



Standard Specification for Copper-Beryllium Alloy Sand Castings for General Applications¹

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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. Nominal compositions of the alloys defined by this specification are shown in Table 1.²

1.2 The values stated in inch-pound units are to be regarded as the standard. Metric values in parentheses are for information only.

2. Referenced Documents

2.1 The following documents in effect on date of material purchase form a part of this specification to the extent referenced herein:

2.2 ASTM Standards:

- B 30 Specification for Copper-Base Alloys in Ingot Form²
- B 208 Practice for Preparing Tension Test Specimens for Copper-Base Alloys for Sand, Permanent Mold, Centrifugal and Continuous Castings³
- B 601 Practice for Temper Designations for Copper and Copper Alloys—Wrought and Cast³
- B 824 Specification for General Requirements for Copper Alloy Castings³
- E 527 Practice for Numbering Metals and Alloys (UNS)⁴

3. Ordering Information

3.1 Orders for castings under this specification shall include the following information:

- 3.1.1 Quantity of castings required,
- 3.1.2 Copper alloy UNS number (Table 2) and temper (as-cast, heat treated, etc.) (Section 5),
- 3.1.3 Specification number, title, and year of issue,
- 3.1.4 Pattern or drawing number, and condition (cast, machined, etc.),

¹ This practice is under the jurisdiction of ASTM Committee B-5 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.05 on Castings and Ingots for Remelting.

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² 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.

³ Annual Book of ASTM Standards, Vol 02.01.

⁴ Annual Book of ASTM Standards, Vol 01.01.

3.1.5 Chemical analysis of residual elements, if specified in the purchase order (Specification B 824),

3.1.6 Mechanical requirements, if specified in the purchase order (Section 6),

3.1.7 Pressure test requirements, if specified in the purchase order (Specification B 824),

3.1.8 Soundness requirements, if specified in the purchase order (Specification B 824),

3.1.9 Repair of castings (Section 8),

3.1.10 Certification, if specified in the purchase order (Specification B 824),

3.1.11 Foundry test report, if specified in the purchase order (Specification B 824),

3.1.12 Witness inspection, if specified in the purchase order (Specification B 824), and

3.1.13 Product marking, if specified in the purchase order (Specification B 824).

3.2 When material is purchased for agencies of the U.S. Government, the Supplementary Requirements of Specification B 824 may be specified.

4. Chemical Composition

4.1 The castings shall conform to the requirements shown in Table 2.

4.2 These specification limits do not preclude the presence of other elements. Limits may be established for unnamed elements by agreement between manufacturer or supplier and purchaser. Copper may be given as remainder and may be taken as the difference between the sum of all elements analyzed and 100 %. When all elements in Table 2 are analyzed, their sum shall be 99.5 % minimum.

4.3 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).

5. Temper

5.1 The standard tempers are listed as follows:

5.1.1 *TF00*—Cast, solution heat treated and precipitation heat treated.

5.1.2 *MOI*—As sand cast.

5.1.3 Special or non-standard tempers are subject to negotiation between the supplier and purchaser. Standard temper

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	1.5	...	0.5	...	...	...	...	...	...
C82400 ^A	165C, 165CT ^A	97.8	...	...	1.7	0.5	...	...	...	...	...
C82500 ^A	20C, 20CT ^A	97.2	...	0.3	2.0	0.5	...	...	...	...	...
C82510	21C	96.6	...	0.3	2.0	1.1	...	...	...	...	...
C82600 ^A	245C, 245CT ^A	96.8	...	0.3	2.4	0.5	...	...	...	...	...
C82800 ^A	275C, 275CT ^A	96.6	...	0.3	2.6	0.5	...	...	...	...	...
C96700	72C	67.2	31.0	...	1.2	...	...	0.6	0.3	0.3	0.6

^A When fine-grained castings are specified, 0.02 to 0.12 Ti is added for grain refinement, usually in the remelt ingot. See Specification B 30.

designations are in accordance with Practice B 601.

6. Mechanical Properties

6.1 Material furnished under this specification is not normally sold with mechanical requirements.

6.2 When tension tests are required, separately cast test bar castings shall be used to determine mechanical properties, and shall meet the requirements shown in Table 3 in the as cast, or solution heat-treated and precipitation heat-treated condition.

7. Precipitation Heat Treatment

7.1 For the purpose of determining conformance to the appropriate requirement in Table 3, the castings and test specimens shall be precipitation heat treated at a uniform temperature from the solution heat treated condition. Solution heat treatment and precipitation heat treatments are listed in Table 4. Other treatment times and temperatures may be preferable for end products made from this material.

7.2 Special combinations of properties such as increased ductility, electrical conductivity, dimensional accuracy, endurance life, may be obtained by special precipitation heat treatments. The mechanical requirements of Table 3 do not apply to such special heat treatments. Specific test requirements as needed shall be agreed upon between the manufacturer or supplier and purchaser of the end product.

8. Casting Repair

8.1 The castings shall not be weld repaired without approval

of the purchaser (3.1.8).

8.2 The castings shall not be impregnated without approval of the purchaser (3.1.8).

9. General Requirements

9.1 Material furnished under this specification shall conform to the applicable requirements of Specification B 824.

10. Sampling

10.1 Lot Size:

10.1.1 A lot shall consist of all castings produced from one furnace melt or crucible melt.

10.1.2 When two or more furnace melts or crucible melts, or both, are used to charge a ladle for pouring, the castings produced therefrom shall constitute a lot.

10.1.3 A lot may consist of such groups of melts as agreed upon by the manufacturer and purchaser and in such case a lot shall consist of not more than 1000 lb (455 kg) of castings (gates and risers removed).

10.2 Test bar castings for the Copper Alloy UNS Nos. in this specification shall be cast to the form and dimensions shown in Figs. 1, Figs. 2, Figs. 3, or Figs. 4 in Practice B 208.

11. Keywords

11.1 copper alloy castings; copper-base alloy castings; copper beryllium castings