Designation: B 124/B 124M – 00

Standard Specification for Copper and Copper Alloy Forging Rod, Bar, and Shapes[1]

This standard is issued under the fixed designation B 124/B 124M; 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 and copper alloy rod, bar, and shapes intended for hot forging. The following coppers and copper alloys are involved:

Copper UNS Nos.	Copper Alloy UNS Nos.
C11000	C36500
C14500	C37000
C14700	C37700
	C46400
	C48200
	C48500
	C61900
	C62300
	C63000
	C63200
	C64200
	C64210
	C65500
	C67500
	C67600
	C70620
	C71520
	C77400

1.2 The values stated in either inch-pound units or in SI units are to be regarded separately as the 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 independent of the other. Combining values from the two systems may result in nonconformance with the specification.

1.3 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

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

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

B 283 Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed)[2]

E 54 Test Methods for Chemical Analysis of Special Brasses and Bronzes[3]

E 62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods)[3]

E 75 Test Methods for Chemical Analysis of Copper-Nickel and Copper-Nickel-Zinc Alloys[3]

E 76 Test Methods for Chemical Analysis of Nickel-Copper Alloys[3]

E 121 Test Methods for Chemical Analysis of Copper-Tellurium Alloys[3]

E 478 Test Methods for Chemical Analysis of Copper Alloys[4]

2.2 *ISO Standard:*

No. 3110, Part 2 (TC 26 Ref. No. N 670 E/F) Determination of Aluminum Content: Flame Atomic Absorption Spectrometric Method[5]

3. General Requirements

3.1 The following sections of Specifications B 249 or B 249M form a part of this specification:

3.1.1 Terminology,
3.1.2 Material 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 Mill Test Reports,
3.1.13 Packaging and Package Marking, and

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

[3] *Annual Book of ASTM Standards,* Vol 03.05.

[4] *Annual Book of ASTM Standards*, Vol 03.06.

[5] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

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

3.1.14 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 that supplement those appearing in Specifications B 249 or B 249M.

4. Ordering Information

4.1 Include the following in orders for products:

4.1.1 ASTM designation and year of issue (B 124/B 124M–XX),

4.1.2 Copper or Copper-Alloy UNS No. designation,

4.1.3 Form (rod, bar, or shape) and size,

4.1.4 Dimensions, Mass, and Permissible Variations (Section 10),

4.1.5 Temper (Section 7),

4.1.6 Length (Section 10),

4.1.7 Quantity; total weight for each size and form,

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

4.2 The following options are available and should be specified at the time of placing of the order when required:

4.2.1 Mechanical Properties for Temper designated,

4.2.2 Certification, and

4.2.3 Test Report.

5. Materials and Manufacture

5.1 *Materials:*

5.1.1 The material of manufacture shall be a cast rod, bar, or billet of the designated copper or copper-alloy of such purity and soundness to be suitable for processing in to the products prescribed herein.

5.1.2 In the event that heat identification or traceability is required, the purchaser shall specify the details desired. It should be noted that 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.

5.2 *Manufacture*:

5.2.1 The products shall be manufactured by such hot working, cold working, and annealing processes as to produce a uniform wrought structure in the finished product.

5.2.2 The product shall be hot or cold worked to the finished size and subsequently annealed, when required, to meet the temper designated, and mechanical properties agreed upon.

6. Chemical Composition

6.1 The material shall conform to the chemicals compositonal requirements in Table 1 for the copper or copper alloy UNS No. designation specified in the ordering information.

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

TABLE 1 Chemical Requirements

Copper or Copper Alloy UNS No.	Composition, %													
	Copper	Lead	Tin	Iron	Nickel (incl Co)	Aluminum	Silicon	Manganese	Zinc	Sulfur	Tellurium	Phosphorus	Arsenic	Copper Plus Elements with Specific Limits Present, min
C11000	99.90 min[A]	...	...	...	...	...	...	...	...	...	...	...	...	...
C14500[B]	99.90 min[C]	...	...	...	...	...	...	...	...	...	0.40–0.7	0.004–0.012	...	...
C14700[B]	99.90 min[D]	...	...	...	...	...	...	...	...	0.20–0.50	...	0.002–0.005	...	...
C36500	58.0–61.0	0.25–0.7	0.25 max	0.15 max	...	...	...	...	remainder	...	...	...	...	99.6
C37000	59.0–62.0	0.8–1.5		0.15 max	...	...	...	...	remainder	...	...	...	...	99.6
C37700	58.0–61.0	1.5–2.5	...	0.30 max	...	...	...	...	remainder	...	...	...	...	99.5
C46400	59.0–62.0	0.20 max	0.50–1.0	0.10 max	...	...	...	...	remainder	...	...	...	...	99.6
C48200	59.0–62.0	0.40–1.0	0.50–1.0	0.10 max	...	...	...	...	remainder	...	...	...	...	99.6
C48500	59.0–62.0	1.3–2.2	0.50–1.0	0.10 max	...	...	...	...	remainder	...	...	...	...	99.6
C61900	remainder	0.02 max	0.6 max	3.0–4.5	...	8.5–10.0	...	...	0.8 max	...	...	...	...	99.5
C62300	remainder	...	0.6 max	2.0–4.0	1.0 max	8.5–10.0	0.25 max	0.50 max	...	...	...	...	...	99.5
C63000	remainder	...	0.20 max	2.0–4.0	4.0–5.5	9.0–11.0	0.25 max	1.5 max	0.30 max	...	...	...	...	99.5
C63200	remainder	0.02 max	...	3.5–4.3[E]	4.0–4.8[E]	8.7–9.5	0.10 max	1.2–2.0	...	...	...	...	...	99.5
C64200	remainder	0.05 max	0.20 max	0.30 max	0.25 max	6.3–7.6	1.5–2.2	0.10 max	0.50 max	...	...	...	0.15 max	99.5
C64210	remainder	0.05 max	0.20 max	0.30 max	0.25 max	6.3–7.0	1.5–2.0	0.10 max	0.50 max	...	...	...	0.15 max	99.5
C65500	remainder	0.05 max	...	0.8 max	0.6 max	...	2.8–3.8	0.50–1.3	1.5 max	...	...	...	...	99.5
C67500	57.0–60.0[A]	0.20 max	0.50–1.5	0.8–2.0	...	0.25 max	...	0.05–0.50	remainder	...	...	...	...	99.5
C67600	57.0–60.0[A]	0.50–1.0	0.50–1.5	0.40–1.3	...	...	...	0.05–0.50	remainder	...	...	...	...	99.5
C70620[F]	86.5 min[A]	0.02 max	...	1.0–1.8	9.0–11.0	...	...	1.0 max	0.50 max	0.02 max	...	0.02 max	...	99.5
C71520[F]	65.0 min[A]	0.02 max	...	0.40–1.0	29.0–33.0	...	...	1.0 max	0.50 max	0.02 max	...	0.02 max	...	99.5
C77400	43.0–47.0[A]	0.20 max	...	...	9.0–11.0	...	...	...	remainder	...	...	...	...	99.5

[A] Silver counts as copper.
[B] Includes oxygen-free or deoxidized grades with deoxidizers (such as phosphorus, boron, lithium, or others) in amount agreed upon.
[C] This includes copper + silver + tellurium.
[D] This includes copper + silver + sulfur + phosphorus.
[E] Iron content shall not exceed nickel content.
[F] Carbon shall be 0.05 %.