



# Standard Specification for Copper and Copper Alloy Forging Rod, Bar, and Shapes<sup>1</sup>

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 ( $\epsilon$ ) 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                |
|                 | C69300                |
|                 | C70620                |
|                 | C71520                |
|                 | C77400                |

NOTE 1—Additional information about forging practice and forgings produced from these alloys is given in **Appendix X1** and in Specification **B 283**.

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.*

<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.

Current edition approved Oct. 1, 2008. Published November 2008. Originally approved in 1939. Last previous edition approved in 2008 as B 124/B 124M – 08.

## 2. Referenced Documents

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

**B 249/B 249M** Specification for General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes and Forgings

**B 283** Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed)

**E 54** Test Methods for Chemical Analysis of Special Brasses and Bronzes<sup>3</sup>

**E 62** Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods)

**E 75** Test Methods for Chemical Analysis of Copper-Nickel and Copper-Nickel-Zinc Alloys

**E 76** Test Methods for Chemical Analysis of Nickel-Copper Alloys<sup>3</sup>

**E 121** Test Methods for Chemical Analysis of Copper-Tellurium Alloys

**E 478** Test Methods for Chemical Analysis of Copper Alloys

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<sup>4</sup>

## 3. General Requirements

3.1 The following sections of Specification **B 249/B 249M**, 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,

<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.

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 Withdrawn.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

<sup>4</sup> 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.



- 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 B 249/B 249M.

#### 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 (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 (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 (B 249/B 249M),
- 4.2.3 Test Report (B 249/B 249M), and
- 4.2.4 When product is ordered for ASME Boiler and Pressure Vessel Code Application (see Certification Section of B 249/B 249M).

#### 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.

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. 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 No.                                                                                                 | Sum of Results,<br>% min |
|----------------------------------------------------------------------------------------------------------------------|--------------------------|
| C36500, C37000, C46400, C48200, C48500                                                                               | 99.6                     |
| C37700, C61900, C62300, C63000, C63200,<br>C64200, C64210, C65500, C67500, C67600,<br>C69300, C70620, C71520, C77400 | 99.5                     |

#### 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 M20—As hot-rolled.
- 7.1.3 M30—As hot-extruded.

#### 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 B 249/B 249M.

#### 10. Dimensions and Permissible Variations

10.1 The dimensions and tolerances for product described by this specification shall be as specified in Specification B 249/B 249M 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. C36500, C37000, C37700, C46400, C48200, C48500, C61900, C62300, C63000, C63200, C64200, C64210, C67500, C67600, C69300, C70620, and C71520, refer to Table 4.

10.1.1.2 For M30 rod, Copper UNS Nos. C11000, C14500, and C14700 and Copper Alloy UNS Nos. C65500 and C77400, 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, C48200, and C48500.

10.1.1.5 For H50 rod, refer to Table 2 for Copper Alloy UNS Nos. C36500, C37000, C37700, C61900, C62300,



TABLE 1 Chemical Requirements

| Copper<br>or<br>Copper<br>Alloy<br>UNS<br>No. | Composition, %         |          |          |                      |                      |          |          |           |           |           |           |                 |          |      | Copper<br>Plus<br>Elements<br>with<br>Specific<br>Limits<br>Present,<br>min |
|-----------------------------------------------|------------------------|----------|----------|----------------------|----------------------|----------|----------|-----------|-----------|-----------|-----------|-----------------|----------|------|-----------------------------------------------------------------------------|
|                                               | Copper                 | Lead     | Tin      | Iron                 | Nickel<br>(incl Co)  | Aluminum | Silicon  | Manganese | Zinc      | Sulfur    | Tellurium | Phos-<br>phorus | Arsenic  |      |                                                                             |
| C11000                                        | 99.90 min <sup>A</sup> | ...      | ...      | ...                  | ...                  | ...      | ...      | ...       | ...       | ...       | ...       | ...             | ...      | ...  |                                                                             |
| C14500 <sup>B</sup>                           | 99.90 min <sup>C</sup> | ...      | ...      | ...                  | ...                  | ...      | ...      | ...       | ...       | ...       | 0.40–0.7  | 0.004–<br>0.012 | ...      | ...  |                                                                             |
| C14700 <sup>B</sup>                           | 99.90 min <sup>D</sup> | ...      | ...      | ...                  | ...                  | ...      | ...      | ...       | ...       | 0.20–0.50 | ...       | 0.002–<br>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 <sup>E</sup> | 4.0–4.8 <sup>E</sup> | 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  | ...       | ...       | ...             | 0.09 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  | ...       | ...       | ...             | 0.09 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 <sup>A</sup> | 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 <sup>A</sup> | 0.50–1.0 | 0.50–1.5 | 0.40–1.3             | ...                  | ...      | ...      | 0.05–0.50 | remainder | ...       | ...       | ...             | ...      | 99.5 |                                                                             |
| C69300                                        | 73.0–77.0              | 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 <sup>F</sup>                           | 86.5 min <sup>A</sup>  | 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 <sup>F</sup>                           | 65.0 min <sup>A</sup>  | 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 <sup>A</sup> | 0.09 max | ...      | ...                  | 9.0–11.0             | ...      | ...      | ...       | remainder | ...       | ...       | ...             | ...      | 99.5 |                                                                             |

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

C63000, C63200, C64200, C64210, C65500, C67500, C67600, C69300, C70620, C71520, and C77400.

### 10.1.2 Width and Thickness:

10.1.2.1 For M30 bar refer to Table 4 for Copper Alloy UNS Nos. C36500, C37000, C37700, C46400, C48200, C48500, C61900, C62300, C63000, C63200, C64200, C64210, C67500, C67600, 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 and C77400.

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. C46400, C48200, and C48500.

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

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.

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                           | ... |

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).



## 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<br>2–12 | ISO No. 3110 (AA)<br>E 478 (Titrimetric)   |
| Arsenic     | 0–0.50           | E 62                                       |
| Copper      | 43–99.9          | E 478                                      |
| Carbon      |                  | E 76                                       |
| Iron        | 0.15–5           | E 54, E 75 for CuNi                        |
| Lead        | 0.02–3           | E 478 (AA)                                 |
| Manganese   | 0.10–2.0         | E 62, E 75 for CuNi                        |
| Nickel      | 0–5<br>>5        | E 478 (Photometric)<br>E 478 (Gravimetric) |
| Phosphorous | 0.004–0.7        | E 62                                       |
| Silicon     | 0.10–4           | E 62                                       |
| Sulfur      | 0–0.5            | E 76 (Gravimetric)                         |
| Tellurium   | 0.40–1           | E 121                                      |
| Tin         | 0.2–1.5          | E 478 (Photometric)                        |
| Zinc        | 0.3–1.5<br>2–40  | E 478 (AA)<br>E 478 (Titrimetric)          |

11.1.2 Test methods to be followed for the determination of elements resulting from contractual or purchase order agree-

ment shall be as agreed upon between the manufacturer, or supplier, and the purchaser.

## 12. Keywords

12.1 bar; brass; brass forging shapes; bronze; brass forgings; bronze forging shapes; copper; copper alloy; copper alloy forgings; copper alloy forging rod; copper alloy forging bar; copper alloy forging shapes; copper forging rod; copper forging bar; 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 No. C36500; UNS Alloy No. C37000; UNS Alloy No. C37700; UNS Alloy No. C46400; UNS Alloy No. C48200; UNS Alloy No. C48500; UNS Alloy No. C61900; UNS Alloy No. C62300; UNS Alloy No. C63000; UNS Alloy No. C63200; UNS Alloy No. C64200; UNS Alloy No. C64210; UNS Alloy No. C65500; UNS Alloy No. C67500; UNS Alloy No. C67600; UNS Alloy No. C69300; UNS Alloy No. C70620; UNS Alloy No. C71520; UNS Alloy No. C77400; UNS No. C11000; UNS No. C14500; UNS No. C14700

## 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 B 249/B 249M shall apply.

S2. *Identification Marking*—Forging stock shall be marked with the producer's name or trademark, this ASTM specifica-

tion number, the UNS 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 B 283, Appendix 2, Table 4.

X1.2 For the relative strength of these alloy forgings, as hot pressed, see Specification B 283, Appendix X3, Table X3.1.



TABLE X1.1 Forging Temperatures and Forgeability

| Copper or Copper Alloy<br>UNS No. | Name                            | Suggested Forging Temperatures |           | Forgeability Rating <sup>A</sup> |
|-----------------------------------|---------------------------------|--------------------------------|-----------|----------------------------------|
|                                   |                                 | °F                             | K         |                                  |
| C11000                            | Copper                          | 1400–1700                      | 1030–1200 | 65                               |
| C14500                            | Copper-tellurium                | 1350–1650                      | 1010–1170 | 65                               |
| C14700                            | Copper-sulfur                   | 1400–1600                      | 750–875   | 65                               |
| C36500                            | Leaded muntz metal, uninhibited | 1200–1450                      | 920–1060  | 100                              |
| C37000                            | Free-cutting muntz metal        | 1200–1450                      | 920–1060  | 100                              |
| C37700                            | Forging brass                   | 1200–1450                      | 920–1060  | 100                              |
| C46400                            | Naval brass                     | 1200–1500                      | 920–1090  | 90                               |
| C48200                            | Medium leaded naval brass       | 1200–1500                      | 920–1090  | 90                               |
| C48500                            | Leaded naval brass              | 1200–1500                      | 920–1090  | 90                               |
| C61900                            | Aluminum bronze                 | 1300–1600                      | 980–1140  | 75                               |
| C62300                            | Aluminum bronze, 9 %            | 1300–1600                      | 980–1140  | 75                               |
| C63000                            | Aluminum-nickel bronze          | 1450–1700                      | 1060–1200 | 75                               |
| C63200                            | Aluminum-nickel bronze          | 1450–1700                      | 1060–1200 | 75                               |
| C64200                            | Aluminum-silicon bronze         | 1300–1600                      | 980–1140  | 75                               |
| C64210                            | Aluminum-silicon bronze, 6.7 %  | 1300–1600                      | 980–1140  | 75                               |
| C65500                            | High-silicon bronze (A)         | 1300–1600                      | 980–1140  | 40                               |
| C67500                            | Manganese bronze (A)            | 1350–1550                      | 1010–1120 | 80                               |
| C67600                            | Leaded manganese bronze A       | 1350–1550                      | 1010–1120 | 80                               |
| C69300                            | Copper-zinc-silicon             | 1200–1450                      | 920–1060  | 95                               |
| C70620                            | Copper-nickel 90–10             | 1550–1750                      | 1120–1230 | 75                               |
| C71520                            | Copper-nickel 70–30             | 1700–1900                      | 1030–1310 | 40                               |
| C77400                            | Nickel silver, 45–10            | 1300–1500                      | 980–1090  | 85                               |

<sup>A</sup> 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 (B 124/B 124M – 08) that may impact the use of this standard. (Approved Oct. 1, 2008.)

(1) Changed lead level for the following alloys: C69300 from .10 % max to .09 % max; C77400 from .20 % max to .09 % max.

Committee B05 has identified the location of selected changes to this standard since the last issue (B 124/B 124M – 06) that may impact the use of this standard. (Approved April 1, 2008.)

(1) **Table 1** footnote C revised to include phosphorus.

(2) **Table 1** arsenic entries for C64200 and C64210 revised.

*ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.*

*This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.*

*This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).*