Designation: B124/B124M – 17

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

This standard is issued under the fixed designation B124/B124M; 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 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.		Copper Alloy EN 1412 Nos.
C11000	C27450	C49350	CW612N
C14500	C27451	C49355	CW617N
C14700	C27453	C49360	
	C28500	C61900	
	C35330	C62300	
	C36500	C63000	
	C37000	C63200	
	C37700	C64200	
	C46400	C64210	
	C46500	C65500	
	C46750	C67500	
	C48200	C67600	
	C48500	C69150	
	C48600	C69240	
	C49250	C69300	
	C49255	C70620	
	C49260	C71520	
	C49265	C77400	
	C49300	C87700	
	C49340	C87710	
	C49345		

NOTE 1—Additional information about forging practice and forgings produced from these alloys is given in Appendix X1 and in Specification B283/B283M.

1.2 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. 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 non-conformance with the standard.

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 requirements 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:*[2]

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

B283/B283M Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed)

E54 Test Methods for Chemical Analysis of Special Brasses and Bronzes (Withdrawn 2002)[3]

E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)[3]

E75 Test Methods for Chemical Analysis of Copper-Nickel and Copper-Nickel-Zinc Alloys (Withdrawn 2010)[3]

E76 Test Methods for Chemical Analysis of Nickel-Copper Alloys (Withdrawn 2003)[3]

E121 Test Methods for Chemical Analysis of Copper-Tellurium Alloys (Withdrawn 2010)[3]

E478 Test Methods for Chemical Analysis of Copper Alloys

2.2 *Other Standards:*

EN 1412 Copper and Copper Alloys—European Numbering System[4]

EN 12165 Copper and Copper Alloys—Wrought and Unwrought Forging Stock[4]

ISO 3110, Part 2 (TC 26 Ref. No. N 670 E/F) Determination of Aluminum Content: Flame Atomic Absorption Spectrometric Method[4]

[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] 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.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

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

JIS H 1068:2005 Methods for Determination of Bismuth in Copper and Copper Alloys[5] (Japanese Industrial Standards)

3. General Requirements

3.1 The following sections of Specification B249/B249M, as applicable, constitute 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
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 Specification B249/B249M.

4. Ordering Information

4.1 Include the following information when placing orders for products under this specification:

4.1.1 ASTM designation and year of issue (B124/B124M – XX), or EN 12165 and year of issue;

4.1.2 Copper or Copper-Alloy UNS No. designation, or EN 1412 No. designation;

4.1.3 Form (rod, bar, or shape) and size (Dimensions and Permissible Variations Section),

4.1.4 Permissible Variations (Dimensions and Permissible Variations Section),

4.1.5 Temper (Temper Section),

4.1.6 Length (Dimensions and Permissible Variations Section),

4.1.7 Quantity: total weight for each size and form,

4.1.8 If the product is purchased for agencies of the U.S. government (see the Supplementary Requirements Section of this specification for additional requirements, if specified.)

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

4.2.1 Mechanical Properties for Temper designated (Mechanical Properties Section),

4.2.2 Certification (Specification B249/B249M),

4.2.3 Test Report (Specification B249/B249M),

4.2.4 When product is ordered for ASME Boiler and Pressure Vessel Code Application (see Certification Section of Specification B249/B249M), and

4.2.5 Shapes; dimensional tolerances required and agreed upon (see 10.1.3).

[5] Available from Japanese Standards Association (JSA), Mita MT Bldg., 3-13-12 Mita, Minato-ku, Tokyo, 108-0073, Japan, http://www.jsa.or.jp.

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 into the products prescribed herein.

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

NOTE 2—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 product 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 properties specified.

6. Chemical Composition

6.1 The material shall conform to the chemical composition requirements in Table 1 for the copper or copper alloy UNS No. or EN 1412 No. designation specified in the ordering information.

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

6.2 For alloys in which either copper or zinc is listed as "remainder," copper or zinc is the difference between the sum of results of all elements determined and 100 %. When all elements in Table 1 for the specified copper-alloy are determined, the sum of results shall be as follows:

Copper Alloy UNS or EN 1412 No.	Sum of Results, % min
CW612N, CW617N	99.8
C36500, C37000, C46400, C46500, C48200, C48500, C48600, C69150	99.6
C27450, C27451, C27453, C35330, C37700, C46750, C49250, C49255, C49260, C49265, C49300, C49340, C49345, C49350, C49355, C49360, C61900, C62300, C63000, C63200, C64200, C64210, C65500, C67500, C67600, C69240, C69300, C70620, C71520, C77400	99.5
C28500	99.1
C87700, C87710	99.2

7. Temper

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

7.1.1 H50—Extruded and drawn.
7.1.2 H80—Hard drawn.
7.1.3 M20—As hot-rolled.
7.1.4 M30—As hot-extruded.
7.1.5 060—Soft Annealed.
7.1.6 O61—Annealed.
7.1.7 O30—Hot Extruded and Annealed.

TABLE 1 Chemical Requirements

Copper or Copper Alloy UNS or EN 1412 No.	Composition, %														
	Copper	Lead	Tin	Iron	Nickel (incl Co)	Aluminum	Silicon	Manganese	Zinc	Sulfur	Tellurium	Phos-phorus	Arsenic	Bismuth	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	...	...	...
C27450	60.0–65.0	0.25 max	...	0.35 max	...	...	...	...	remainder	...	...	...	...	...	99.5
C27451	61.0–65.0	0.25 max	...	0.35 max	...	...	...	...	remainder	...	...	0.05–0.20	...	...	99.5
C27453	61.5–63.5	0.25 max	0.15 max	0.15 max	...	...	...	...	remainder	...	...	...	0.02–0.15	...	99.5
C28500	57.0–59.0	0.25 max	...	0.35 max	...	...	...	...	remainder	...	...	...	...	...	99.1
C35330	59.5–64.0	1.5–3.5	...	...	...	...	...	...	remainder	...	...	...	0.02–0.25	...	...
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
C46500	59.0–62.0	0.20 max	0.50–1.0	0.10 max	...	...	...	...	remainder	...	...	...	0.02–0.06	...	...
C46750[E]	59.2–62.5	0.25 max	1.00–1.80	0.10 max	0.50 max	...	...	...	remainder	...	...	0.05–0.15	...	...	99.5
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
C48600	59.0–62.0	1.0–2.5	0.30–1.5	...	...	...	...	...	remainder	...	...	...	0.02–0.25	...	...
C49250[F]	58.0–61.0	0.09 max	0.30 max	0.50 max	...	...	...	...	remainder	...	...	...	...	1.8–2.4	99.5
C49255[G]	58.0–60.0	0.01 max	0.50 max	0.10 max	0.10–0.30	...	0.10 max	...	remainder	...	...	0.10 max	...	1.7–2.9	99.5
C49260[H]	58.0–63.0	0.09 max	0.50 max	0.50 max	...	...	0.10 max	...	remainder	...	...	0.05–0.15	...	0.50–1.8	99.5
C49265[F]	58.0–62.0[A]	0.09–0.25	0.50 max	0.30 max	...	...	0.10 max	...	remainder	...	...	0.05–0.12	...	0.50–1.3	99.5
C49300[I]	58.0–62.0	0.01 max	1.0-1.8	0.10 max	1.5 max	0.50 max	0.10 max	0.03 max	remainder	...	...	0.20 max	...	0.50–2.0	99.5
C49340[J]	60.0–63.0	0.09 max	0.50- 1.5	0.12 max	...	...	0.10 max	...	remainder	...	...	0.05–0.15	...	0.50–2.2	99.5
C49345[F]	60.0–64.0[A]	0.09–0.25	0.50–1.5	0.30 max	...	...	0.10 max	...	remainder	...	...	0.05–0.12	...	0.50–1.3	99.5
C49350[K]	61.0–63.0	0.09 max	1.5-3.0	0.12 max	...	...	0.30 max	...	remainder	...	...	0.04–0.15	...	0.50–2.5	99.5
C49355[L]	63.0–69.0	0.09 max	0.50-2.0	0.10 max	...	...	1.0–2.0	0.10 max	27.0–35.0	...	...	...	...	0.50–1.5	99.5
C49360	remainder	0.09 max	1.0-2.0	...	...	...	2.0-3.5	...	19.0–22.0	...	...	...	...	0.50–1.5	99.5
C61900	remainder[A]	0.02 max	0.6 max	3.0–4.5	...	8.5–10.0	...	...	0.8 max	...	...	...	...	...	99.5
C62300	remainder[A]	...	0.6 max	2.0–4.0	1.0 max	8.5–10.0	0.25 max	0.50 max	...	...	...	...	...	...	99.5
C63000	remainder[A]	...	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[A]	0.02 max	...	3.5–4.3[M]	4.0–4.8[M]	8.7–9.5	0.10 max	1.2–2.0	...	...	...	...	...	...	99.5
C64200	remainder[A]	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	...	...	...	0.09 max	...	99.5
C64210	remainder[A]	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	...	...	...	0.09 max	...	99.5
C65500	remainder[A]	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

TABLE 1 *Continued*

Copper or Copper Alloy UNS or EN 1412 No.	Composition, %														
	Copper	Lead	Tin	Iron	Nickel (incl Co)	Aluminum	Silicon	Manganese	Zinc	Sulfur	Tellurium	Phos-phorus	Arsenic	Bismuth	Copper Plus Elements with Specific Limits Present, min
C69150[A]	82.5–87.5	0.05 max	0.025 max	0.25 max	0.20 max	0.7–1.3	0.02 max	0.25–0.6	remainder	. . .	. . .	. . .	. . .	. . .	99.6
C69240	71.0–72.5	0.25 max	0.30 max	0.20 max	0.10–0.50	. . .	1.8–2.2	0.6–1.2	remainder	. . .	. . .	0.06–0.12	. . .	. . .	99.5
C69300	73.0–77.0[A]	0.09 max	0.20 max	0.10 max	0.10 max	. . .	2.7–3.4	0.10 max	remainder	. . .	. . .	0.04–0.15	. . .	. . .	99.5
C70620[N]	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[N]	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]	0.09 max	. . .	. . .	9.0–11.0	. . .	. . .	. . .	remainder	. . .	. . .	. . .	. . .	. . .	99.5
C87700[O]	87.5 min	0.09 max	2.0 max	0.50 max	0.25 max[P]	. . .	2.5–3.5	0.8 max	7.0–9.0	. . .	. . .	0.15 max	. . .	. . .	99.2
C87710[O]	84 min	0.09 max	2.0 max	0.50 max	0.25 max[P]	. . .	3.0–5.0	0.8 max	9.0–11.0	. . .	. . .	0.15 max	. . .	. . .	99.2
CW612N	59.0–60.0	1.6–2.5	0.3 max	0.3 max	0.3 max[P]	0.05 max	. . .	. . .	remainder	. . .	. . .	. . .	. . .	. . .	99.8
CW617N	57.0–59.0	1.6–2.5	0.3 max	0.3 max	0.3 max[P]	0.05 max	. . .	. . .	remainder	. . .	. . .	. . .	. . .	. . .	99.8

[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 + phosphorus.
[D] This includes copper + silver + sulfur + phosphorus.
[E] Includes antimony 0.05–0.15
[F] Includes cadmium 0.001 % max.
[G] Includes cadmium 0.01, selenium 0.02–0.07.
[H] Includes cadmium 0.001 % max.
[I] Includes antimony 0.50 % max and selenium 0.20 % max.
[J] Includes cadmium 0.001 % max.
[K] Includes antimony 0.02–0.10 %.
[L] Includes boron 0.001 % max.
[M] Iron content shall not exceed nickel content.
[N] Carbon shall be 0.05 % max.
[O] Antimony shall be 0.10 % max.
[P] Not including Co.

7.1.8 M—As-manufactured without specified mechanical properties (EN 12165).

7.1.9 H070—Minimum value of hardness requirement for the product with mandatory hardness requirements (EN 12165).

7.1.10 H080—Minimum value of hardness requirement for the product with mandatory hardness requirements (EN 12165).

8. Mechanical Property Requirements

8.1 Mechanical property requirements, if any, are to be established by agreement between the manufacturer and the purchaser.

9. Purchases for U.S. Government

9.1 When specified in the contract or purchase order, products purchased for agencies of the U.S. Government shall conform to the special governmental regulations specified in the Supplementary Requirements sections of this specification and of Specification B249/B249M.

10. Dimensions and Permissible Variations

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

10.1.1 *Diameter or Distance Between Parallel Surfaces:*

10.1.1.1 For M30 rod, Copper Alloy UNS Nos. C27450, C27451, C27453, C28500, C35330, C36500, C37000, C37700, C46400, C46500, C46750, C48200, C48500, C48600, C49250, C49255, C49260, C49265, C49300, C49340, C49345, C49350, C49355, C49360, C61900, C62300, C63000, C63200, C64200, C64210, C67500, C67600, C69150, C69240, C69300, C70620, and C71520, refer to Table 4.

10.1.1.2 For M30 rod, Copper UNS Nos. C11000, C14500, C14700, C65500, C77400, C87700, and C87710, refer to Table 5.

10.1.1.3 For M20, round rod, refer to Table 6.

10.1.1.4 For H50 rod, refer to Table 1 for Copper UNS Nos. C11000, C14500, C14700, and Copper Alloy UNS Nos. C46400, C46500, C46750, C48200, C48500, C49250, C49255, C49260, C49265, C49300, C49340, C49345, C49350, C49360, and C69150.

10.1.1.5 For H50 rod, refer to Table 2 for Copper Alloy UNS Nos. C27450, C27451, C27453, C28500, C36500, C37000, C37700, C61900, C62300, C63000, C63200, C64200, C64210, C65500, C67500, C67600, C69240, C69300, C70620, C71520, C77400, C87700, and C87710.

10.1.2 *Width and Thickness:*

10.1.2.1 For M30 bar refer to Table 4 for Copper Alloy UNS Nos. C27450, C27451, C27453, C28500, C35330, C36500, C37000, C37700, C46400, C46500, C46750, C48200, C48500, C48600, C49250, C49255, C49260, C49265, C49300, C49340, C49345, C49350, C49355, C49360, C61900, C62300, C63000, C63200, C64200, C64210, C67500, C67600, C69150, C69240, C69300, C70620, and C71520.

10.1.2.2 For M30 bar refer to Table 5 for Copper UNS Nos. C11000, C14500, and C14700 and Copper Alloy UNS Nos. C65500, C77400, C87700, and C87710.

10.1.2.3 For H50 bar, refer to Tables 7 and 10 for Copper UNS Nos. C11000, C14500, and C14700.

10.1.2.4 For H50 bar, refer to Tables 8 and 10 for Copper Alloy UNS Nos. C35330, C46400, C46500, C48200, C48500, and C48600.

10.1.2.5 For H50 bar refer to Tables 9 and 11 for Copper Alloy UNS Nos. C27450, C27451, C27453, C28500, C36500, C37000, C37700, C46750, C61900, C62300, C63000, C63200, C64200, C64210, C65500, C67500, C67600, C69240, C69300, C70620, C71520, C77400, C87700, and C87710.

10.1.3 *Shapes*—The dimensional tolerances for shapes shall be agreed upon between the manufacturer and the purchaser and shall be specified in the order.

10.2 *Length*—Rod, bar, and shapes for forging, when ordered to any length, will be furnished in stock lengths, unless it is specifically stated in the purchase order that the lengths are to be specific.

10.2.1 Stock lengths for all rod, bar, and shapes for forging up to and including 1 in. [25 mm] in diameter shall be as listed in Table 2, but the weight of lengths less than the ordered length, shall not exceed 40 % of any one shipment. The tolerance for the full-length pieces shall be plus 1 in. [25 mm].

10.2.2 For rod and bar for forging over 1 in. [25 mm] up to and including 2 in. [50 mm] in diameter, the lengths shall be random lengths, from 4 to 12 ft [1.2 to 3.7 m].

10.2.3 Rod and bar for forging, over 2 in. [50 mm] in diameter shall be ordered in special lengths.

10.3 *Straightness*—The material shall be straight, within 1 in. [25 mm] maximum depth of arc in 6 ft [1.8 m].

TABLE 2 Stock Lengths

Ordered Length		Shortest Permissible Length	
ft	[m]	ft	[m]
12	[4]	6	[2]
10	[3]	6	[2]
8	[2]	4	[1]
6	. . .	4	. . .

11. Test Methods

11.1 *Chemical Analysis:*

11.1.1 In case of disagreement, determine the composition using the following methods:

Element	Range, %	Method
Aluminum	0.005–12	ISO 3110 (AA)
	2–12	E478 (Titrimetric)
Antimony	0.05–0.70	E62
Arsenic	0–0.50	E62
Bismuth		JIS H 1068:2005
Copper	43–99.9	E478
Carbon		E76
Iron	0.15–5	E54, E75 for CuNi
	0.003–1.25	E478
Lead	0.02–3	E478 (AA)
Manganese	0.10–2.0	E62, E75 for CuNi
Nickel	0–5	E478 (Photometric)
	>5	E478 (Gravimetric)
Phosphorous	0.004–0.7	E62
Silicon	0.10–4	E62
Sulfur	0–0.5	E76 (Gravimetric)
Tellurium	0.40–1	E121
Tin	0.2–1.5	E478 (Photometric)
Zinc	0.3–1.5	E478 (AA)
	2–40	E478 (Titrimetric)

11.1.2 Test methods to be followed for the determination of elements resulting from contractual or purchase order agreement shall be as agreed upon between the manufacturer or supplier and the purchaser.

12. Keywords

12.1 bar; brass; brass forging shapes; brass forgings; bronze; bronze forging shapes; copper; copper alloy; copper alloy forging bar; copper alloy forging rod; copper alloy forging shapes; copper alloy forgings; copper forging bar; copper forging rod; copper forging shapes; copper forgings; copper nickel; copper nickel forging rod; copper nickel forgings; hot forging; hot forging stock; nickel silver; nickel silver forging shapes; nickel silver forgings; rod; shapes; UNS Alloy Nos. C27450; C27451; C27453; C28500; C35330; C36500; C37000; C37700; C46400; C46500; C46750; C48200; C48500; C48600; C49250; C49255; C49260; C49265; C49300; C49340; C49345; C49350; C49355; C49360; C61900; C62300; C63000; C63200; C64200; C64210; C65500; C67500; C67600; C69150; C69240; C69300; C70620; C71520; C77400; UNS Nos. C11000; C14500; C14700; C87700; C87710; CW612N; CW617N

SUPPLEMENTARY REQUIREMENTS

The following supplementary requirements shall apply only when specified by the purchaser in the contract or purchase order. Details of the supplementary requirements shall be agreed upon in writing, between the manufacturer and the purchaser. Supplementary requirements shall in no way negate any requirement of the specification itself.

S1. Supplementary requirements S1, S2, and S4 of Specification B249/B249M shall apply.

S2. *Identification Marking*—Forging stock shall be marked with the producer's name or trademark, this ASTM specification number, the UNS or the EN 1412 number, and the heat number or lot number. Marking shall be by low stress die stamps or vibroetching.

APPENDIX

(Nonmandatory Information)

X1. FORGING PRACTICE

X1.1 The data in Table X1.1 do not constitute a part of this specification. The suggested forging temperatures give the range suitable for hot forging of the alloys and the forgeability ratings illustrate the relative difference in ease of forging, with forging brass being the most readily forgeable. For the relative strength of these alloy forgings, as hot pressed, see Specification B283/B283M, Appendix 2, Table 4.

X1.2 For the relative strength of these alloy forgings, as hot pressed, see Specification B283/B283M, Appendix X3, Table X3.1.

TABLE X1.1 Forging Temperatures and Forgeability

Copper or Copper Alloy UNS or EN 1412 No.	Name	Suggested Forging Temperatures		Forgeability Rating[A]
		°F	°C	
C11000	Copper	1400–1700	760–930	65
C14500	Copper-tellurium	1350–1650	730–900	65
C14700	Copper-sulfur	1400–1600	760–870	65
C27450	Plumbers Brass	1200–1450	650–790	95
C27451	Plumbers Brass	1200–1450	650–790	95
C27453	Copper-zinc alloy	1200–1450	650–790	95
C28500	Copper-zinc brass	1150–1320	620–720	100
C35330	Leaded brass	1200–1450	650–790	95
C36500	Leaded muntz metal, uninhibited	1200–1450	650–790	100
C37000	Free-cutting muntz metal	1200–1450	650–790	100
C37700	Forging brass	1200–1450	650–790	100
C46400	Naval brass	1200–1500	650–820	90
C46500	Naval brass	1200–1470	650–820	90
C46750	Tin brass	1200–1470	650–800	95
C48200	Medium leaded naval brass	1200–1500	650–820	90
C48500	Leaded naval brass	1200–1500	650–820	90
C48600	Naval brass	1200–1500	650–820	90
C49250	Bismuth brass	1200–1450	650–790	90
C49255	Bismuth brass	1200–1450	650–790	95
C49260	Bismuth brass	1210–1450	650–790	90
C49265	Bismuth brass, low leaded	1210–1450	650–790	90
C49300	Bismuth brass	1260–1510	680–820	95
C49340	Bismuth brass	1260–1510	680–820	90
C49345	Bismuth brass, low leaded	1260–1510	680–820	90
C49350	Bismuth brass	1260–1510	680–820	95
C49355	Bismuth brass	1220–1360	660–740	80
C49360	Bismuth brass	1330–1510	720–820	90
C61900	Aluminum bronze	1300–1600	700–870	75
C62300	Aluminum bronze, 9 %	1300–1600	700–870	75
C63000	Aluminum-nickel bronze	1450–1700	790–930	75
C63200	Aluminum-nickel bronze	1450–1700	790–930	75
C64200	Aluminum-silicon bronze	1300–1600	700–870	75
C64210	Aluminum-silicon bronze, 6.7 %	1300–1600	700–870	75
C65500	High-silicon bronze (A)	1300–1600	700–870	40
C67500	Manganese bronze (A)	1350–1550	730–840	80
C67600	Leaded manganese bronze A	1350–1550	730–840	80
C69150	Copper-zinc-manganese-aluminum	1300–1550	700–840	85
C69240	Copper-zinc-silicon-manganese	1250–1450	675–790	95
C69300	Copper-zinc-silicon	1200–1450	650–790	95
C70620	Copper-nickel 90–10	1550–1750	840–950	75
C71520	Copper-nickel 70–30	1700–1900	930–1040	40
C77400	Nickel silver, 45–10	1300–1500	700–820	85
C87700	Silicon Bronze	1250–1520	. . .	80
C87710	Silicon Bronze	1200–1485	. . .	80
CW612N	Forging brass	1200–1450	650–790	100
CW617N	Forging brass	1200–1380	650–750	100

[A] Relative forgeability rating takes into consideration such variable factors as pressure, die wear, and plasticity (hot). Since it is impractical to reduce these variables to common units, calibration in terms of a percentage of the most generally used alloy, forging brass (100 %), is considered the most practical basis for such ratings. The values shown represent the general opinion and are intended for information to enable the designer to better understand the forging characteristics of these various alloys. Intricate parts are more likely to be available in alloys having a high rating.

SUMMARY OF CHANGES

Committee B05 has identified the location of selected changes to this standard since the last issue (B124/B124M – 16a) that may impact the use of this standard. (Approved April 1, 2017.)

(1) Added UNS Alloy Nos. C27453 and C28500 to 1.1, 6.2, Table 1, 10.1.1.1, 10.1.1.5, 10.1.2.1, 10.1.2.5, Section 12, and Table X1.1.

(2) Added UNS Alloy No. C46500 to 1.1, 6.2, Table 1, 10.1.1.1, 10.1.1.4, 10.1.2.1, 10.1.2.4, Section 12, and Table X1.1.

Committee B05 has identified the location of selected changes to this standard since the last issue (B124/B124M – 16) that may impact the use of this standard. (Approved October 1, 2016.)

(1) Added UNS Alloy Nos. C49265 and C49345 to 1.1, 6.2, Table 1, 10.1.1.1, 10.1.1.4, 10.1.2.1, Section 12, and Table X1.1.

Committee B05 has identified the location of selected changes to this standard since the last issue (B124/B124M – 15) that may impact the use of this standard. (Approved April 1, 2016.)

(1) Added EN 1412 alloy numbers CW612N and CW617N from standard EN 12165 on Copper and Copper Alloys—Wrought and Unwrought Forging Stock to 1.1, 2.2, 4.1.1, 4.1.2, 6.1, 6.2, 7.1.8, 7.1.9, 7.1.10, Table 1, Section 12, Table X1.1, and Supplementary Requirements S2.