



## Standard Specification for Steam or Valve Bronze Castings<sup>1</sup>

This standard is issued under the fixed designation B 61; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

*This standard has been approved for use by agencies of the Department of Defense. Consult the DoD Index of Specifications and Standards for the specific year of issue which has been adopted by the Department of Defense.*

### 1. Scope\*

1.1 This specification<sup>2</sup> establishes requirements for a high-grade steam-metal or valve-bronze alloy (Copper Alloy UNS No. C92200<sup>3</sup>) used for component castings of valves, flanges, and fittings.

1.2 The castings covered are used in products that may be manufactured in advance and supplied from stock by the manufacturer or other dealer.

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

### 2. Referenced Documents

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

#### 2.1.1 ASTM Standards:

B 208 Practice for Preparing Tension Test Specimens for Copper-Base Alloys for Sand, Permanent Mold, Centrifugal, and Continuous Castings<sup>4</sup>

B 824 Specification for General Requirements for Copper Alloy Castings<sup>4</sup>

E 527 Practice for Numbering Metals and Alloys (UNS)<sup>4</sup>

#### 2.1.2 MSS Standards:

SP-25 Standard Marking System for Valves, Fittings, Flanges and Unions<sup>5</sup>

### 3. General Requirements

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

### 4. Ordering Information

4.1 Orders for castings under this specification shall include the following:

- 4.1.1 Quantity of castings required,
  - 4.1.2 Copper Alloy UNS No. (Table 1),
  - 4.1.3 Specification title, number, and year of issue,
  - 4.1.4 Pattern or drawing number and condition (as-cast, machined, etc.),
  - 4.1.5 Chemical analysis of residual elements if specified in the purchase order (Specification B 824),
  - 4.1.6 Pressure test requirements, if specified in the purchase order (Specification B 824),
  - 4.1.7 Soundness requirements, if specified in the purchase order (Specification B 824),
  - 4.1.8 Certification, if specified in the purchase order (Specification B 824),
  - 4.1.9 Foundry test report, if specified in the purchase order (Specification B 824),
  - 4.1.10 Witness inspection, if specified in the purchase order (Specification B 824),
  - 4.1.11 ASME boiler and pressure vessel application (Section 9), and
  - 4.1.12 Product marking, if specified in the purchase order (Specification B 824 and Section 10).
- 4.2 When material is purchased for agencies of the U.S. Government, the Supplementary Requirements in Specification B 824 may be specified.

### 5. Chemical Composition

5.1 The alloy shall conform to the chemical requirements for major elements specified in Table 1.

5.2 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 or zinc may be given as remainder and may be taken as the difference between the sum of all elements analyzed and 100 %. When all named elements in Table 1 are analyzed, their sum shall be as follows:

Copper plus named elements, 99.3 % minimum.

5.3 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).

### 6. Mechanical Properties

6.1 Mechanical properties shall be determined from separately cast test bars and shall meet the requirements shown in Table 2.

<sup>1</sup> 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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<sup>2</sup> For ASME Boiler and Pressure Vessel Code applications see related Specification SB-61 of that Code.

<sup>3</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>4</sup> Annual Book of ASTM Standards, Vol 02.01.

<sup>5</sup> Available from Manufacturers Standardization Society of the Valve and Fittings Industry, 127 Park Street NE, Vienna, VA 22180.

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

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**TABLE 1 Chemical Requirements, Copper Alloy UNS No. C92200**

Major Elements	Composition, % max (Except as indicated)
Copper	86.0–90.0
Tin	5.5–6.5
Lead	1.0–2.0
Zinc	3.0–5.0
Nickel incl Cobalt	1.0 <sup>A</sup>
Residual Elements	Composition, % max (Except as indicated)
Iron	0.25
Antimony	0.25
Sulfur	0.05
Phosphorus	0.05
Aluminum	0.005
Silicon	0.005

<sup>A</sup> In determining copper minimum, copper may be calculated as copper plus nickel.

**TABLE 2 Tensile Properties**

Tensile strength, min, ksi <sup>A</sup> (MPa <sup>B</sup> )	34 (235)
Yield strength, <sup>C</sup> min, ksi <sup>A</sup> (MPa <sup>B</sup> )	16 (110)
Elongation in 2 in. (50.8 mm), min %	24

<sup>A</sup> ksi = 1000 psi.

<sup>B</sup> See Appendix.

<sup>C</sup> Yield strength shall be determined as the stress producing an elongation under load of 0.5 % that is, 0.01 in. (0.25 mm) in a gage length of 2 in. (51 mm).

**7. Casting Repair**

7.1 Castings shall not be plugged, welded, burned-in or impregnated.

**8. Sampling**

8.1 Copper Alloy UNS No. C92200 test bar castings shall be cast to the form and dimensions shown in Figs. 2, 3, or 4 of Practice B 208.

**9. Certification**

9.1 When material is specified to meet the requirements of *ASME Boiler and Pressure Vessel Code*, the certification requirements of Specification B 824 are mandatory.

**10. Product Marking**

10.1 Valves, flanges, and fittings shall be marked in accordance with the latest revision of the Standard Marking System for Valves, Fittings, Flanges, and Unions (No. SP-25) of the Manufacturers Standardization Society of the Valve and Fittings Industry, and in such position as not to injure the usefulness of the casting.

**11. Keywords**

11.1 Navy M castings; steam bronze castings; valve castings

**APPENDIX****(Nonmandatory Information)****X1. METRIC EQUIVALENTS**

X1.1 The SI unit for strength properties now shown is in accordance with the International System of Units (SI). The derived SI unit for force is the newton (N), which is defined as that force which when applied to a body having a mass of one kilogram gives it an acceleration of one metre per second squared ( $N = \text{kg} \cdot \text{m}/\text{s}^2$ ). The derived SI unit for pressure or

stress is the newton per square metre ( $\text{N}/\text{m}^2$ ), which has been named the pascal (Pa) by the General Conference on Weights and Measures. Since  $1 \text{ ksi} = 6\,894\,757 \text{ Pa}$  the metric equivalents are expressed as megapascal (MPa), which is the same as  $\text{MN}/\text{m}^2$  and  $\text{N}/\text{mm}^2$ .

**SUMMARY OF CHANGES**

This section identifies principle changes to this specification since the last issue.

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| 1. Paragraph 1.1 was rewritten                         | Specification B 824 General Requirements for Copper Alloy Castings. |
| 2. The entire specification was revised to comply with |   |

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