manganese,<br>max | Magnesium,<br>max | Niobium,<br>max |
| C72900                  | Cu-15Ni-8Sn | Remainder               | 0.02         | 7.5 to 8.5     | 0.50         | 0.50         | 14.5 to 15.5            | 0.30              | 0.15              | 0.10            |