



Designation: ~~B770-05~~ Designation: **B 770 – 08**

## Standard Specification for Copper-Beryllium Alloy Sand Castings for General Applications<sup>1</sup>

This standard is issued under the fixed designation B 770; 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 requirements for copper-beryllium alloy sand castings for general applications and nominal compositions alloys defined by this specification are shown in Table 1.<sup>2</sup>

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, which 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 and health practices and determine the applicability of regulatory requirements prior to use.*

### 2. Referenced Documents

2.1 The following documents in the current issue of the Book of Standards form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards*:<sup>3</sup>

B 30 Specification for Copper Alloys in Ingot Form

B 208 Practice for Preparing Tension Test Specimens for Copper Alloy Sand, Permanent Mold, Centrifugal, and Continuous Castings

B 601 Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast

B 824 Specification for General Requirements for Copper Alloy Castings

B 846 Terminology for Copper and Copper Alloys

E 527 Practice for Numbering Metals and Alloys (UNS) Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

### 3. General Requirements

3.1 The following sections of Specification B 824 constitute a part of this specification:

3.1.1 Terminology,

3.1.2 Material and Manufacture,

3.1.3 Chemical Composition,

3.1.4 Dimensions and Permissible Variations,

3.1.5 Workmanship, Finish and Appearance,

3.1.6 Sampling,

3.1.7 Number of Tests and Retests,

3.1.8 Specimen Preparation,

3.1.9 Test Methods,

3.1.10 Significance of Numerical Limits,

3.1.11 Inspection,

<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 B05.05 on Castings and Ingots for Remelting.

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<sup>2</sup> The UNS system for copper and copper alloys (see Practice E 527) is a simple expansion of the former standard designation system accomplished by the addition of a prefix “C” and a suffix “00”. The suffix can be used to accommodate composition variations of the base alloy.

<sup>3</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.

**TABLE 1 Nominal Compositions**

| Copper Alloy UNS No. | Previous Designation     | Copper | Nickel | Silicon | Beryllium | Cobalt | Chromium | Iron | Zirconium | Tin | Manganese |
|----------------------|--------------------------|--------|--------|---------|-----------|--------|----------|------|-----------|-----|-----------|
| C81400               | 70C                      | 99.1   | ...    | ...     | 0.06      | ...    | 0.8      | ...  | ...       | ... | ...       |
| C82000               | 10C                      | 97     | ...    | ...     | 0.5       | 2.5    | ...      | ...  | ...       | ... | ...       |
| C82200               | 3C, 14C                  | 98     | 2.0    | ...     | 0.5       | ...    | ...      | ...  | ...       | ... | ...       |
| C82400 <sup>A</sup>  | 165C, 165CT <sup>A</sup> | 97.8   | ...    | ...     | 1.7       | 0.5    | ...      | ...  | ...       | ... | ...       |
| C82500 <sup>A</sup>  | 20C, 20CT <sup>A</sup>   | 97.2   | ...    | 0.3     | 2.0       | 0.5    | ...      | ...  | ...       | ... | ...       |
| C82510               | 21C                      | 96.6   | ...    | 0.3     | 2.0       | 1.1    | ...      | ...  | ...       | ... | ...       |
| C82600 <sup>A</sup>  | 245C, 245CT <sup>A</sup> | 96.8   | ...    | 0.3     | 2.4       | 0.5    | ...      | ...  | ...       | ... | ...       |
| C82800 <sup>A</sup>  | 275C, 275CT <sup>A</sup> | 96.6   | ...    | 0.3     | 2.6       | 0.5    | ...      | ...  | ...       | ... | ...       |
| C96700               | 72C                      | 67.2   | 31.0   | ...     | 1.2       | ...    | ...      | 0.6  | 0.3       | 0.3 | 0.6       |

<sup>A</sup> When fine-grained castings are specified, 0.02 to 0.12 titanium is added for grain refinement, usually in the remelt ingot. See Specification B 30.

- 3.1.12 Rejection and Rehearing,
- 3.1.13 Certification,
- 3.1.14 Mill Test Report, and
- 3.1.15 Packaging and Package Marking.

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 B 824.

#### 4. Terminology

4.1 For definitions of terms relating to copper and copper alloys, refer to Terminology B 846.

#### 5. Ordering Information

5.1 Include the following information for orders for product:

- 5.1.1 ASTM designation number, title, and year of issue,
- 5.1.2 Copper Alloy UNS Number designation,
- 5.1.3 Temper,
- 5.1.4 Quantity of castings required,
- 5.1.5 Pattern or drawing number, and condition (cast, machined, and so forth),
- 5.1.6 When material is purchased for agencies of the U.S. government, the Supplementary Requirements of Specification B 824 may be specified.

5.2 The following options are available and should be specified in the contract or purchase order when required.

- 5.2.1 Chemical analysis of residual elements, if specified in the purchase order (Specification B 824),
- 5.2.2 Mechanical requirements, if specified in the purchase order (Section 10),
- 5.2.3 Pressure test requirements, if specified in the purchase order (Specification B 824),
- 5.2.4 Soundness requirements, if specified in the purchase order (Specification B 824),
- 5.2.5 Repair of castings (Section 12),
- 5.2.6 Certification, if specified in the purchase order (Specification B 824),
- 5.2.7 Foundry test report, if specified in the purchase order (Specification B 824),
- 5.2.8 Witness inspection, if specified in the purchase order (Specification B 824), and
- 5.2.9 Product marking, if specified in the purchase order (Specification B 824).

#### 6. Materials and Manufacture

6.1 *Material*—The material of manufacture shall be castings of the copper alloys listed in Table 1, as specified in the purchase order or contract, and of such purity and soundness as to be suitable for the products prescribed herein.

6.2 *Manufacture*— The product shall be manufactured by casting and thermal treatment to meet the properties specified.

#### 7. Chemical Composition

7.1 The castings shall conform to the chemical composition requirements prescribed in Table 2 for the Copper Alloy UNS Number designations specified in the ordering information.

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

7.3 Copper is customarily given as remainder but may be taken as the difference between the sum of all elements analyzed and 100 %.

7.4 When all elements in Table 2 are analyzed, their sum shall be 99.5 % minimum.

7.5 It is recognized that residual elements may be present in cast copper-base alloys. Analysis shall be made for residual elements only when specified in the purchase order (Specification B 824).

#### 8. Temper

8.1 The standard tempers are listed as follows: