



Designation: B206/B206M – 12 (Reapproved 2017)

Standard Specification for Copper-Nickel-Zinc (Nickel Silver) Wire and Copper-Nickel Alloy Wire¹

This standard is issued under the fixed designation B206/B206M; 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 U.S. Department of Defense.

1. Scope*

1.1 This specification establishes the requirements for wire in round, hexagonal, octagonal, rectangular, and square form of UNS Alloy Nos. C71000, C74500, C75200, C75700, C76400, C77000, and C79200.

1.2 This specification is general in that the product is used in many applications where the requirements are too particular to be specified by standard test results.

1.2.1 For particular or critical applications it is advisable for the purchaser to submit samples or drawings to the manufacturer to secure an adjustment of anneal or temper to suit the application for which the product is intended.

1.3 The following information is intended to assist the purchaser in the application of this specification:

1.3.1 For most general applications—UNS Alloy Nos. C71000, C74500, C75200, and C75700.

1.3.2 For hard or spring tempers—UNS Alloy Nos. C76400 and C77000.

1.3.3 For ease of machining—UNS Alloy No. C79200.

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

1.5 *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.*

¹ 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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2. Referenced Documents

2.1 *ASTM Standards*:²

B250/B250M Specification for General Requirements for Wrought Copper Alloy Wire

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

E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)³

E112 Test Methods for Determining Average Grain Size

E478 Test Methods for Chemical Analysis of Copper Alloys

3. General Requirements

3.1 The following sections of Specification **B250/B250M** 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 Reports (Mill),

3.1.13 Packaging and Package Marking, and

3.1.14 Supplemental 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

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.

³ The last approved version of this historical standard is referenced on www.astm.org.

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

contains additional requirements that supplement those which appear in Specification **B250/B250M**.

4. Terminology

4.1 For the definition of general 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:

- 5.1.1 ASTM designation and year of issue,
- 5.1.2 Copper Alloy UNS No. (Section 1),
- 5.1.3 Temper designation (Section 8),
- 5.1.4 Quantity—Total weight or length or number of pieces of each temper, form, or alloy.
- 5.1.5 Dimensions—Diameter, distance between parallel surfaces,
- 5.1.6 How furnished—specific lengths, coils, reels, and so forth, and
- 5.1.7 Intended application.

5.2 The following options are available but may not be included unless specified at the time of placing of the order, when required:

- 5.2.1 Heat identification or traceability details,
- 5.2.2 Certification (Specification **B250/B250M**), and
- 5.2.3 Mill Test Reports (Specification **B250/B250M**).
- 5.2.4 If product is purchased for agencies of the U.S. Government (Specification **B250/B250M**).

6. Material and Manufacture

6.1 *Material*—The material shall be made from cast or wrought billets, logs or rods of Copper Alloy UNS Nos. C71000, C74500, C75200, C75700, C76400, C77000, or C79200, and shall be of such soundness and structure as to enable them to be processed into the desired product.

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

6.2 *Manufacture*—The product shall be manufactured by such hot-working, cold-working, straightening, coiling or reeling and annealing processing needed to produce a uniform wrought structure and obtain the finish properties specified in the purchase order or contract.

7. Chemical Composition

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

specified in the ordering information:

7.1.1 These composition limits do not preclude the presence of other elements. When required, limits may be established and analysis required for unnamed elements by agreement between the supplier and the purchaser.

7.2 For UNS No. C71000, in which copper is listed as the remainder, the copper content may be determined as the difference between the sum of results for all elements analyzed and 100 %.

7.3 For those 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 1**.

7.4 When all elements listed in **Table 1** for the Copper Alloy UNS No. prescribed in the ordering information are determined, the sum of results shall be 99.5 % minimum.

8. Temper

8.1 Tempers, as defined in Classification **B601**, available to this specification are as prescribed in **Table 2**, **Table 3**, and **Table 4** in the various alloys and sizes listed.

8.2 Hexagonal, octagonal, rectangular, and square wire are normally furnished in H01 (quarter-hard) temper.

8.3 UNS Alloy Nos. C76400 and C77000 are normally furnished in the H04 (hard), H08 (spring), or H14 (extra spring) tempers.

9. Grain Size for Annealed Wire

9.1 Product furnished in the OS (annealed) condition shall conform to the requirements specified in **Table 4** for the temper and Copper Alloy UNS No. designated in the ordering information, when tested in accordance with Test Methods **E112**.

9.1.1 Grain size shall be the standard requirement for product ordered in the OS (annealed) condition and acceptance or rejection based upon grain size shall depend upon the average grain size test results obtained.

10. Mechanical Property Requirements

10.1 *Tensile Strength Requirements:*

10.1.1 Round wire 0.020 through 0.250 in. [0.50 through 6.0 mm] in diameter of the Copper Alloy UNS No. specified in the ordering information shall conform to the requirements of **Table 2** or **Table 3** for the prescribed H (cold-worked) temper ordered.

TABLE 1 Chemical Requirements

Copper Alloy UNS No.	Composition, %					
	Copper	Nickel (incl cobalt)	Lead	Iron, max	Manganese, max	Zinc
C71000	remainder	19.0-23.0	0.05 max	1.0	1.0	1.0 max
C74500	63.5-66.5	9.0-11.0	0.05 max	0.25	0.50	remainder
C75200	63.0-66.5	16.5-19.5	0.05 max	0.25	0.50	remainder
C75700	63.5-66.5	11.0-13.0	0.05 max	0.25	0.50	remainder
C76400	58.5-61.5	16.5-19.5	0.05 max	0.25	0.50	remainder
C77000	53.5-56.5	16.5-19.5	0.05 max	0.25	0.50	remainder
C79200	59.0-66.5	11.0-13.0	0.8-1.4	0.25	0.50	remainder