NOTICE: This standard has either been superceded and replaced by a new version or discontinued.
Contact ASTM International (www.astm.org) for the latest information.

Designation: B 369 – 96

Standard Specification for Copper-Nickel Alloy Castings[1]

This standard is issued under the fixed designation B 369; 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 Department of Defense.

1. Scope

1.1 This specification covers requirements for copper-nickel alloy castings whose nominal compositions are shown in Table 1. These are as follows:[2]

Copper Alloy UNS No.[2]	Previous Designation
C96200	Alloy A
C96400	Alloy B

1.2 Castings of these alloys are used primarily for corrosion-resisting purposes in both constructional and pressure applications and particularly in marine pumps, valves, and fittings.

1.3 These alloys are considered weldable, but they may be ordered with a weld test to ensure weldability. When extensive welding is to be performed on the casting, weldability tests should be specified in the ordering information (4.2.6) to ensure proper welding characteristics.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are provided for information purposes only.

1.5 This hazard statement applies only to Section 6, Weldability Test, of 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 limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

B 208 Practice for Preparing Tension Test Specimens for Copper Alloys for Sand, Permanent Mold, Centrifugal and Continuous Castings[3]

B 824 Specification for General Requirements for Copper Alloy Castings[3]

B 846 Terminology for Copper and Copper Alloys[3]

E 527 Practice for Numbering Metals and Alloys (UNS)[4]

2.2 *ASME Code:*

ASME Boiler and Pressure Vessel Code[5]

2.3 *AWS Standard:*

AWS A5.6 Specification for Copper and Copper-Alloy Arc-Welding Electrodes[6]

3. Terminology

3.1 Definitions of terms relating to copper alloys can be found in Terminology B 846.

4. Ordering Information

4.1 Orders for castings under this specification should include the following information:

4.1.1 Specification title, number, and year of issue,

4.1.2 Quantity of castings,

4.1.3 Copper Alloy UNS Number (Table 2),

4.1.4 Pattern or drawing number and condition (as-cast, machined, etc.),

4.1.5 ASME Boiler and Pressure Vessel Code Requirements (Section 11),

4.1.6 When material is purchased for agencies of the U.S. Government, the Supplementary Requirements of this specification may be specified.

4.2 The following are optional and should be specified in the purchase order when required:

4.2.1 Pressure test or soundness requirements (Specification B 824),

4.2.2 Witness inspection (Specification B 824),

4.2.3 Certification (Specification B 824),

4.2.4 Foundry test report (Specification B 824),

4.2.5 Product marking (Specification B 824),

4.2.6 Weldability test (1.3 and Section 6), and

4.2.7 Approval of weld procedure and records of repairs (Section 10).

---

[1] 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.

Current edition approved Sept. 10, 1996. Published November 1996. Originally published as B 369 – 61 T. Last previous edition B 369 – 95.

[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.

[5] Available from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017.

[6] Available from American Welding Society, 2501 NW 7th Street, Miami, FL 33125.

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States.

NOTICE: This standard has either been superceded and replaced by a new version or discontinued.
Contact ASTM International (www.astm.org) for the latest information.

TABLE 1 Nominal Compositions

Copper Alloy UNS No.	Composition, %					
	Copper	Nickel	Iron	Silicon	Manganese	Niobium
C96200	87.5	10.0	1.5	0.1	0.9	...
C96400	67.0	30.0	0.7	0.5	0.8	1.0

TABLE 2 Chemical Requirements

	Copper Alloy UNS No. C96200		Copper Alloy UNS No. C96400	
	Min, %	Max, %	Min, %	Max, %
Copper	balance		balance	
Lead	...	0.01	...	0.01
Iron	1.0	1.8	0.25	1.5
Nickel, incl cobalt	9.0	11.0	28.0	32.0
Manganese	...	1.5	...	1.5
Silicon	...	0.50	...	0.50
Niobium	...	1.0	0.50	1.5
Phosphorus	...	0.02	...	0.02
Sulfur	...	0.02	...	0.02
Carbon	...	0.10	...	0.15

5. Chemical Composition

5.1 The castings shall conform to the chemical requirements shown in Table 2 for the copper alloy UNS numbers specified in the purchase order.

5.2 These specification limits do not preclude the presence of other elements. Limits may be established and analysis required for unnamed elements agreed upon between the manufacturer or supplier and the 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 the elements in the table are analyzed, their sum shall be 99.5 % minimum.

6. Mechanical Properties

6.1 Mechanical properties shall be determined from separately cast test bar castings, and shall meet the requirements shown in Table 3.

7. Weldability Test

7.1 When specified in the purchase order at least one test cast as shown in Fig. 1 shall be prepared for each lot of welding grade castings (4.2.6).

7.2 The block shall be molded, gated, and risered in a manner to produce a sound casting without defects that might interfere with welding or the interpretation of the results of the test.

7.3 The groove in the test block shall be completely filled with weld deposit metal, using the manual metallic-arc process with ⅛-in. (12.7-mm) or 5⁄32-in. (3.97-mm) diameter copper-nickel (70-30) coated electrodes conforming to classification AWS ECuNi of AWS Specification A 5.6. The interpass temperature need not be controlled, unless it is to be controlled in fabrication.

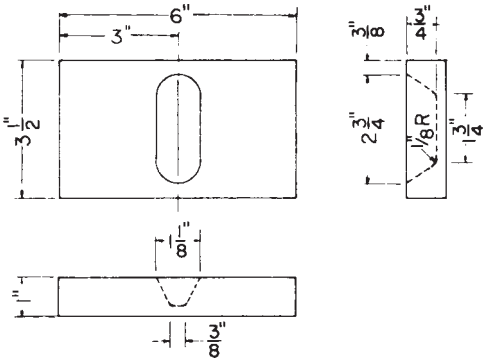
7.4 One ⅜-in. (9.52-mm) minimum thick bend coupon (see Fig. 2), shall be removed longitudinally from the center of the welded block by machining, sawing, abrasive cutting, or other suitable means. Cut surfaces and edges should be sanded smooth if necessary. The side bend specimen then shall be bent 180° in a guided bend jig around a mandrel 1½ in. (38.1 mm) in diameter with the weld located at the center of the bend.

7.5 Cracks or other open defects exceeding ⅛ in. measured in any direction in the fusion zone or heat-affected zone on the convex surface of the specimen after bending shall be cause for rejection. Cracks originating at weld-bead undercuts, at weld-slag inclusions, or at casting defects shall not be cause for rejection.

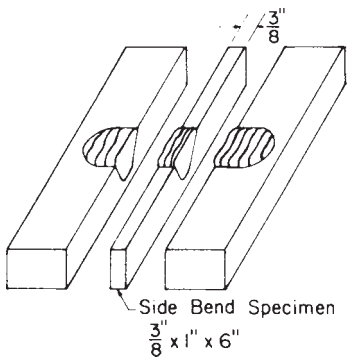
TABLE 3 Mechanical Requirements

	Copper Alloy UNS No. C96200	Copper Alloy UNS No. C96400
Tensile strength, min, ksi[A] (MPa)	45 (310)	60 (415)
Yield strength,[B] min, ksi[A] (MPa)	25 (170)	32 (220)
Elongation in 2 in. (50.8 mm), %	20	20

[A] ksi = 1000 psi.
[B] Yield strength shall be determined as the stress producing an elongation under load of 0.5 %, that is 0.01 in. (0.254 mm) in a gage length of 2 in. (50.8 mm).



NOTE 1—For metric equivalents see Table 4.
FIG. 1 Cast Block for Weldability Test



NOTE 1—For metric equivalents see Table 4.
FIG. 2 Weldability Test Block