

MIL-C-20159C
8 March 1985
SUPERSEDING
MIL-C-20159B
2 March 1962
(See 6.4)

MILITARY SPECIFICATION

COPPER-NICKEL ALLOY CASTINGS (UNS NO. C96200 AND C96400)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers sand and centrifugal copper-nickel alloy castings (UNS No. C96200 and C96400) used primarily for marine applications, including pumps, valves, and fittings.

1.2 Classification. Copper-nickel castings shall be one of the following copper alloys, as specified (see 6.2.1).

UNS Alloy No. C96400

UNS Alloy No. C96200

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Standards. Unless otherwise specified, the following standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

STANDARDS

FEDERAL

FED-STD-151 - Metals; Test Methods.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

NO DELIVERABLE DATA REQUIRED BY THIS DOCUMENT

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- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-248 - Welding and Brazing Procedure and Performance Qualification.
- MIL-STD-278 - Fabrication Welding and Inspection, and Casting Inspection and Repair for Machinery, Piping and Pressure Vessels in Ships of the United States Navy.
- MIL-STD-792 - Identification Marking Requirements for Special Purpose Components.

(Copies of standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- B 208-82 - Preparing Tension Test Specimens for Copper-Base Alloys for Sand Castings.
- B 369-82 - Copper-Nickel Alloy Castings.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

UNIFORM CLASSIFICATION COMMITTEE AGENT

Uniform Freight Classification Ratings, Rules and Regulations

(Application for copies should be addressed to the Uniform Classification Committee Agent, Tariff Publication Officer, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 General. Unless otherwise specified herein, requirements for UNS alloy C96200 and UNS alloy C96400 castings shall be in accordance with ASTM B 369.

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3.2 Chemical composition. The chemical composition of alloys C96200 and C96400 for sand and centrifugal castings shall be the same as specified in ASTM B 369 with the following exceptions:

- (a) Lead content shall not exceed 0.01 percent.
- (b) Sulfur and phosphorous shall not exceed 0.02 percent.

3.3 Mechanical properties. The mechanical property requirements shall be in accordance with ASTM B 369.

3.4 Unless otherwise specified (see 6.2.1), pressure and fracture requirements shall be in accordance with MIL-STD-278.

3.5 Casting repair. Weld repair of castings shall be performed in accordance with MIL-STD-278. Welding procedure qualification, prior to production welding, shall be in accordance with MIL-STD-248.

3.6 Identification marking. When castings are of sufficient size, each casting shall be permanently marked with the following identification data in accordance with MIL-STD-792:

- (a) Specification number (including revision letter).
- (b) Manufacturer's name or trademark.
- (c) Melt or lot number.
- (d) Pattern or drawing number.

The information shall be located on the casting where it will not be machined off in manufacture to finished dimensions.

3.6.1 When castings are of a size that individual marking is impractical, castings of the same lot or melt and pattern shall be wired together or placed in a container, or otherwise separated, and a metal tag containing the data required in 3.6 attached thereto.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Quality conformance inspection. Castings shall be examined and tested in accordance with ASTM B 369 and 4.4.1 and 4.4.2 herein. If any specimen fails to conform to the requirements of this specification, the entire lot shall be rejected, except as specified in 4.4.1, subject to the retest provisions of FED-STD-151.

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4.2.1 Certification of quality conformance. A certificate of quality conformance shall be prepared for each lot of material offered for acceptance (see 6.2.2). The certificate shall include actual quantitative data of specified chemical and mechanical tests. Qualitative results of nondestructive tests and other inspections or tests shall be recorded on the certificate. The certificate shall also state that each lot has been sampled, tested, and inspected in accordance with the specification and meets all specification requirements. The certificates shall be signed by a responsible representative of the contractor.

4.3 Sampling.

4.3.1 Visual and dimensional examination. From each lot as defined in ASTM B 369, samples shall be selected for visual and dimensional examination in accordance with MIL-STD-105 at inspection level 1. The acceptable quality level, (AQL) shall be 4.0 percent defective.

4.3.2 Mechanical property tests. Samples for mechanical property testing shall be selected in accordance with ASTM B 369.

4.3.2.1 Sand castings. Samples for mechanical property testing shall be selected in accordance with ASTM B 369.

4.3.2.2 Centrifugal castings. The method of sampling centrifugal castings for mechanical property tests shall be to add extra length sufficient to provide necessary test specimens or to provide an extra casting to represent each lot. Separately cast test bars may be provided when extra length on castings from which specimens can be prepared is impractical and when there are less than ten castings or 500 pounds of rough castings in the lot; or when specimens of required dimensions can not be machined from castings. When a separately cast specimen is required, castings produced in chill molds of metal or graphite shall have test coupons cast in open keel-block molds of the same material as the molds used for the castings. Where castings are produced in sand lined molds, separate test bars shall be cast to the form and dimensions as specified in Recommended Practice of ASTM B 208. Test bars shall be positively identified with the castings they represent.

4.4 Examinations and tests.

4.4.1 Visual and dimensional examination. Each of the castings selected in 4.3.1 shall be visually and dimensionally examined for conformance with the requirements of ASTM B 369. Any casting in the lot containing one or more visual or dimensional defects shall be considered a defective item and rejected. If the number of defective items found in the lot equals or exceeds the rejection number specified in MIL-STD-105, the lot shall be rejected subject to the resubmittal provisions of MIL-STD-105.

4.4.2 Weldability test. Unless otherwise specified (see 6.2.1), the weldability test for sand and centrifugal castings shall be performed in accordance with ASTM B 369.

4.4.3 Chemical analysis and mechanical property tests. The chemical analysis and mechanical property tests shall be in accordance with ASTM B 369.

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4.4.4 Pressure and fracture tests. Pressure and fracture tests shall be performed in accordance with MIL-STD-278.

4.4.5 Unless otherwise specified (see 6.2.1), surface inspection, pressure and soundness tests shall be performed, as applicable, in accordance with MIL-STD-278. Conformance shall be with MIL-STD-278 in accordance with the applicable category of the casting. The category of the casting shall be noted on the casting drawing.

4.5 Rejection. If any specimen fails to conform to the requirements of this specification, the entire lot shall be rejected, except as specified in 4.4.1, subject to the retest provisions of ASTM B 369.

4.6 Inspection of packaging. Sample packages and packs, and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The preparation for delivery requirements specified herein apply only for direct Government acquisition.)

5.1 Examination for preparation for delivery. Packaging and packing shall be examined for compliance with the Supplementary Requirements section of ASTM B 369 as specified (see 6.2.1). Examination shall be in accordance with MIL-STD-105, with an AQL of 4.0 percent defective.

6. NOTES

6.1 Intended use. The copper-nickel alloy castings covered in this specification are suitable for pumps, valves, fittings and propulsion shaft sleeves.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Alloy required (see 1.2).
- (c) Pattern or drawing number.
- (d) Condition of casting (whether as-cast or machined).
- (e) Whether pattern is to be furnished and disposition of pattern.
- (f) Quantity of castings required.
- (g) Fracture and pressure test requirements if other than MIL-STD-278 (see 3.4).
- (h) When weldability tests are not required (see 4.4.2).
- (i) Nondestructive tests required if other than by MIL-STD-278 (see 4.4.4).
- (j) Level of preservation/packaging and packing required (see Supplementary Requirements in ASTM B 369) (see 5.1).

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6.2.2 Data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of FAR 55.227-7031 are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraph.

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
4.2.1	Certification data/report	UDI-A-23264	----

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5000.19L., Vol. II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4, or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

6.3 Supersession data. The alloys of this revision are related to the types of revision B, as follows:

<u>MIL-C-20159B</u>	<u>MIL-C-20159C</u>
Type 1 70-30 CuNi	UNS Alloy No. C96400
Type 2 90-10 CuNi	UNS Alloy No. C96200

6.4 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:

Army - MR
Navy - SH

Preparing activity:

Navy - SH
(Project MECA-0279)

Review activity:

Navy - AS

User activities:

Army - AT
Navy - OS

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions - Reverse Side)*1. DOCUMENT NUMBER
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2. DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

☐ VENDOR☐ USER☐ MANUFACTURER☐ OTHER (Specify): _____

b. ADDRESS (Street, City, State, ZIP Code)

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER (Last, First, MI) - Optional

b. WORK TELEPHONE NUMBER (Include Area Code) - Optional

c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional

8. DATE OF SUBMISSION (YYMMDD)

TO DETACH THIS FORM, CUT ALONG THIS LINE.)