

METRIC

DOD-P-24639(SH)
13 August 1984

MILITARY SPECIFICATION

PROPELLER, FIXED PITCH, SHIP (METRIC)

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the general requirements for marine (ship) fixed pitch propellers. Specific requirements or exceptions applicable to individual propellers shall be as shown on the individual propeller drawings furnished by the contracting activity.

1.2 Classification. The propellers shall be of the following types as specified (see b.2.1).

- Type I - Solid.
- Type II - Built-up.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. Unless otherwise specified, the following specifications and 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.

SPECIFICATIONS

FEDERAL

- QQ-C-465 - Copper-Aluminum Alloys (Aluminum Bronze) (Copper Alloy Numbers 606, 614, 630, 632M and 642); Rod, Flat Products with Finished Edges (Flat Wire, Strip, and Bar, Shapes, and Forgings).
- QQ-N-281 - Nickel-Copper Alloy Bar, Rod, Plate, Sheet, Strip, Wire, Forgings, and Structural and Special Shaped Section.
- QQ-N-286 - Nickel-Copper-Aluminum Alloy, Wrought (UNS N05500 and (N05502).

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 5523, Department of the Navy, Washington, DC 20362 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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- MIL-R-2765 - Rubber Sheet, Strip, Extruded, and Molded Shapes, Synthetic, Oil Resistant.
- MIL-P-2845 - Packaging of Main Propulsion Shafting, Bearings, Boat and Ship Propellers, and Associated Repair Parts.
- MIL-B-21230 - Bronze, Nickel Aluminum and Manganese-Nickel Aluminum: Castings, Ship Propeller Application.

STANDARDS

FEDERAL

- FED-STD-H28 - Screw-Thread Standards for Federal Services.

MILITARY

- MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited).

2.1.2 Government drawings and publications. The following Government drawings and publications form a part of this specification to the extent specified herein.

DRAWINGS

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

- NAVSHIPS 810-1385967 - Gages Propeller Bore Plug and Shaft Taper Ring.
- NAVSHIPS 810-4435837 - Propeller.

PUBLICATIONS

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

- 0900-LP-003-8000 - Metals Surface Inspection Acceptance Standards.
- 0987-LP-011-2000 - Gauge Propeller Blade Design and Application, TM.
- 0991-LP-023-3000 - Propeller Ship Bronze Straightening and Welding of, TM.

(Copies of specifications, standards, drawings, and publications 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 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.

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3. REQUIREMENTS

3.1 Material.

3.1.1 Solid propellers, blades, and hubs of built-up propellers, caps, and glands shall be fabricated from cast nickel-aluminum-bronze conforming to alloy 1 of MIL-B-21230. Wrought material corresponding to QQ-C-465, alloy 632M is acceptable for use in constructing prairie type propellers or fabricated fairwater caps. In certain cases or for special application, alternative propeller materials may be specified (see 6.2.1).

3.1.2 Bolts and studs securing caps and glands shall be made of class A wrought nickel-copper alloy conforming to QQ-N-281. Nuts shall be made of class A or B wrought nickel-copper alloy conforming to QQ-N-281. Studs and nuts securing blades to hubs shall be made of wrought nickel-copper-aluminum alloy conforming to class B of QQ-N-286, annealed and age hardened. When special materials are specified for the propellers, and nickel-copper alloys specified above may not be compatible, requiring the use of alternative materials as specified (see 6.2.1).

3.1.3 Cap and gland seals shall be made of rubber conforming to MIL-R-2765.

3.1.4 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and shall be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

3.2 Design and dimensions. Design and dimensions of propellers shall be as specified (see 6.2.1) on individual propeller drawings. Propeller blade section, edge, and fillet gages shall comply with NAVSEA 0987-LP-011-2000; and the hub bore taper gage shall comply with Drawing 810-1385967.

3.3 Balance. Propellers and caps shall be balanced separately, in accordance with type II of MIL-STD-167-1. Unless otherwise authorized, propellers shall be balanced and corrected to single-plane on balancing equipment which requires rotation of the work.

3.4 Nuts. The propeller shall be held on the shaft by a propeller nut, or integral cap and nut, screwed and locked in place as shown on Drawing 810-4435837. Unless otherwise specified in the contract or order (see 6.2.1), the propeller nut on integral cap and nut shall be furnished with the propeller shaft.

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3.5 Hub caps. For shafts over 7 inches in diameter, the propeller nut shall be covered by a cap secured to the hub by studs as specified on Drawing 810-4435837. For shafts 7 inches in diameter and under, the cap may be integral with the nut. The cap shall be sealed with a gasket of circular cross section in accordance with the applicable drawings.

3.6 Threaded parts. Threaded parts, except the material, shall conform to FED-STD-H28.

3.7 Finish. The blade, hubs, and caps shall be accurately machined. The remaining external surfaces shall be ground and all external surfaces shall be polished conforming to Drawing 810-4435837.

3.8 Painting. Propellers of corrosion-resisting material shall not be painted.

3.9 Marking. Hubs, caps, and gland rings of propellers shall be stamped in accordance with Drawing 810-4435837.

3.9.1 Blades of built-up propellers shall be stamped on the top of the base forward of the blades and clear of the fillets with the following information:

- (a) National stock number.
- (b) Serial number.
- (c) Drawing number.
- (d) Name of manufacturer.
- (e) Contract number.
- (f) Mass (actual).
- (g) Material.
- (h) Position (in set, determined by balance).

3.10 Interchangeability. Propellers of identical rotation built to the same drawings shall be strictly interchangeable without necessity of further machining or balancing.

3.11 Repairs. NAVSEA 0900-LP-003-8000 and 0991-LP-023-3000 shall be adhered to if repairs are required.

3.12 Mass. At delivery, the actual mass shall be indicated on the bill of lading.

3.13 Manufacturing tolerance. Manufacturing tolerances shall be as specified in table I, or on the drawings specified in the contract or order (see 6.2.1).

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TABLE I. Manufacturing tolerances.

Blade nomenclature	Combatant	Noncombatant	Service
Radius	+0 -1/2 percent of design or 3.2 mm (1/8 inch), whichever is greater	+0 -1 percent of design	+ 1.5 percent of design
Pitch at any section	+ 1 percent of design	+ 1-1/2 percent of design	+ 2 percent of design
Pitch variation at adjacent radii	+ 1/2 percent of design	+ 3/4 percent of design	-----
Mean pitch	+ 3/4 percent of design	+ 1 percent of design	+ 1-1/2 percent of design
Section half length	+0 -1/2 percent of design maximum blade section length Adjacent sections 1/4 percent of maximum blade section length	+0 -3/4 percent of design maximum blade section length -----	+ 1 percent of design maximum blade section length -----
Section maximum thickness	+0 -1.6 mm (1/16 inch) or -2 percent of the maximum design thick- ness of each section, whichever is greater	+ 0.8 mm (1/32 inch) - 2.4 mm (3/32 inch) or -2-1/2 percent of the maximum design thickness of each section, whichever is greater	+ 3.2 mm (1/8 inch) or + 3 percent of the maximum design thickness of each section, whichever is greater
Angular spacing of blade center axes	+ 15 minutes	+ 30 minutes	+ 1 degree
Track at .95R	1/4 percent of design diameter or 6.4 mm (1/4 inch) whichever is greater	1/2 percent of design diameter or 12.7 mm (1/2 inch), whichever is greater	1/2 percent of design diameter or 12.7 mm (1/2 inch), whichever is greater

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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.

4.1.1 Inspection system. The contractor shall provide and maintain an inspection system in accordance with the data ordering documents included in the contract or order (see 6.2.2).

4.2 Inspection and measurement of each propeller shall be in accordance with Drawing 810-4435837 and NAVSEA 0987-LP-011-2000. The contractor shall prepare a propeller measurement report in accordance with the data ordering document included in the contract or order (see 6.2.2).

4.3 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. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.3.)

5.1 Preservation-packaging, packing and marking. Propellers shall be preserved-packaged level A or C, packed level A or C, and marked as specified (see 6.2.1) in accordance with MIL-P-2845.

6. NOTES

6.1 Intended use. Propellers covered by this specification are intended for marine ship fixed pitch.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type required (see 1.2).
- (c) Material required (see 3.1.1 and 3.1.2) including applicable specification, if other than as specified.

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- (d) Applicable drawing number(s) (see 3.2 and 3.13).
- (e) If propeller nuts are not to be furnished (see 3.4).
- (f) Level of preservation-packaging and level of packing required (see 5.1).
- (g) List of items to be furnished.

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 52.227-7031 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 paragraphs.

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
4.1.1	Inspection system program plan	DI-R-4803	---
4.2	Report, propeller measurements	UDI-T-23734	---

(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 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

Preparing activity:
Navy - SH
(Project 2010-N022)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER

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2. DOCUMENT TITLE

Propeller, Fixed Pitch, Ship (METRIC)

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)

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

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