USCG Small Cutter Monobloc and Controllable Pitch Propellers

SPECIFICATION FOR SERVICES

FY2025

(Draft-0, 7 January 2026)

TABLE OF CONTENTS

Revisions Record....iii
References....iv
Government-furnished Property....v
General Requirements – Controllable Pitch Propeller (CPP) Blades and Monobloc Propellers, Overhaul, Repair and Manufacture....1
WORK ITEM 1: Propeller, Overhaul, 65 WYTL....15
WORK ITEM 2: Propeller, Overhaul, 65/75 WLR/WLIC (Post-IRESS)....23
WORK ITEM 3: Propeller, Overhaul, 75F WLR....31
WORK ITEM 4: Propeller, Overhaul, 140 WTGB....40
WORK ITEM 5: Propeller, Overhaul, 160 WLIC....48
WORK ITEM 6: Blade(s), Controllable Pitch Propeller (CPP), 225 WLB Class, Inspect and Repair....56
WORK ITEM 7: Propeller, 175' WLM, Manufacture....67
WORK ITEM 8: Propeller, 87 WPB - Inspect, Repair/Overhaul....74
WORK ITEM 9: 154 WPC Propeller, Inspect, Repair/Overhaul....95
WORK ITEM 10: Blade(s), Controllable Pitch Propeller (CPP), 210 "A" Class, Inspect and Repair....119
WORK ITEM 11: Blade(s), Controllable Pitch Propeller (CPP), 210 "B" Class, Inspect and Repair....131
WORK ITEM 12: Blade(s), Controllable Pitch Propeller (CPP), 270 Class, Inspect and Repair....143

REVISIONS RECORD

This page is used to record specification revisions, which may have occurred subsequent to a Revision 0 (Rev-0) package. Information listed is intended to provide contractors and field unit personnel a means to ensure all the current specification revision pages are present when reviewing or utilizing this specification package.

DATE	REV#	WORK ITEM#	CHANGES MADE

NOTE : All work item and paragraph numbers listed above for a given revision correspond to same numbers in the previous revision. This revised specification is self-contained with all of the above listed changes incorporated.

REFERENCES

The individual work items herein will provide lists of applicable documents making up a portion of this specification via referencing. Approval/publication dates or revision dates/numbers are also identified, to ensure that same document versions are used at the time of specification writing and during contract execution.

All Coast guard drawings, technical publications, and standard specifications will be provided to contractors by the Coast Guard at an appropriate time, or upon request, free of charge. Other Government documents may be accessed – free of charge – from links located on the SFLC website. Commercial sites provide access to their respective documents.

GOVERNMENT-FURNISHED PROPERTY

The individual work items herein will provide lists of property, which the Government will furnish. These lists supersede any other material obligations indicated or implied by referenced drawings.

General Requirements – Controllable Pitch Propeller (CPP) Blades and Monobloc Propellers, Overhaul, Repair and Manufacture

1. SCOPE

1.1 Intent. These General Requirements apply for conducting USCG CPP blade and monobloc propeller inspections, repairs and overhauls, including packaging and shipping preparations, performed at commercial contractor facilities. All components serviced via this specification and contract must adhere to these general requirements except as modified by the applicable, individual work items.

1.2 Requirements precedence. Where conflict exists between these General Requirements and the specific, individual work item requirements in the overall specification, the individual work item requirements take precedence.

1.3 Terminology.

1.3.1 The term "component" used within these General Requirements will occasionally be used in lieu of "propeller(s)" and/or "blade(s)".

1.3.2 Where the term "blade(s)" is used, it is in reference to CPP blades unless otherwise defined, i.e., "propeller blades" for monobloc propellers.

1.3.3 The terms "serviceable" and "A-condition" may be used interchangeably.

NOTE
Serviceable or A-condition is defined as being capable of functioning and performing in the same manner as an identical new CPP blade set although the set may not have a new appearance.

2. REFERENCES

COAST GUARD DRAWINGS

None

COAST GUARD PUBLICATIONS

Surface Forces Logistics Center Standard Specification 0740 (SFLC Std Spec 0740), 2022, Welding and Allied Processes

OTHER REFERENCES

ANSI/ASQC Q9001, Quality Management Systems - Requirements - T860E

DOD 4140.01-M-1, Compliance for Defense Packaging

ISO/IEC 17025, General requirements for the Competence of Testing and Calibration Laboratories - Third Edition

MIL-DTL-2845E (SH), Propulsion Systems, Boat and Ship; Main Shafting, Propellers, Bearings, Gauges, Special Tools, and Associated Repair Parts; Preservation, Packaging, Packing and Storage of

SAE AMS-T-22085, Tapes, Pressure-Sensitive, Adhesive, Preservation and Sealing

2.1 Document availability. To obtain documents referenced anywhere in this specification, refer to Section 6.1 (Document sources) herein.

2.2 References order of precedence. The references listed are required to be adhered to in fulfilling the contract. In the event of a conflict between the text of this specification and the references cited herein, this specification and the work items within shall take precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. GENERAL REQUIREMENTS

3.1 Work responsibility. The Contractor must provide all labor and materials required to inspect, and if required, repair or overhaul designated components in accordance with the requirements and references cited in the applicable work items of this specification.

3.2 Welding and brazing – general.

3.2.1 Process requirements. The Contractor must perform all welding, allied processes, and NDE in accordance with SFLC Std Spec 0740.

3.2.2 Certifications. Welder and weld procedure certifications must be in accordance with the applicable sections of SFLC Std Spec 0740 and made available for review to the Contracting Officer (KO), Contracting Specialist (KS), and/or the USCG Quality Assurance Representative (QAR) upon request at any time during the contract period.

3.3 Test and inspection plan. Prior to award, the Contractor must submit to the KO for evaluation a general and sequential, outlined plan for the required pre- and post-repair tests and inspections for propellers and blades.

3.4 Inspections - general.

3.4.1 Personnel requirements. Visual Preservation Inspections (VPI), Visual Technical Inspections (VTI) and geometrical/dimensional inspections must be conducted by those trained and qualified via the NAVSEA Propeller Visual Inspection Course, or a proposed and acceptable industry/society equivalent.

NOTE
PRIOR TO AWARD, the Contractor is responsible for providing to the KS/KO the proposed industry/society equivalent for review and approval. The proposed equivalent will be used in the Contractor technical evaluation.

3.4.2 Arrival inspections. Upon receipt of Government-Furnished Property (GFP), the Contractor must verify that the items received are in accordance with the applicable contract and/or contract delivery order. Within 5 business days, the Contractor must provide to the KO an Arrival Inspection Report, accounting for all arrived GFP and any missing items, if any.

NOTE

Once in Contractor possession, the Contractor is responsible for the care and security of all GFP received.

3.4.3 Visual preservation inspections (VPI). Prior to moving and/or opening any propeller or blade crate(s), the Contractor must inspect each crate and provide a written report for any observed damage to the crate. Once opened, the Contractor must observe and detail any damage to the content preservation and protection systems inside the crates, i.e., protective edges, preservation coating, etc. Submit CFRs for each prior to removing the container contents.

3.4.4 Visual and technical inspections – general.

3.4.4.1 Component visual pre-inspection requirements. Each propeller and/or blade to be inspected must be thoroughly and wholly cleaned, free of all growth, scale, dirt, etc., prior to conducting any visual inspections.

3.4.4.2 Open and Inspect Report (OIR) requirements. An OIR detailing the information sought in the following paragraphs must be submitted to the KO within ten (10) days of receipt of GFP.

3.4.4.2.1. Following the propeller and/or blade packaging inspection and cleaning, the Contractor must conduct a Visual Technical Inspection (VTI) of the component(s) and make an initial determination for expected work required to return each item to "A" condition as defined below.

NOTE

"A" condition is defined as a repaired or overhauled component meeting all requirements herein. All items must be capable of functioning and performing in the same manner as an identical, new item, although it may not have the appearance of a new item.

3.4.4.2.2 OIRs must include all estimated costs of labor and materials (per task) including in-process and post-repair testing. Also included must be costs associated with the repair and/or renewal of packaging, protection, and crate(s).

CAUTION!

If at any time, while performing the initial inspection or during authorized work, the Contractor determines the propeller and/or blade is beyond economical repair (BER), the KO and COR must be notified immediately with detailed, supporting information for the determination.

No further work beyond the OIR is to proceed until authorized by the KO in writing.

NOTE

Out-of-tolerance or damaged propeller bores will often render a BER condition; it is recommended to start propeller inspections with the bore absent another obvious BER condition.

3.4.4.2.3 OIR information. The OIR must contain the following information:

- Contractor name, address, and telephone number.
- Date of OIR inspection.
- Contract number and delivery order number, as applicable.

- Name of personnel conducting inspections.
- Component(s) serial number(s).
- Estimated cost and duration to complete repair/overhaul.
- Estimated cost and duration to repair or replace shipping container, if required.
- Estimated cost and duration to complete any work that is beyond the scope of the applicable work item.
- Contractor recommendation (repair or BER) to the KO for each propeller and/or blade; the KO will advise the Contractor how to proceed.

3.4.4.2.4 BER disposition. BER options are as follows:

- Contractor to scrap onsite and provide credit to the Coast Guard based on current regional material scrap prices.
- Propeller(s) to be re-packaged in the original shipping container (unless replaced), properly marked "H Condition" per section 5.6 and returned to SFLC Baltimore, MD at the address listed in section 5.8.1.

3.4.5 Geometrical/dimensional inspections - general.

3.4.5.1 Measuring equipment. The Contractor must adhere to the following dimensional and geometrical measurement inspections requirements:

3.4.5.1.1 All propeller and/or blade surfaces must be measured using electronic, computer-aided equipment (exceptions permitted for bore diameter measurements or other inaccessible areas). Known, acceptable computer-aided inspection systems, i.e., 3-dimensional coordinate measuring machines (CMM, preferred), Prop Scan, Hale Measurement Recording Instrument (MRI), or a combination of these systems, or a proposed equivalent system, shall be used for all inspections.

CAUTION!
Drop-style pitchometers and/or sheet metal gauges must not be used unless explicitly required in a specific work item.

NOTE
Areas where hand measurement tools are more appropriate, i.e., digital micrometer/caliper, gauges, etc., are authorized provided they met the accuracy requirements.

3.4.5.1.2 Prior to contract award, the contractor must identify the inspection system/method to be used to the KO.

3.4.5.1.3 All measuring equipment accuracy shall be a minimum of 0.001".

3.4.5.2 Ancillary equipment. All rotational equipment, i.e., mandrels, concentric rings, shafts, etc., used to for propeller/blade inspections and balancing must not exceed a total indicated run-out (TIR) of 0.001".

3.4.5.4 Data and tolerances. All required data points and tolerance bands will be in accordance with the specific work items in the larger specification.

3.4.6 Blue fit inspections. When required, blue fit inspections are recommended to be done using a blue coating thickness of .0002" and .0004" for best results.

NOTE

If blue fit inspections are required and a certified companion component is unavailable, the Contractor may propose a virtual fit-up inspection via three-dimensional CMM scanning of the existing component overlaid with a companion component CAD model.

3.5 Propeller repairs – general. Repairs must be made using the following methods in declining preference order:

3.5.1 Straightening.

3.5.2 Material removal (grinding), limited to the minimum required to repair.

3.5.3 Hot work (welding processes).

3.6 Final inspections and test reports. The Contractor must submit to the KO for approval detailed, final inspection reports prior to scheduling an onsite Coast Guard SFLC Quality Assurance (QA) verification inspection.

CAUTION!

All components require a 100% Coast Guard QA verification inspection at the Contractor's facility prior to shipping to their final locations as designated by the KO.

NOTE

For the safety of Coast Guard personnel and shop workers, QA inspections shall be completed indoors away from normal shop work, operating machinery, loud noise, welding (arching) and grinding operations if permissible.

3.6.1 The report must detail the final condition of each component after all work has been completed. All final technical measurements must be recorded and presented for SFLC QA desk audit, including any final dye penetrant (PT) inspection reports.

3.6.2 The Contractor is responsible for notifying the KO at least ten (10) calendar days prior the contractor being ready for any Coast Guard QA inspections or testing as required herein.

3.6.3 A copy of all test and inspection reports shall be turned over to the SFLC QA Representative upon arrival at the Contractor's facility.

3.6.4 The final inspection report must be in the English language and reported dimensions must be presented in standard or metric as represented on drawings or any compliance forms.

3.6.5 All Coast Guard QA inspections must be completed within the continental United States of America.

3.7 Warranty. Standard manufacturer's warranty applies to items serviced under this specification.

4. QUALITY ASSURANCE

4.1 **General**. The Contractor must maintain an inspection system in compliance with ANSI/ASQC Q9001 and ensures each item offered to the Coast Guard for acceptance and approval meets all contractual requirements.

4.2 **Records and reports**.

4.2.1 The Contractor must maintain complete inspection and test records for all components serviced, serialized and traceable to each component.

4.2.2 In addition to the recorded conditions and measurements, pre- and post-work, the records must track all conditions found, actions taken, and final outcomes.

4.2.3 All reports must indicate out of tolerance readings via highlight, color coding, shading, circling, or other prominent marking.

4.3 **Calibration system**. The Contractor, as well as any subcontractors, must maintain a test equipment calibration program in compliance with ISO/IEC 17025. The program shall be documented and traceable to the National Institute of Standards (NIST).

4.4 **Inspection responsibility**. The Contractor must conduct all required inspections with a NAVSEA qualified propeller inspector. The Contractor must provide the space, personnel, and test equipment to conduct and meet all inspection requirements, ensuring all final products conform to the contractual requirements.

4.5 **Compliance**.

4.5.1 All work must meet the general requirements detailed in Sections 3 and 5. The absence of any requirements in the specification shall not relieve the Contractor of the responsibility of assuring that all components returned to the government comply with all requirements of the contract. Sampling for quality conformance does not authorize submission of known defective material (either indicated or actual), nor does it commit the government to acceptance of defective material.

4.5.2 The inspections and tests required by this specification are the minimum required and are not intended to supplant any controls, examination, inspections or tests normally employed by the Contractor to assure the quality of the item in question.

4.6 Coast Guard SFLC QAR reviews. The following are required and must be observed by Coast Guard SFLC QAR(s):

- Condition and care of all GFE.
- Propeller inspection requires 100% verification to assure full compliance with the applicable drawings, references, compliance sheets and this work item.
- Mandatory replacement parts in accordance with the applicable work item.
- Welder certifications in accordance with paragraph 3.2.2 herein.
- Preservation, packaging, packing, marking, and bar-coding of each propeller prior to shipping in accordance with Section 5 below and subsections.

4.6 **Document responsibility**. The Contractor must have the latest versions of the drawings, specifications, tolerances and approved test procedures available for review when requested.

4.7 **Failure and corrective action responsibility**. If a propeller fails to pass any inspection or test, the Contractor must report the failure and provide a corrective action recommendation to the KO for approval.

4.7.1 Only with KO approval and authorization will the corrective action be taken. No further testing or inspection is to be taken until the corrective action has been completed, with exception of any in-process checks that are required. Only after the corrective action is complete will the KO authorize post-work inspections or testing.

NOTE
The KO reserves the right to totally reject any failed item without considering any suggested corrective action.

4.7.2 Acceptance will be withheld until post-corrective action inspection and/or testing has been successfully demonstrated.

4.7.3 The Contractor must document all corrective actions and submit post-work inspection/testing reports to the KO for approval.

4.7.4 Each corrective action report shall include, but not be limited to, the cause of each defect, corrective action recommended and accomplished, and any steps taken to prevent a recurrence of each defect.

5. PRESERVATION, PACKAGING, PACKING, MARKING, AND SHIPPING

5.1 General. Each component must individually cleaned, preserved, packaged, packed, marked and bar-coded in its own reusable shipping container, or a new reusable shipping container, if approved. Preservation, packaging, packing, marking and bar-coding will be inspected by Coast Guard SFLC QA personnel at Contractor's facility.

WARNING!
Prior to the packaging and marking of the completed units, the KO must be notified to permit USCG QA inspection. Only following satisfactory inspection can the Contractor begin the process covered under Section 5 herein.

5.2 Cleaning, preservation and protection.

5.2.1 Prior to preservation, each component shall be cleaned by any process or combination of processes which will accomplish thorough cleaning without damage to the component(s).

5.2.2 After cleaning, apply to each component tape conforming to SAE AMS-T-22085, TYPE II and strippable compound preservative in accordance with MIL-DTL-2845E (SH) section 3.14.1.3.1.

5.2.3 After applying strippable compound, galvanized sheet metal blade edge protectors shall be installed in accordance with MIL-DTL-2845E (SH) section 3.14.1.4. The edge protection shall be held in place with all stainless steel grade hardware.

5.2.4 Plastic flange plugs/caps shall be inserted in the large and small bore openings, as applicable, and in all bolt holes.

5.3 Packaging and packing. Each component shall be individually packed in accordance with MIL-DTL-2845E paragraph 3.14.2.2.2.

5.3.1 The Contractor must enclose a print-out summation of all measured results with each component. The results shall be placed in an envelope and marked "For the USCG cognizant engineer".

5.3.2 After enclosing the print-out, the container cover must be carefully secured using lag bolts.

NOTE
Packaging and packing photo examples are available in section 6.2

5.4 New, reusable wood crate. When authorized by the KO, the Contractor must construct a new reusable shipping container in accordance with MIL-DTL-2845E paragraph 3.14.2.2.2 suitably sized for the component to be contained.

5.5 Wood Packing Material (WPM) requirements.

5.5.1 New, reusable shipping containers shall meet the phytosanitary requirements for WPM in accordance with paragraph C2.1.1 of DOD 4140.01-M-1, Compliance for Defense Packaging.

5.5.2 WPM is defined as wood pallets, skids, load boards, pallet collars, wooden boxes, reels, dunnage, crates, frames and cleats.

5.5.3 Packaging material exempt from the requirements are materials that have undergone a manufacturing process such as corrugated fiberboard, plywood, particleboard, veneer and oriented strand board (OSB).

5.5.4 All new purchases of WPM shall be constructed from heat treated (treated to 56° C. core temperature for 30 Minutes) lumber and certified by an accredited agency recognized by the American Lumber Standard Committee (ALSC).

5.5.5 All shipping containers must have the appropriate markings in accordance with DOD 4140.01-M-1, Compliance for Defense Packaging Ref. 2 paragraph C2.5.

5.5.6 Newly manufactured skid-type shipping containers shall be secured and stored per section 3.1.

5.6 Markings. Each packaged and packed component must be marked in the upper left-hand side of the two longest sides, (two opposite sides if square facing the forklift driver) of each shipping container. The container lettering shall be black waterproof painted stencil and permanently affixed. The lettering shall be painted on a white background. Additional marking requirements are listed in section 5.6.1 and 5.6.2.

NOTE
Marking examples can be seen in section 6.2

5.6.1 Unless otherwise noted in an individual work item, markings must consist of the following:

- National stock number (NSN): {insert NSN}
- Item name: {insert item name, including "LH" for left hand or "RH" for right hand, as applicable}
- Part number (P/N): {insert part number}
- Serial number (S/N): {insert part number}
- Contract number: {insert contract number}
- Shipping weight (lbs): {insert measured container + component weights}
- Condition: CONDITION A

- Quantity & unit of issue: 1 – EA {or as applicable}
- U.S. Coast Guard SFLC Material

5.6.2 Additional marking requirements. The Contractor must also complete the additional requirements as stated below for newly manufactured shipping containers.

a. The Contractor must paint the area of the top screws to be removed and lifting eye stencil white. A two-inch red square shall be painted to identify each screw that is used to secure the top to the container. The screws must be in the center of the square. The stencil must be waterproof with one-inch black block letters. Four eye bolts (one on each corner) must be adequately sized and installed to lift the lid. The following stencil shall be put on the crate in the area of the eye bolts:

THESE LIFTING EYES PROVIDED
FOR REMOVAL OF COVER ONLY
DO NOT USE FOR HANDLING OR MOVING
CONTAINED COMPONENTS

See example of markings in section 6.2.4, figure 4.

b. The Contractor must stencil a note on the top of the container in the center using waterproof one-inch black block lettering on a contracting white background. The stencil shall state the following:

NOTE: TO OPEN CONTAINER
REMOVE RED SCREWS AND LIFT
COVER USING LIFTING EYES

See example of markings in section 6.2.5, figure 5.

5.7 Bar coding. The U.S. Coast Guard requires bar coding of the NSN in accordance with MIL-STD-129R. See paragraph 5.4.1.2.1, page 51 of MIL-STD-129R for identification linear (Code 39) and 2D (PDF417) bar code markings and locations.

5.7.1 The bar code label can be applied separately or as part of the marking required in 5.6.

5.8 Shipping. Unless otherwise directed, the Contractor must ship and deliver the component(s) as follows:

5.8.1 Shipping must be to the following Government address:

US COAST GUARD
SURFACE FORCES LOGISTICS CENTER
2401 Hawkins Point Road
Receiving Room – Building 88
Baltimore, MD 21226

5.8.2 Notify the KO and Contracting Officer's Representative (COR) 7 days in advance of shipping.

5.8.3 Provide timely shipping information to KO and COR including the name of the shipping company, date of shipment, and arrival date expected to the government facility.

NOTE
No shipment shall arrive outside of government normal business hours as determined by the KO.

5.8.4 Delivery acceptance will be made at destination by a Government representative. Acceptance will be contingent upon representative's verification of no damage in transit, correctness and completeness of the order, including the Contractor's compliance with the preservation, packaging, packing, marking and bar-coding requirements.

6 NOTES

6.1 **Document sources**.

6.1.1 **Government document sources**.

- Department of Defense Single Stock Point (DODSSP)
  Building 4, Section D
  700 Robbins Avenue Philadelphia, PA 19111-5094
  215-697-2667/2179
  FAX 215-697-1462
- DOD & Navy Publications & Forms (Other Than DODSSP)
  Naval Publication and Forms Center 5801 Tabor Ave.
  Philadelphia, PA 19120
  215-697-2000
- USCG Surface Forces Logistics Center
  2401 Hawkins Point Road Baltimore, MD 21226-5000
  Phone: 410-762-6649
  ATTN: Contracting Branch, CPD1

6.1.2 **Commercial document sources**.

- ASTM International
  1916 Race Street
  Philadelphia, PA 19103-1187
  Phone: 215-299-5585
  Fax: 215-977-9679
- American National Standards Institute (ANSI)
  1430 Broadway New York, NY 10018
  Phone: 212-642-4900
- International Standard Organization (ISO)
  1, ch. De la Voie-Creuse
  CP 56 - CH-1211 Geneva 20 Switzerland
  Phone: +41 22 749 01 11
  Fax: +41 22 733 34 30

- American Society of Mechanical Engineers (ASME)
  Two Park Avenue
  New York, NY 10016-5990
  Phone: 800-843-2763
- The Society for Protective Coatings (SSPC)
  800 Trumbull Drive
  Pittsburgh, PA 15205
  Phone: 1-877-281-7772
  Fax: 412-444-3591
- Society of Automotive Engineers (SAE)
  400 Commonwealth Drive
  Warrendale, PA 15096
  Phone: 724-776-4841
  Fax: 724-776-0790

6.2 **Photo examples**.

(See below)

6.2.1 Figure 1: Example of a prepared propeller crate.

6.2.2 Figure 2: Example of propeller with edge guards and cap over bore.

6.2.3 Figure 3: Example of propeller with edge guards and cap over bore.

6.2.4 Figure 4: Example of crate markings and lifting eyes on top of crate.

6.2.5 Figure 5: Example of crate markings to remove top off crate.

6.2.6 Figure 6: Example of finished propeller crate with markings.

WORK ITEM 1: Propeller, Overhaul, 65 WYTL

1. SCOPE

1.1 Intent – This work item defines the requirements to inspect and overhaul U.S. Coast Guard 65' Light Harbor Tug right-hand propellers to a serviceable, A-condition.

1.2 Government furnished property (GFP). The listed items are property of and managed by the United States Coast Guard (USCG) Surface Forces Logistics Center (SFLC), Baltimore MD and will be issued to the contractor as issuance of a contract or contract delivery order.

ITEM DESCRIPTION	NATIONAL STOCK NUMBER (NSN) PART NUMBER (P/N)
Propeller, Right-Hand (RH)	NSN: 2010-01-482-6135 P/N: 4B56Dx46P-RH

2. REFERENCES

COAST GUARD DRAWINGS

Coast Guard Drawing 65B-WYT-4400-3, Rev C, 65 FT WYTL All Classes Propeller

COAST GUARD PUBLICATIONS

Surface Forces Logistics Center Standard Specification 0740 (SFLC Std Spec 0740), 2022, Welding and Allied Processes

OTHER REFERENCES

American Bureau of Shipbuilding (ABS) Rules for Survey After Construction 2021 - Guide for Bronze and Stainless-Steel Propeller Castings, Part 7 Appendix 1, Section 10

ASTM E1417/E1417M, Dated 9/1/2021 – Standard Practice for Liquid Penetrant Testing

DOD-STD-2185 (SH) – Requirements for Repair and Straightening of Bronze Naval Ship Propellers

International Standard ISO 484/2, Shipbuilding – Ship Screw Propellers – Manufacturing Tolerances

MIL-STD-167-1A, Department of Defense Test Method Equipment, Mechanical Vibrations of Shipboard Equipment

SAE-J-448A - Surface Texture Standard

3. REQUIREMENTS

3.1 General.

3.1.1 Inspection, repair and overhaul - general. All inspections, repairs and overhaul must be accomplished in accordance with the requirements set within this work item.

3.1.2 Workmanship. Upon completion of all work, all propellers must have a polished, professional finish and be free of dirt, grease, burrs, sharp edges, etc.

3.2 Inspections. Referring to the General Requirements work item for guidance, for each blade set received, the Contractor must accomplish the following inspections and submit an Open and Inspect Report (OIR) on all of the following:

NOTE

The OIR must include all results from the inspections and measurements under 3.2 and follow-on paragraphs.

3.2.1 Arrival inspection.

3.2.2 Visual Preservation Inspection (VPI).

3.2.3 Visual and Technical Inspections (VTI). The Contractor must conduct all inspections required under paragraph 3.2.4 and follow-on paragraphs.

3.2.4 Geometrical/dimensional inspections. Prior to overhaul/repair, while using Coast Guard Drawing 65 WYTL 4400-3 as guidance, the Contractor must conduct the following inspections and measurements, recording all results and deviations outside of prescribed tolerances.

NOTE

ISO 484/2, Class II is the guiding document for the inspections and repairs to be made. Class II measurements and tolerances apply unless explicitly stated otherwise.

3.2.4.1 Blade radius length. Measure each blade radius length.

3.2.4.2 Section pitch. Measure the pitch of each blade at the following radii: 0.5, 0.6, 0.7, 0.8, 0.9, and 0.95.

3.2.4.3 Blade pitch average. Calculate the average blade pitch using the radii prescribed in the above paragraph.

3.2.4.4 Blade section widths. Measure each blade section width at the radii prescribed in 3.2.4.2.

3.2.4.5 Maximum blade thicknesses. Measure the maximum blade thicknesses at the radii prescribed in 3.2.4.2.

3.2.4.6 Blade track. Measure each blade track at the 0.95 radius for each blade.

3.2.4.7 Fairness. Conduct a fairing survey for each blade, noting all locations and deviations from the prescribed fairness and fairness rate of change tolerances.

3.2.4.8 Surface finish. Using SFLC Std Spec 0740 as guidance, conduct a surface finish survey for all blade surfaces, fillets and palms.

3.2.4.8.1 Blade surfaces from R 0.2 to the tip must have a finish of 63 micro inches or better.

3.2.4.8.2 Blade fillets and hubs must be 125 micro inches or better.

3.2.4.9 Surface inspections. Using SFLC Std Spec 0740 and ABS Part 7, Section 10, Table for acceptance criteria, conduct the following:

3.2.4.9.1 Surface inspection – visual. Conduct a visual inspection of each propeller as guidance; markup and report all discrepant physical condition findings on the form provided in Section 4.

3.2.4.9.2 Surface inspection – Nondestructive test (NDT). Conduct a dye penetrant inspection on all component surfaces, including the hubs.

3.2.4.9.3 Surface inspection reports. Markup and report all discrepant visual and NDT findings on the forms (blades) provided in Section 4 for each surface inspected.

NOTE

The Section 4 forms are provided for convenience and the Contractor may opt to use clearer forms in their submission.

3.3 Overhaul/repair. If a Change Request has been authorized and released by the KO, the Contractor must make all recommended repairs (or as amended by the KO) for the affected blade(s) in accordance with the following:

3.3.1 Tolerances. The repair tolerances must be in accordance with ISO 484/2, **Class II** in conjunction with Coast Guard Drawing 65 WYTL 4400-3.

3.3.2 Welding specifics.

3.3.2.1 Critical blade areas are described as the pressure face of a blade between the fillet and the .4 radius, starting at the leading edge encompassing 80% of the chord length taken at the 0.4 radius (see Figure 1 of DOD-STD-2185).

WARNING!

Welding required between the 0.2 and 0.25 radii must not be taken without prior KO approval.

3.3.2.3 All welding performed must be documented on the visual inspection sheets for each blade; each weld must be dimensionally identified by location, length, width, and depth.

3.3.2.6 Provide photo documentation to the KO during in-process welding repairs and any discontinuities during dye penetrant inspection.

3.3.2.6.1 Each photograph shall include the component serial number and date the photograph was taken.

3.3.2.6.2 Color photographs must be taken with a digital camera and the images provided electronically in "**jpg format**" to the KO during:

3.3.3 Surface finish. Blade surfaces must be ground fair and polished to the following finishes in accordance with SAE-J-448A:

- Blade surfaces from 0.2R to tip – 63 micro inches Ra;
- Hub exterior surfaces – 125 micro inches Ra.
- Remove all high spots, burrs, abrasions, knicks, corrosion/oxidation, and foreign matter from the propeller keyways, glands, hub bores, flanges and mating surfaces.
- Chase and tap exposed threaded areas where necessary

3.3.4 Balancing. Each propeller must be single plane balanced in accordance with MIL-STD-167-1A, paragraph 5.2.2.2 and as follows:

NOTE

All balancing must be accomplished by means of balancing equipment that requires work piece rotation.

3.3.4.1 Prior to performing any balance tests, the Contractor must demonstrate the balance machine sensitivity using a weight determined by the following formula:

$Ws = 0.1(U)/r$

- Where, Ws = sensitivity weight
- U = residual unbalance tolerance;
- r = radial location of the weight.

NOTE

Weight addition/removal shall be easily detected and discernable to the balance machine operator.

Material removed to balance shall be taken from the suction face of the heavy blade(s).

For blades, the area from which metal is taken must not come from within 10 percent of the chord length adjacent to the leading or trailing edges.

Any material alterations effect must not exceed any dimensional/geometrical tolerances.

3.3.4.2 Document the final, actual unbalance amount for each blade set in the Final Inspection Report.

3.3.5 Residual imbalance. The residual imbalance in each component plane of correction must not exceed the value calculated via the following formula:

$U = 4000W/N^2$

- Where, U = maximum allowable residual unbalance in oz.-in;
- W = weight of rotating part in pounds;

- N = maximum operating speed of unit.

3.4 Final nspection and report. The Contractor shall accomplish the following:

NOTE
Final inspections, tests and/or measurements that were not affected by repairs, and previously recorded in the OIR, are not required to be redone. However, the Final Inspection Report must include all the unaffected pre-repair data as post repair data.

3.4.1 In areas affected by repairs, again conduct the applicable inspections under 3.2.4 and follow-on paragraphs for the final inspections and tests.

3.4.2 Provide the final inspection and test results to the KO in the Final Inspection Report, including the final balancing data.

3.5 Stamping. Following all repairs, the Contractor must accomplish the following:

3.5.1 Each propeller must be stamped with the following information (minimum), updated where necessary if the stamping already exists:

a. Repair facility/company name

b. Repair completion date

c. Propeller serial number

f. RH

g. Material type

h. Weight

3.5.2 Stamping must be be at least 1/4" high, legible printing, or the same height of the existing stamping if only corrected stamping is required.

3.6 QA inspection.

3.6.1 Following KO acceptance and approval of the Final Inspection Report and prior to conducting any preservation, packing and packaging, the Contractor must schedule the Coast Guard SFLC QA inspection.

3.6.2 A copy of the Final Inspection Report must be provided to the Coast Guard QA Representative upon arrival for final inspection.

3.6.3 The KO must be given 10-calendar day advance notice ahead of desired inspection date.

3.7 Photography requirements. The Contractor shall provide photographs (.jpg format or similar) for the following evolutions:

3.7.1 During initial propeller receipt; photos must show the suction and pressure faces, fillets and hubs, plus four photographs of the shipping crate sides and top taken at 90° intervals.

3.7.2 Prior to damaged area repairs affecting remarkable cost and/or time; close-up views showing the affected areas before and after those repairs must be provided.

3.7.3 Pre-repair, failed NDT areas.

3.7.4 In-process repairs in areas requiring significant welding and/or machining.

3.7.5 Following final inspection and prior to preservation/packaging, photograph suction and pressure sides of blade(s), hub(s), surface texture/finish, including stamped markings.

3.7.6 Prior to packing, photograph each propeller showing strippable compound application and installed blade edge protection.

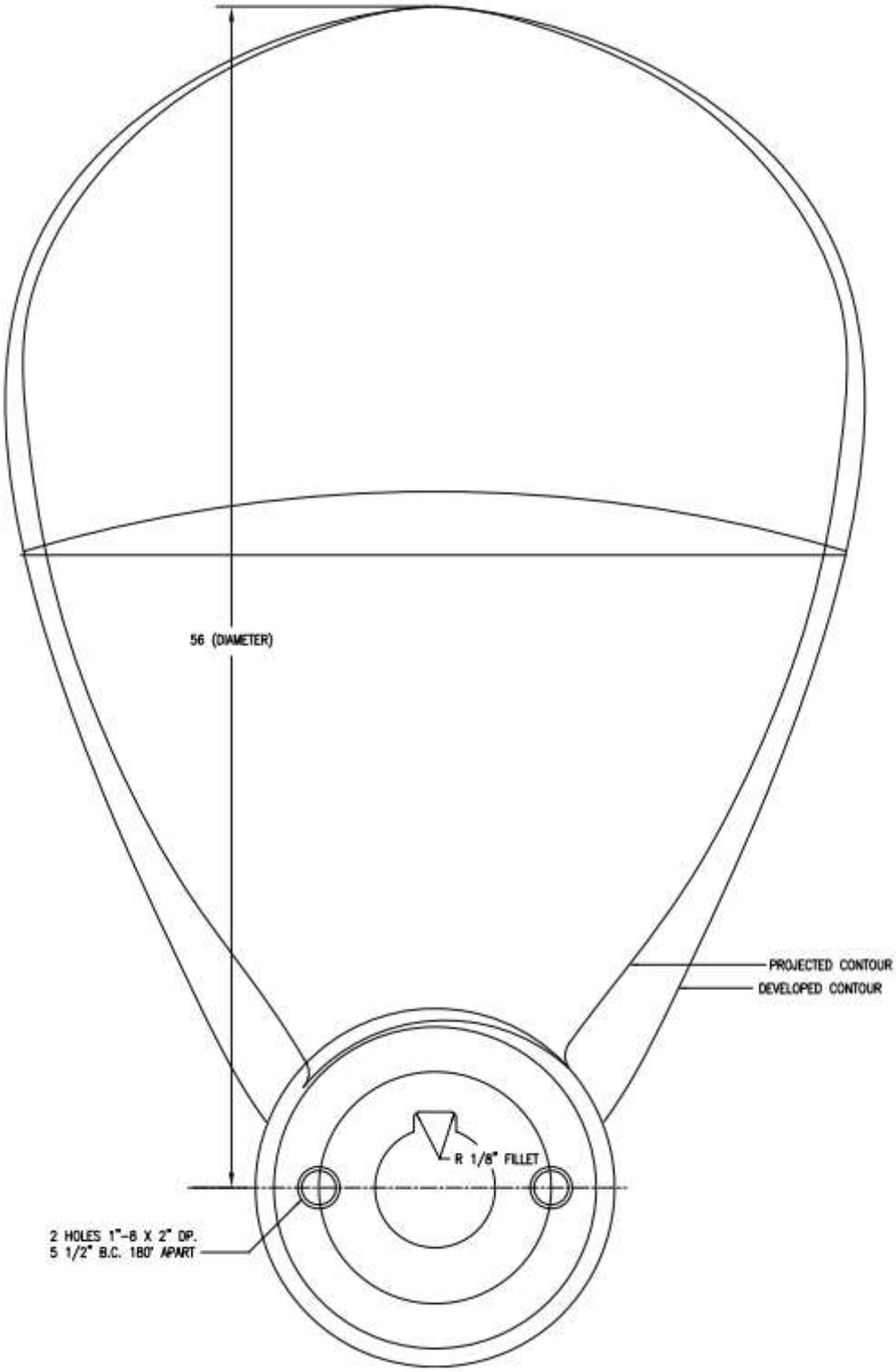
3.7.7 Prior to shipping, photograph all container markings.

4. NOTES

4.1 Post-repair/overhaul activities. Refer to the General Requirements work item, Section 5, for the preservation, packaging, packing, and shipping requirements.

4.2 Reference sources. Refer to General Requirements work item, Section 6, for referenced document sources.

4.3 Blade and hub image.



Pressure side _____ Suction side _____

5. Supplementary Requirements and Information

NOTE
This information is specific to the serviced components and supplements the General Requirements work item. Where information between the General Requirements work item and herein conflict, the information here takes precedence.

5.1 Markings example.

STOCK NUMBER 2010-01-482-6135
ITEM NAME PROPELLER, RH
PART NUMBER 4B56Dx46P-RH
SERIAL NUMBER *See propeller markings*
CONTRACT NUMBER *As indicated on the contract*
SHIPPING WEIGHT *As determined by Contractor*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL

24599_65/75_1225_Rev -

WORK ITEM 2: Propeller, Overhaul, 65/75 WLR/WLIC (Post-IRESS)

1. SCOPE

1.1 Intent – This work item defines the requirements to inspect and overhaul U.S. Coast Guard 65' and 75' River and Construction Tender propellers to a serviceable, A-condition.

1.2 Government furnished property (GFP). The listed items are property of and managed by the United States Coast Guard (USCG) Surface Forces Logistics Center (SFLC), Baltimore MD and will be issued to the contractor as issuance of a contract or contract delivery order.

ITEM DESCRIPTION	NATIONAL STOCK NUMBER (NSN) PART NUMBER (P/N)
Propeller, Left-Hand (LH)	NSN: 2010-01-534-9095 P/N: 75-WLIC-245-001LH
Propeller, Right-Hand (RH)	NSN: 2010-01-534-9089 P/N: 75-WLIC-245-001RH

2. REFERENCES

COAST GUARD DRAWINGS

Coast Guard Drawing 75-WAGL-4400-003, Rev L., Propeller to Suit IF 1312 MDE

COAST GUARD PUBLICATIONS

Surface Forces Logistics Center Standard Specification 0740 (SFLC Std Spec 0740), 2022, Welding and Allied Processes

OTHER REFERENCES

American Bureau of Shipbuilding (ABS) Rules for Survey After Construction 2021 - Guide for Bronze and Stainless-Steel Propeller Castings, Part 7 Appendix 1, Section 10

ASTM E1417/E1417M, Dated 9/1/2021 – Standard Practice for Liquid Penetrant Testing

DOD-STD-2185 (SH) – Requirements for Repair and Straightening of Bronze Naval Ship Propellers

International Standard ISO 484/2, Shipbuilding – Ship Screw Propellers – Manufacturing Tolerances

MIL-STD-167-1A, Department of Defense Test Method Equipment, Mechanical Vibrations of Shipboard Equipment

SAE-J-448A - Surface Texture Standard

3. REQUIREMENTS

3.1 General.

3.1.1 Inspection, repair and overhaul - general. All inspections, repairs and overhaul must be accomplished in accordance with the requirements set within this work item.

3.1.2 Workmanship. Upon completion of all work, all propellers must have a polished, professional finish and be free of dirt, grease, burrs, sharp edges, etc.

3.2 Inspections. Referring to the General Requirements work item for guidance, for each blade set received, the Contractor must accomplish the following inspections and submit an Open and Inspect Report (OIR) on all of the following:

NOTE

The OIR must include all results from the inspections and measurements under 3.2 and follow-on paragraphs.

3.2.1 Arrival inspection.

3.2.2 Visual Preservation Inspection (VPI).

3.2.3 Visual and Technical Inspections (VTI). The Contractor must conduct all inspections required under paragraph 3.2.4 and follow-on paragraphs.

3.2.4 Geometrical/dimensional inspections. Prior to overhaul/repair, while using Coast Guard Drawing 75-WAGL-4400-003 as guidance, the Contractor must conduct the following inspections and measurements, recording all results and deviations outside of prescribed tolerances.

NOTE

ISO 484/2, Class I is the guiding document for the inspections and repairs to be made. Class I measurements and tolerances apply unless explicitly stated otherwise.

3.2.4.1 Blade radius length. Measure each blade radius length.

3.2.4.2 Section pitch. Measure the pitch of each blade at the following radii: 0.5, 0.6, 0.7, 0.8, 0.9, and 0.95.

3.2.4.3 Blade pitch average. Calculate the average blade pitch using the radii prescribed in the above paragraph.

3.2.4.4 Blade section widths. Measure each blade section width at the radii prescribed in 3.2.4.2.

3.2.4.5 Maximum blade thicknesses. Measure the maximum blade thicknesses at the radii prescribed in 3.2.4.2.

3.2.4.6 Blade track. Measure each blade track at the 0.95 radius for each blade.

3.2.4.7 Fairness. Conduct a fairing survey for each blade, noting all locations and deviations from the prescribed fairness and fairness rate of change tolerances.

3.2.4.8 Surface finish. Using SFLC Std Spec 0740 as guidance, conduct a surface finish survey for all blade surfaces, fillets and palms.

3.2.4.8.1 Blade surfaces from R 0.2 to the tip must have a finish of 63 micro inches or better.

3.2.4.8.2 Blade fillets and hubs must be 125 micro inches or better.

3.2.4.9 Surface inspections. Using SFLC Std Spec 0740 and ABS Part 7, Section 10, Table for acceptance criteria, conduct the following:

3.2.4.9.1 Surface inspection – visual. Conduct a visual inspection of each propeller as guidance; markup and report all discrepant physical condition findings on the form provided in Section 4.

3.2.4.9.2 Surface inspection – Nondestructive test (NDT). Conduct a dye penetrant inspection on all component surfaces, including the hubs.

3.2.4.9.3 Surface inspection reports. Markup and report all discrepant visual and NDT findings on the forms (blades) provided in Section 4 for each surface inspected.

NOTE

The Section 4 forms are provided for convenience and the Contractor may opt to use clearer forms in their submission.

3.3 Overhaul/repair. If a Change Request has been authorized and released by the KO, the Contractor must make all recommended repairs (or as amended by the KO) for the affected blade(s) in accordance with the following:

3.3.1 Tolerances. The repair tolerances must be in accordance with ISO 484/2, **Class I** in conjunction with Coast Guard Drawing 75-WAGL-4400-003.

3.3.2 Welding specifics.

3.3.2.1 Critical blade areas are described as the pressure face of a blade between the fillet and the .4 radius, starting at the leading edge encompassing 80% of the chord length taken at the 0.4 radius (see Figure 1 of DOD-STD-2185).

WARNING!

Welding required between the 0.2 and 0.25 radii must not be taken without prior KO approval.

3.3.2.3 All welding performed must be documented on the visual inspection sheets for each blade; each weld must be dimensionally identified by location, length, width, and depth.

3.3.2.6 Provide photo documentation to the KO during in-process welding repairs and any discontinuities during dye penetrant inspection.

3.3.2.6.1 Each photograph shall include the component serial number and date the photograph was taken.

3.3.2.6.2 Color photographs must be taken with a digital camera and the images provided electronically in "**jpg format**" to the KO during:

3.3.3 Surface finish. Blade surfaces must be ground fair and polished to the following finishes in accordance with SAE-J-448A:

- Blade surfaces from 0.2R to tip – 63 micro inches Ra;
- Hub exterior surfaces – 125 micro inches Ra.
- Remove all high spots, burrs, abrasions, knicks, corrosion/oxidation, and foreign matter from the propeller keyways, glands, hub bores, flanges and mating surfaces.
- Chase and tap exposed threaded areas where necessary

3.3.4 Balancing. Each propeller must be single plane balanced in accordance with MIL-STD-167-1A, paragraph 5.2.2.2 and as follows:

NOTE

All balancing must be accomplished by means of balancing equipment that requires work piece rotation.

3.3.4.1 Prior to performing any balance tests, the Contractor must demonstrate the balance machine sensitivity using a weight determined by the following formula:

$Ws = 0.1(U)/r$

- Where, Ws = sensitivity weight
- U = residual unbalance tolerance;
- r = radial location of the weight.

NOTE

Weight addition/removal shall be easily detected and discernable to the balance machine operator.

Material removed to balance shall be taken from the suction face of the heavy blade(s).

For blades, the area from which metal is taken must not come from within 10 percent of the chord length adjacent to the leading or trailing edges.

Any material alterations effect must not exceed any dimensional/geometrical tolerances.

3.3.4.2 Document the final, actual unbalance amount for each blade set in the Final Inspection Report.

3.3.5 Residual imbalance. The residual imbalance in each component plane of correction must not exceed the value calculated via the following formula:

$U = 4000W/N^2$

- Where, U = maximum allowable residual unbalance in oz.-in;
- W = weight of rotating part in pounds;

- N = maximum operating speed of unit.

3.4 Final nspection and report. The Contractor shall accomplish the following:

NOTE
Final inspections, tests and/or measurements that were not affected by repairs, and previously recorded in the OIR, are not required to be redone. However, the Final Inspection Report must include all the unaffected pre-repair data as post repair data.

3.4.1 In areas affected by repairs, again conduct the applicable inspections under 3.2.4 and follow-on paragraphs for the final inspections and tests.

3.4.2 Provide the final inspection and test results to the KO in the Final Inspection Report, including the final balancing data.

3.5 Stamping. Following all repairs, the Contractor must accomplish the following:

3.5.1 Each propeller must be stamped with the following information (minimum), updated where necessary if the stamping already exists:

a. Repair facility/company name

b. Repair completion date

c. Propeller serial number

f. RH or LH (as applicable)

g. Material type

h. Weight

3.5.2 Stamping must be be at least 1/4" high, legible printing, or the same height of the existing stamping if only corrected stamping is required.

3.6 QA inspection.

3.6.1 Following KO acceptance and approval of the Final Inspection Report and prior to conducting any preservation, packing and packaging, the Contractor must schedule the Coast Guard SFLC QA inspection.

3.6.2 A copy of the Final Inspection Report must be provided to the Coast Guard QA Representative upon arrival for final inspection.

3.6.3 The KO must be given 10-calendar day advance notice ahead of desired inspection date.

3.7 Photography requirements. The Contractor shall provide photographs (.jpg format or similar) for the following evolutions:

3.7.1 During initial propeller receipt; photos must show the suction and pressure faces, fillets and hubs, plus four photographs of the shipping crate sides and top taken at 90° intervals.

3.7.2 Prior to damaged area repairs affecting remarkable cost and/or time; close-up views showing the affected areas before and after those repairs must be provided.

3.7.3 Pre-repair, failed NDT areas.

3.7.4 In-process repairs in areas requiring significant welding and/or machining.

3.7.5 Following final inspection and prior to preservation/packaging, photograph suction and pressure sides of blade(s), hub(s), surface texture/finish, including stamped markings.

3.7.6 Prior to packing, photograph each propeller showing strippable compound application and installed blade edge protection.

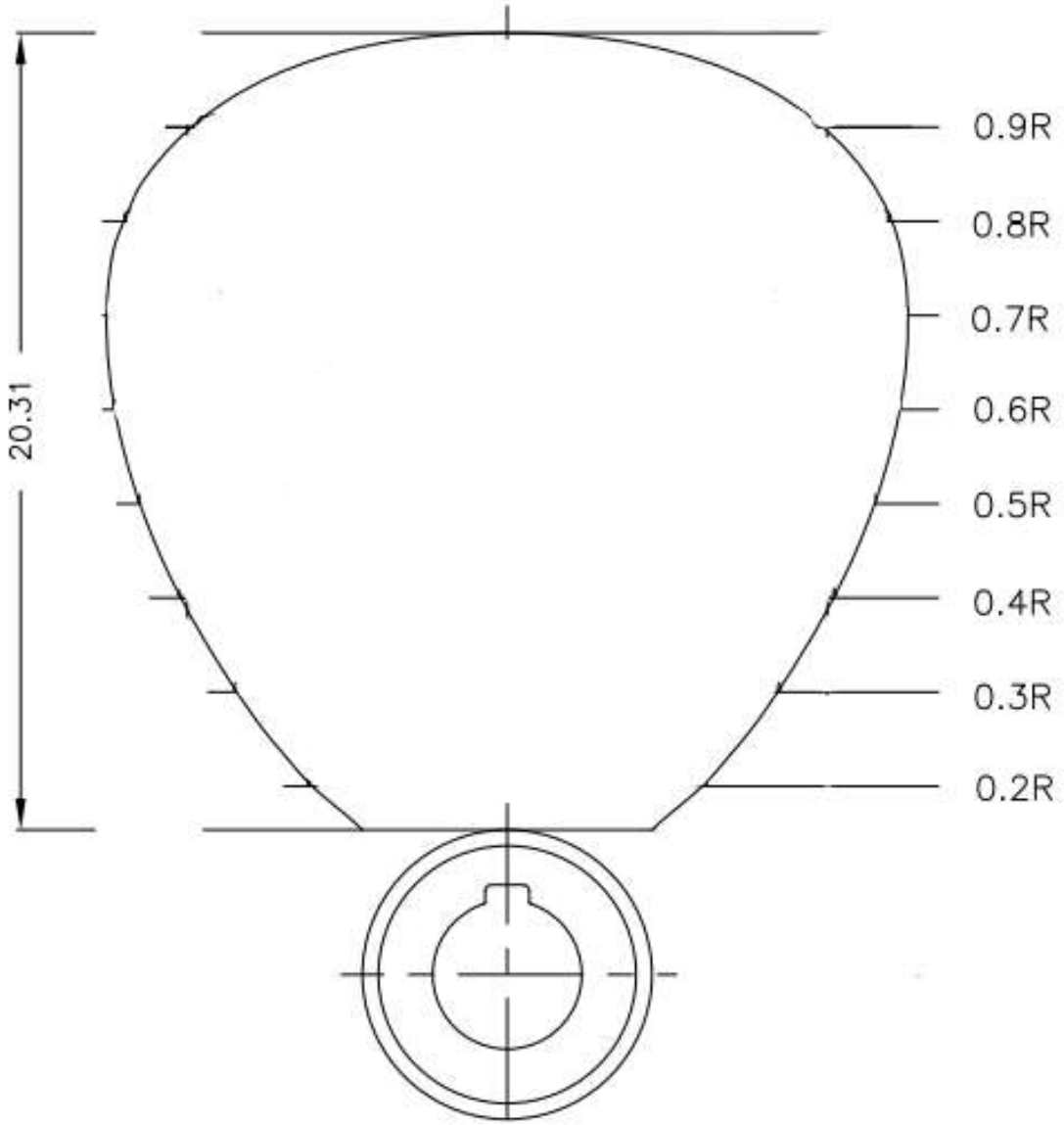
3.7.7 Prior to shipping, photograph all container markings.

4. NOTES

4.1 Post-repair/overhaul activities. Refer to the General Requirements work item, Section 5, for the preservation, packaging, packing, and shipping requirements.

4.2 Reference sources. Refer to General Requirements work item, Section 6, for referenced document sources.

4.3 Blade and hub image.



Pressure side _____ Suction side _____

5. Supplementary Requirements and Information

NOTE
This information is specific to the serviced components and supplements the General Requirements work item. Where information between the General Requirements work item and herein conflict, the information here takes precedence.

5.1 Markings example.

a. Left hand propeller:

STOCK NUMBER 2010-01-534-9095
ITEM NAME PROPELLER, LH
PART NUMBER 75-WLIC-245-001LH
SERIAL NUMBER *See propeller markings*
CONTRACT NUMBER *As indicated on the contract*
SHIPPING WEIGHT *As determined by Contractor*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL

b. Right hand propeller:

STOCK NUMBER 2010-01-534-9089
ITEM NAME PROPELLER, RH
PART NUMBER 75-WLIC-245-001RH
SERIAL NUMBER *See propeller markings*
CONTRACT NUMBER *As indicated on the contract*
SHIPPING WEIGHT *As determined by Contractor*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL

24599_75F_0126_Rev -

WORK ITEM 3: Propeller, Overhaul, 75F WLR

1. SCOPE

1.1 Intent – This work item defines the requirements to inspect and overhaul U.S. Coast Guard 75' F River Tender propellers to a serviceable, A-condition.

1.2 Government furnished property (GFP). The listed items are property of and managed by the United States Coast Guard (USCG) Surface Forces Logistics Center (SFLC), Baltimore MD and will be issued to the contractor as issuance of a contract or contract delivery order.

ITEM DESCRIPTION	NATIONAL STOCK NUMBER (NSN) PART NUMBER (P/N)
Propeller, Left-Hand (LH)	NSN: 2010-01-501-5465 P/N: 46x51LH
Propeller, Right-Hand (RH)	NSN: 2010-01-501-5459 P/N: 46x51RH

2. REFERENCES

COAST GUARD DRAWINGS

Coast Guard Drawing 75-WLR-F-245-003, Rev 2, 75' Cutter Class "F" Propeller, Fairwater & Guards (6 Blade)

COAST GUARD PUBLICATIONS

Surface Forces Logistics Center Standard Specification 0740 (SFLC Std Spec 0740), 2022, Welding and Allied Processes

OTHER REFERENCES

American Bureau of Shipbuilding (ABS) Rules for Survey After Construction 2021 - Guide for Bronze and Stainless-Steel Propeller Castings, Part 7 Appendix 1, Section 10

ASTM E1417/E1417M, Dated 9/1/2021 – Standard Practice for Liquid Penetrant Testing

DOD-STD-2185 (SH) – Requirements for Repair and Straightening of Bronze Naval Ship Propellers

International Standard ISO 484/2, Shipbuilding – Ship Screw Propellers – Manufacturing Tolerances

MIL-STD-167-1A, Department of Defense Test Method Equipment, Mechanical Vibrations of Shipboard Equipment

SAE-J-448A - Surface Texture Standard

3. REQUIREMENTS

3.1 General.

3.1.1 Inspection, repair and overhaul - general. All inspections, repairs and overhaul must be accomplished in accordance with the requirements set within this work item.

3.1.2 Workmanship. Upon completion of all work, all propellers must have a polished, professional finish and be free of dirt, grease, burrs, sharp edges, etc.

3.2 Inspections. Referring to the General Requirements work item for guidance, for each blade set received, the Contractor must accomplish the following inspections and submit an Open and Inspect Report (OIR) on all of the following:

NOTE

The OIR must include all results from the inspections and measurements under 3.2 and follow-on paragraphs.

3.2.1 Arrival inspection.

3.2.2 Visual Preservation Inspection (VPI).

3.2.3 Visual and Technical Inspections (VTI). The Contractor must conduct all inspections required under paragraph 3.2.4 and follow-on paragraphs.

3.2.4 Geometrical/dimensional inspections. Prior to overhaul/repair, while using Coast Guard Drawing 75-WLR-F-245-003 as guidance, the Contractor must conduct the following inspections and measurements, recording all results and deviations outside of prescribed tolerances.

NOTE

ISO 484/2, Class I is the guiding document for the inspections and repairs to be made. Class I measurements and tolerances apply unless explicitly stated otherwise.

3.2.4.1 Blade radius length. Measure each blade radius length.

3.2.4.2 Section pitch. Measure the pitch of each blade at the following radii: 0.5, 0.6, 0.7, 0.8, and 0.9.

3.2.4.3 Blade pitch average. Calculate the average blade pitch using the radii prescribed in the above paragraph.

3.2.4.4 Blade section widths. Measure each blade section width at the radii prescribed in 3.2.4.2.

3.2.4.5 Maximum blade thicknesses. Measure the maximum blade thicknesses at the radii prescribed in 3.2.4.2.

3.2.4.6 Blade track. Measure each blade track at the 0.95 radius for each blade.

3.2.4.7 Fairness. Conduct a fairing survey for each blade, noting all locations and deviations from the prescribed fairness and fairness rate of change tolerances.

3.2.4.8 Surface finish. Using SFLC Std Spec 0740 as guidance, conduct a surface finish survey for all blade surfaces, fillets and palms.

3.2.4.8.1 Blade surfaces from R 0.2 to the tip must have a finish of 63 micro inches or better.

3.2.4.8.2 Blade fillets and hubs must be 125 micro inches or better.

3.2.4.9 Surface inspections. Using SFLC Std Spec 0740 and ABS Part 7, Section 10, Table for acceptance criteria, conduct the following:

3.2.4.9.1 Surface inspection – visual. Conduct a visual inspection of each propeller as guidance; markup and report all discrepant physical condition findings on the form provided in Section 4.

3.2.4.9.2 Surface inspection – Nondestructive test (NDT). Conduct a dye penetrant inspection on all component surfaces, including the hubs.

3.2.4.9.3 Surface inspection reports. Markup and report all discrepant visual and NDT findings on the forms (blades) provided in Section 4 for each surface inspected.

NOTE

The Section 4 forms are provided for convenience and the Contractor may opt to use clearer forms in their submission.

3.3 Overhaul/repair. If a Change Request has been authorized and released by the KO, the Contractor must make all recommended repairs (or as amended by the KO) for the affected blade(s) in accordance with the following:

3.3.1 Tolerances. The repair tolerances must be in accordance with ISO 484/2, **Class I** in conjunction with Coast Guard Drawing 75-WLR-F-245-003.

3.3.2 Welding specifics.

3.3.2.1 Critical blade areas are described as the pressure face of a blade between the fillet and the .4 radius, starting at the leading edge encompassing 80% of the chord length taken at the 0.4 radius (see Figure 1 of DOD-STD-2185).

WARNING!

Welding required between the 0.2 and 0.25 radii must not be taken without prior KO approval.

3.3.2.3 All welding performed must be documented on the visual inspection sheets for each blade; each weld must be dimensionally identified by location, length, width, and depth.

3.3.2.6 Provide photo documentation to the KO during in-process welding repairs and any discontinuities during dye penetrant inspection.

3.3.2.6.1 Each photograph shall include the component serial number and date the photograph was taken.

3.3.2.6.2 Color photographs must be taken with a digital camera and the images provided electronically in "**jpg format"** to the KO during:

3.3.3 Surface finish. Blade surfaces must be ground fair and polished to the following finishes in accordance with SAE-J-448A:

- Blade surfaces from 0.2R to tip – 63 micro inches Ra;
- Hub exterior surfaces – 125 micro inches Ra.
- Remove all high spots, burrs, abrasions, knicks, corrosion/oxidation, and foreign matter from the propeller keyways, glands, hub bores, flanges and mating surfaces.
- Chase and tap exposed threaded areas where necessary

3.3.4 Balancing. Each propeller must be single plane balanced in accordance with MIL-STD-167-1A, paragraph 5.2.2.2 and as follows:

NOTE

All balancing must be accomplished by means of balancing equipment that requires work piece rotation.

3.3.4.1 Prior to performing any balance tests, the Contractor must demonstrate the balance machine sensitivity using a weight determined by the following formula:

$Ws = 0.1(U)/r$

- Where, Ws = sensitivity weight
- U = residual unbalance tolerance;
- r = radial location of the weight.

NOTE

Weight addition/removal shall be easily detected and discernable to the balance machine operator.

Material removed to balance shall be taken from the suction face of the heavy blade(s).

For blades, the area from which metal is taken must not come from within 10 percent of the chord length adjacent to the leading or trailing edges.

Any material alterations effect must not exceed any dimensional/geometrical tolerances.

3.3.4.2 Document the final, actual unbalance amount for each blade set in the Final Inspection Report.

3.3.5 Residual imbalance. The residual imbalance in each component plane of correction must not exceed the value calculated via the following formula:

$U = 4000W/N^2$

- Where, U = maximum allowable residual unbalance in oz.-in;
- W = weight of rotating part in pounds;

- N = maximum operating speed of unit.

3.4 Final nspection and report. The Contractor shall accomplish the following:

NOTE
Final inspections, tests and/or measurements that were not affected by repairs, and previously recorded in the OIR, are not required to be redone. However, the Final Inspection Report must include all the unaffected pre-repair data as post repair data.

3.4.1 In areas affected by repairs, again conduct the applicable inspections under 3.2.4 and follow-on paragraphs for the final inspections and tests.

3.4.2 Provide the final inspection and test results to the KO in the Final Inspection Report, including the final balancing data.

3.5 QA inspection.

3.5.1 Following KO acceptance and approval of the Final Inspection Report and prior to conducting any preservation, packing and packaging, the Contractor must schedule the Coast Guard SFLC QA inspection.

3.5.2 A copy of the Final Inspection Report must be provided to the Coast Guard QA Representative upon arrival for final inspection.

3.5.3 The KO must be given 10-calendar day advance notice ahead of desired inspection date.

3.6 Photography requirements. The Contractor shall provide photographs (.jpg format or similar) for the following evolutions:

3.6.1 During initial propeller receipt; photos must show the suction and pressure faces, fillets and hubs, plus four photographs of the shipping crate sides and top taken at 90° intervals.

3.6.2 Prior to damaged area repairs affecting remarkable cost and/or time; close-up views showing the affected areas before and after those repairs must be provided.

3.6.3 Pre-repair, failed NDT areas.

3.6.4 In-process repairs in areas requiring significant welding and/or machining.

3.6.5 Following final inspection and prior to preservation/packaging, photograph suction and pressure sides of blade(s), hub(s), surface texture/finish, including stamped markings.

3.6.6 Prior to packing, photograph each propeller showing strippable compound application and installed blade edge protection.

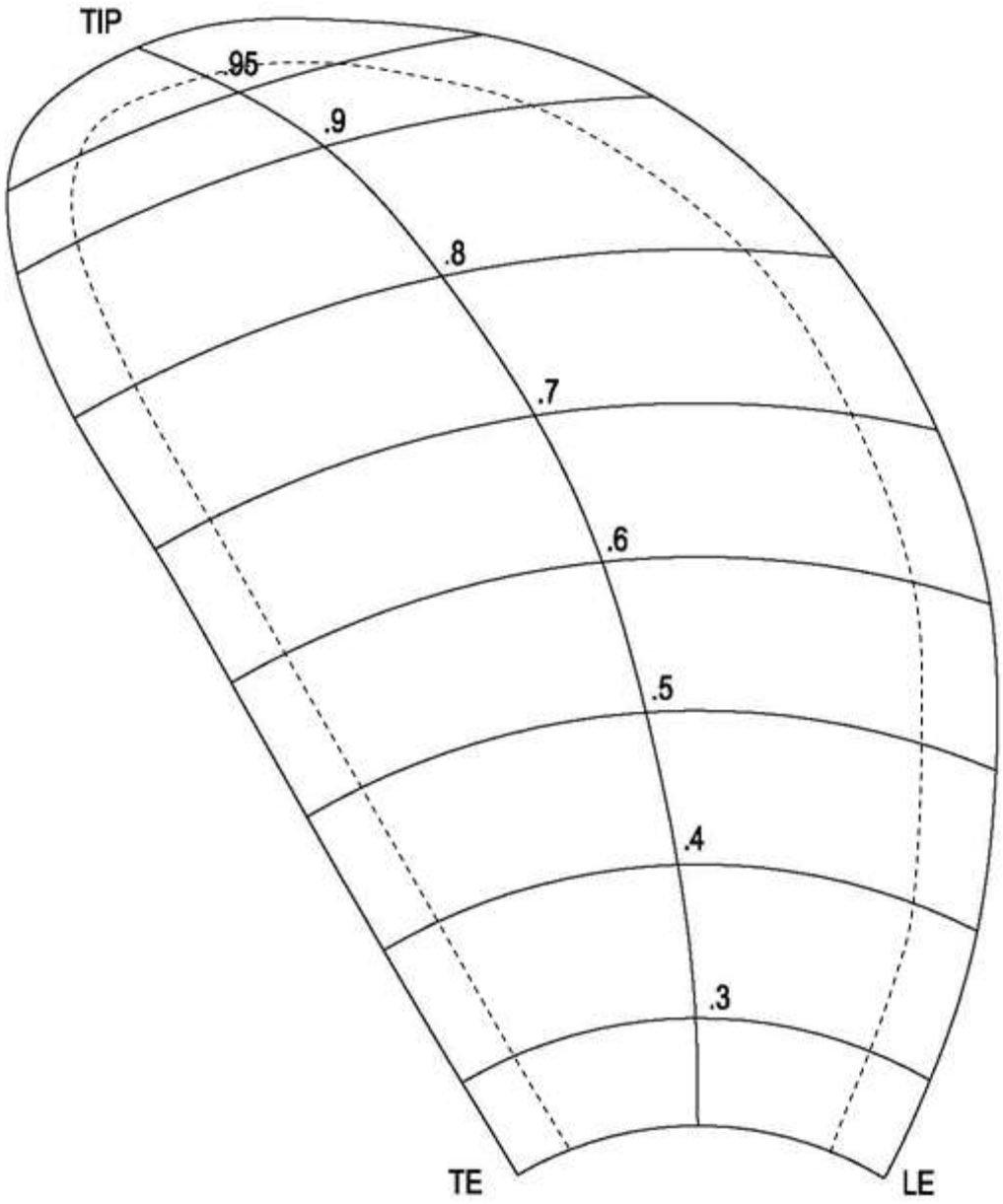
3.6.7 Prior to shipping, photograph all container markings.

4. NOTES

4.1 Post-repair/overhaul activities. Refer to the General Requirements work item, Section 5, for the preservation, packaging, packing, and shipping requirements.

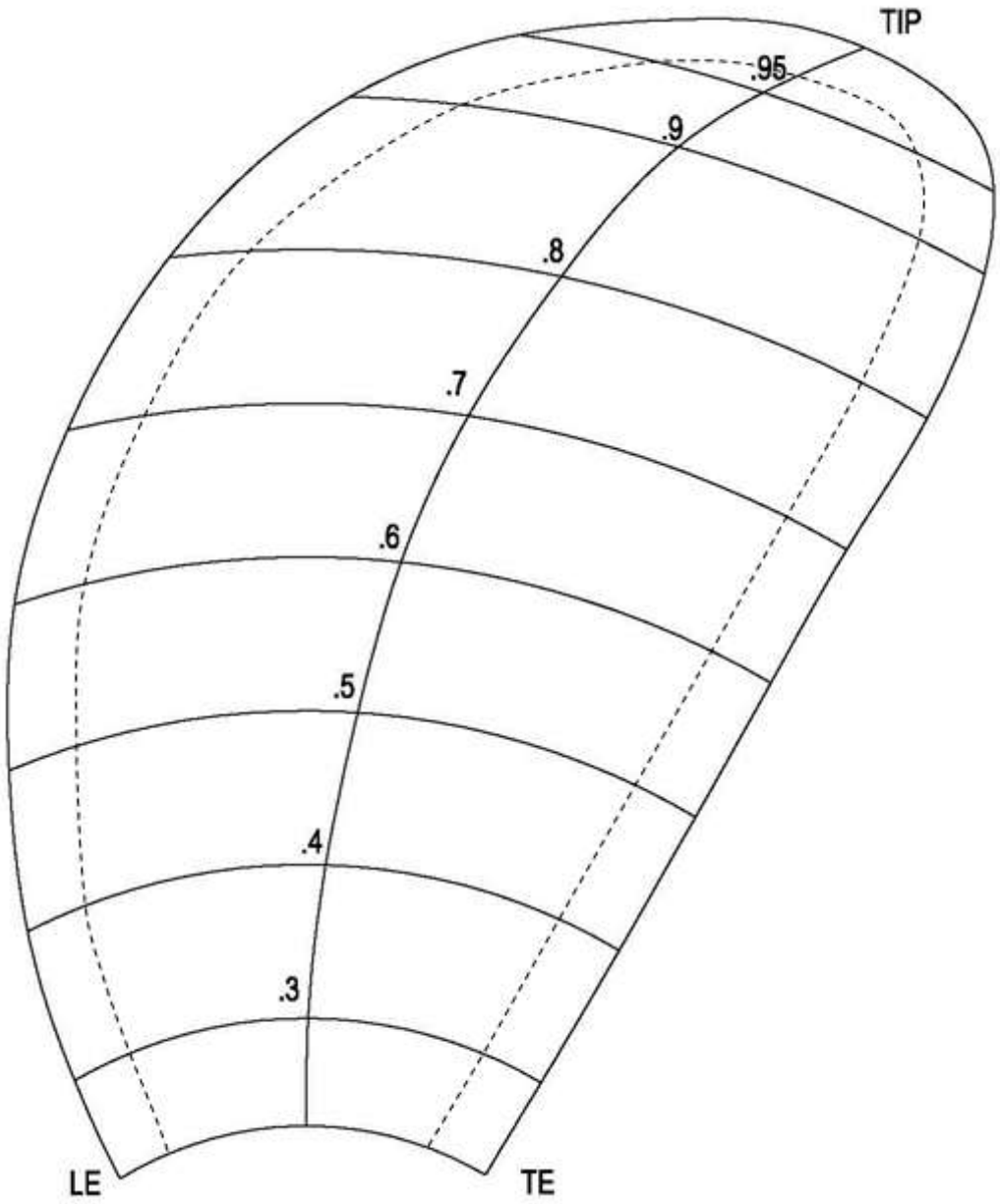
4.2 Reference sources. Refer to General Requirements work item, Section 6, for referenced document sources.

4.3 Blade and hub image.



LH _____ RH _____

Pressure side _____ Suction side _____



LH _____ RH _____

Pressure side _____ Suction side _____

5. Supplementary Requirements and Information

NOTE
This information is specific to the serviced components and supplements the General Requirements work item. Where information between the General Requirements work item and herein conflict, the information here takes precedence.

5.1 Markings example.

a. Left hand propeller:

STOCK NUMBER 2010-01-501-5465
ITEM NAME PROPELLER, LH
PART NUMBER 46x51LH
SERIAL NUMBER *See propeller markings*
CONTRACT NUMBER *As indicated on the contract*
SHIPPING WEIGHT *As determined by Contractor*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL

b. Right hand propeller:

STOCK NUMBER 2010-01-501-5459
ITEM NAME PROPELLER, RH
PART NUMBER 46x51RH
SERIAL NUMBER *See propeller markings*
CONTRACT NUMBER *As indicated on the contract*
SHIPPING WEIGHT *As determined by Contractor*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL

24599_140_0126_Rev -

WORK ITEM 4: Propeller, Overhaul, 140 WTGB

1. SCOPE

1.1 Intent – This work item defines the requirements to inspect and overhaul U.S. Coast Guard 140 WTGB propellers to a serviceable, A-condition.

1.2 Government furnished property (GFP). The listed items are property of and managed by the United States Coast Guard (USCG) Surface Forces Logistics Center (SFLC), Baltimore MD and will be issued to the contractor as issuance of a contract or contract delivery order.

ITEM DESCRIPTION	NATIONAL STOCK NUMBER (NSN) PART NUMBER (P/N)
Propeller, Right-Hand (RH)	NSN: 2010-01-078-8216 P/N: 101WYTM-245-001

2. REFERENCES

COAST GUARD DRAWINGS

Coast Guard Drawing 101-WTGB-245-001, Rev D, Propeller and Offsets 140FT WTGB Cutter

COAST GUARD PUBLICATIONS

Surface Forces Logistics Center Standard Specification 0740 (SFLC Std Spec 0740), 2022, Welding and Allied Processes

OTHER REFERENCES

American Bureau of Shipbuilding (ABS) Rules for Survey After Construction 2021 - Guide for Bronze and Stainless-Steel Propeller Castings, Part 7 Appendix 1, Section 10

ASTM E1417/E1417M, Dated 9/1/2021 – Standard Practice for Liquid Penetrant Testing

DOD-STD-2185 (SH) – Requirements for Repair and Straightening of Bronze Naval Ship Propellers

International Standard ISO 484/2, Shipbuilding – Ship Screw Propellers – Manufacturing Tolerances

MIL-STD-167-1A, Department of Defense Test Method Equipment, Mechanical Vibrations of Shipboard Equipment

SAE-J-448A - Surface Texture Standard

3. REQUIREMENTS

3.1 General.

3.1.1 Inspection, repair and overhaul - general. All inspections, repairs and overhaul must be accomplished in accordance with the requirements set within this work item.

3.1.2 Workmanship. Upon completion of all work, all propellers must have a polished, professional finish and be free of dirt, grease, burrs, sharp edges, etc.

3.2 Inspections. Referring to the General Requirements work item for guidance, for each blade set received, the Contractor must accomplish the following inspections and submit an Open and Inspect Report (OIR) on all of the following:

NOTE

The OIR must include all results from the inspections and measurements under 3.2 and follow-on paragraphs.

3.2.1 Arrival inspection.

3.2.2 Visual Preservation Inspection (VPI).

3.2.3 Visual and Technical Inspections (VTI). The Contractor must conduct all inspections required under paragraph 3.2.4 and follow-on paragraphs.

3.2.4 Geometrical/dimensional inspections. Prior to overhaul/repair, while using Coast Guard Drawing 75-WLR-F-243-003 as guidance, the Contractor must conduct the following inspections and measurements, recording all results and deviations outside of prescribed tolerances.

NOTE

ISO 484/2, Class I is the guiding document for the inspections and repairs to be made. Class I measurements and tolerances apply unless explicitly stated otherwise.

3.2.4.1 Blade radius length. Measure each blade radius length.

3.2.4.2 Section pitch. Measure the pitch of each blade at the following radii: 0.5, 0.6, 0.7, 0.8, 0.9 and 0.95.

3.2.4.3 Blade pitch average. Calculate the average blade pitch using the radii prescribed in the above paragraph.

3.2.4.4 Blade section widths. Measure each blade section width at the radii prescribed in 3.2.4.2.

3.2.4.5 Maximum blade thicknesses. Measure the maximum blade thicknesses at the radii prescribed in 3.2.4.2.

3.2.4.6 Blade track. Measure each blade track at the 0.95 radius for each blade.

3.2.4.7 Fairness. Conduct a fairing survey for each blade, noting all locations and deviations from the prescribed fairness and fairness rate of change tolerances.

3.2.4.8 Surface finish. Using SFLC Std Spec 0740 as guidance, conduct a surface finish survey for all blade surfaces, fillets and palms.

3.2.4.8.1 Blade surfaces from R 0.2 to the tip must have a finish of 63 micro inches or better.

3.2.4.8.2 Blade fillets and hubs must be 125 micro inches or better.

3.2.4.9 Surface inspections. Using SFLC Std Spec 0740 and ABS Part 7, Section 10, Table for acceptance criteria, conduct the following:

3.2.4.9.1 Surface inspection – visual. Conduct a visual inspection of each propeller as guidance; markup and report all discrepant physical condition findings on the form provided in Section 4.

3.2.4.9.2 Surface inspection – Nondestructive test (NDT). Conduct a dye penetrant inspection on all component surfaces, including the hubs.

3.2.4.9.3 Surface inspection reports. Markup and report all discrepant visual and NDT findings on the forms (blades) provided in Section 4 for each surface inspected.

NOTE

The Section 4 forms are provided for convenience and the Contractor may opt to use clearer forms in their submission.

3.3 Overhaul/repair. If a Change Request has been authorized and released by the KO, the Contractor must make all recommended repairs (or as amended by the KO) for the affected blade(s) in accordance with the following:

3.3.1 Tolerances. The repair tolerances must be in accordance with ISO 484/2, **Class I** in conjunction with Coast Guard Drawing 101-WTGB-245-001.

3.3.2 Welding specifics.

3.3.2.1 Critical blade areas are described as the pressure face of a blade between the fillet and the .4 radius, starting at the leading edge encompassing 80% of the chord length taken at the 0.4 radius (see Figure 1 of DOD-STD-2185).

WARNING!

Welding required between the 0.2 and 0.25 radii must not be taken without prior KO approval.

3.3.2.3 All welding performed must be documented on the visual inspection sheets for each blade; each weld must be dimensionally identified by location, length, width, and depth.

3.3.2.6 Provide photo documentation to the KO during in-process welding repairs and any discontinuities during dye penetrant inspection.

3.3.2.6.1 Each photograph shall include the component serial number and date the photograph was taken.

3.3.2.6.2 Color photographs must be taken with a digital camera and the images provided electronically in "**jpg format"** to the KO during:

3.3.3 Surface finish. Blade surfaces must be ground fair and polished to the following finishes in accordance with SAE-J-448A:

- Blade surfaces from 0.2R to tip – 63 micro inches Ra;
- Hub exterior surfaces – 125 micro inches Ra.
- Remove all high spots, burrs, abrasions, knicks, corrosion/oxidation, and foreign matter from the propeller keyways, glands, hub bores, flanges and mating surfaces.
- Chase and tap exposed threaded areas where necessary

3.3.4 Balancing. Each propeller must be single plane balanced in accordance with MIL-STD-167-1A, paragraph 5.2.2.2 and as follows:

NOTE
All balancing must be accomplished by means of balancing equipment that requires work piece rotation.

3.3.4.1 Prior to performing any balance tests, the Contractor must demonstrate the balance machine sensitivity using a weight determined by the following formula:

$Ws = 0.1(U)/r$

- Where, Ws = sensitivity weight
- U = residual unbalance tolerance;
- r = radial location of the weight.

NOTE
Weight addition/removal shall be easily detected and discernable to the balance machine operator.
Material removed to balance shall be taken from the suction face of the heavy blade(s).
For blades, the area from which metal is taken must not come from within 10 percent of the chord length adjacent to the leading or trailing edges.
Any material alterations effect must not exceed any dimensional/geometrical tolerances.

3.3.4.2 Document the final, actual unbalance amount for each blade set in the Final Inspection Report.

3.3.5 Residual imbalance. The residual imbalance in each component plane of correction must not exceed the value calculated via the following formula:

$U = 4000W/N^2$

- Where, U = maximum allowable residual unbalance in oz.-in;
- W = weight of rotating part in pounds;
- N = maximum operating speed of unit.

3.4 Final nspection and report. The Contractor shall accomplish the following:

NOTE
Final inspections, tests and/or measurements that were not affected by repairs, and previously recorded in the OIR, are not required to be redone. However, the Final Inspection Report must include all the unaffected pre-repair data as post repair data.

3.4.1 In areas affected by repairs, again conduct the applicable inspections under 3.2.4 and follow-on paragraphs for the final inspections and tests.

3.4.2 Provide the final inspection and test results to the KO in the Final Inspection Report, including the final balancing data.

3.5 Stamping. Following all repairs, the Contractor must accomplish the following:

3.5.1 Each propeller must be stamped with the following information (minimum), updated where necessary if the stamping already exists:

a. serial number

b. ship class (140 WTGB)

c. RH

d. national stock number

e. design diameter (8’ 6”)

f. design pitch at 0.7R

g. manufacturer name

h. actual weight (pounds)

i. propeller material (NiBrAl ABS Type 4)

3.5.2 Stamping must be 1/4” to 1/2" high, legible printing, or the same height of the existing stamping if only corrected stamping is required.

3.6 QA inspection.

3.6.1 Following KO acceptance and approval of the Final Inspection Report and prior to conducting any preservation, packing and packaging, the Contractor must schedule the Coast Guard SFLC QA inspection.

3.6.2 A copy of the Final Inspection Report must be provided to the Coast Guard QA Representative upon arrival for final inspection.

3.6.3 The KO must be given 10-calendar day advance notice ahead of desired inspection date.

3.7 Photography requirements. The Contractor shall provide photographs (.jpg format or similar) for the following evolutions:

3.7.1 During initial propeller receipt; photos must show the suction and pressure faces, fillets and hubs, plus four photographs of the shipping crate sides and top taken at 90° intervals.

3.7.2 Prior to damaged area repairs affecting remarkable cost and/or time; close-up views showing the affected areas before and after those repairs must be provided.

3.7.3 Pre-repair, failed NDT areas.

3.7.4 In-process repairs in areas requiring significant welding and/or machining.

3.7.5 Following final inspection and prior to preservation/packaging, photograph suction and pressure sides of blade(s), hub(s), surface texture/finish, including stamped markings.

3.7.6 Prior to packing, photograph each propeller showing strippable compound application and installed blade edge protection.

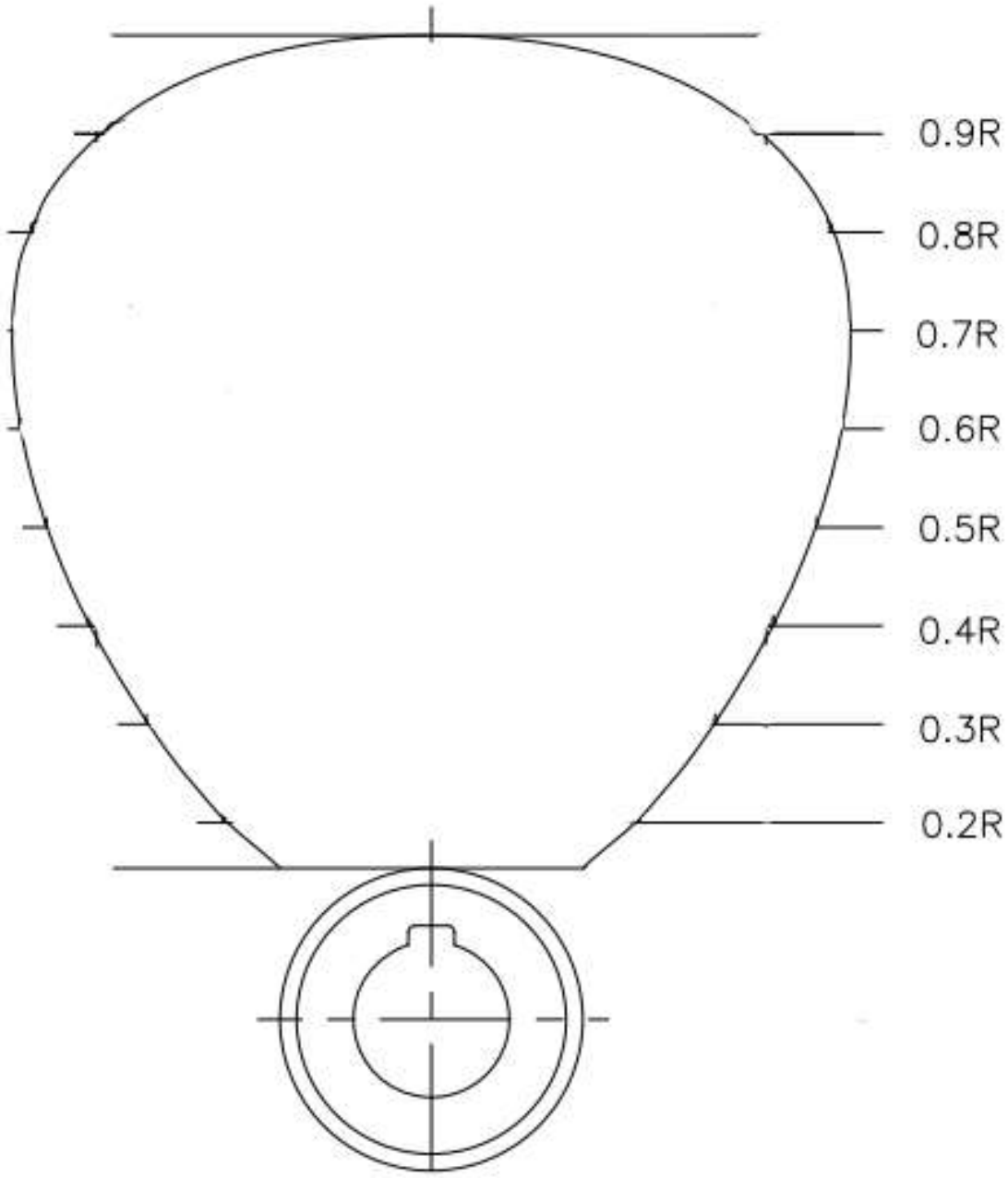
3.7.7 Prior to shipping, photograph all container markings.

4. NOTES

4.1 Post-repair/overhaul activities. Refer to the General Requirements work item, Section 5, for the preservation, packaging, packing, and shipping requirements.

4.2 Reference sources. Refer to General Requirements work item, Section 6, for referenced document sources.

4.3 Blade and hub image.



Pressure side _____ Suction side _____

5. Supplementary Requirements and Information

NOTE
This information is specific to the serviced components and supplements the General Requirements work item. Where information between the General Requirements work item and herein conflict, the information here takes precedence.

5.1 Markings example.

STOCK NUMBER 2010-01-078-8216
ITEM NAME PROPELLER, RH
PART NUMBER 101WYTM-245-001
SERIAL NUMBER *See propeller markings*
CONTRACT NUMBER *As indicated on the contract*
SHIPPING WEIGHT *As determined by Contractor*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL

24599_160_0126_Rev -

WORK ITEM 5: Propeller, Overhaul, 160 WLIC

1. SCOPE

1.1 Intent – This work item defines the requirements to inspect and overhaul U.S. Coast Guard 160' WLIC propellers to a serviceable, A-condition.

1.2 Government furnished property (GFP). The listed items are property of and managed by the United States Coast Guard (USCG) Surface Forces Logistics Center (SFLC), Baltimore MD and will be issued to the contractor as issuance of a contract or contract delivery order.

ITEM DESCRIPTION	NATIONAL STOCK NUMBER (NSN) PART NUMBER (P/N)
Propeller, Left-Hand (LH)	NSN: 2010-01-036-7597 P/N: 160-WLIC-4400-1LH
Propeller, Right-Hand (RH)	NSN: 2010-01-037-7295 P/N: 160-WLIC-4400-2RH

2. REFERENCES

COAST GUARD DRAWINGS

Coast Guard Drawing 160WLIC-4400-003, Rev A, Propeller

COAST GUARD PUBLICATIONS

Surface Forces Logistics Center Standard Specification 0740 (SFLC Std Spec 0740), 2022, Welding and Allied Processes

OTHER REFERENCES

American Bureau of Shipbuilding (ABS) Rules for Survey After Construction 2021 - Guide for Bronze and Stainless-Steel Propeller Castings, Part 7 Appendix 1, Section 10

ASTM E1417/E1417M, Dated 9/1/2021 – Standard Practice for Liquid Penetrant Testing

DOD-STD-2185 (SH) – Requirements for Repair and Straightening of Bronze Naval Ship Propellers

International Standard ISO 484/2, Shipbuilding – Ship Screw Propellers – Manufacturing Tolerances

MIL-STD-167-1A, Department of Defense Test Method Equipment, Mechanical Vibrations of Shipboard Equipment

SAE-J-448A - Surface Texture Standard

3. REQUIREMENTS

3.1 General.

3.1.1 Inspection, repair and overhaul - general. All inspections, repairs and overhaul must be accomplished in accordance with the requirements set within this work item.

3.1.2 Workmanship. Upon completion of all work, all propellers must have a polished, professional finish and be free of dirt, grease, burrs, sharp edges, etc.

3.2 Inspections. Referring to the General Requirements work item for guidance, for each blade set received, the Contractor must accomplish the following inspections and submit an Open and Inspect Report (OIR) on all of the following:

NOTE

The OIR must include all results from the inspections and measurements under 3.2 and follow-on paragraphs.

3.2.1 Arrival inspection.

3.2.2 Visual Preservation Inspection (VPI).

3.2.3 Visual and Technical Inspections (VTI). The Contractor must conduct all inspections required under paragraph 3.2.4 and follow-on paragraphs.

3.2.4 Geometrical/dimensional inspections. Prior to overhaul/repair, while using Coast Guard Drawing 160WLIC-4400-003 as guidance, the Contractor must conduct the following inspections and measurements, recording all results and deviations outside of prescribed tolerances.

NOTE

ISO 484/2, Class II is the guiding document for the inspections and repairs to be made. Class II measurements and tolerances apply unless explicitly stated otherwise.

3.2.4.1 Blade radius length. Measure each blade radius length.

3.2.4.2 Section pitch. Measure the pitch of each blade at the following radii: 0.5, 0.6, 0.7, 0.8, 0.9 and 0.95.

3.2.4.3 Blade pitch average. Calculate the average blade pitch using the radii prescribed in the above paragraph.

3.2.4.4 Blade section widths. Measure each blade section width at the radii prescribed in 3.2.4.2.

3.2.4.5 Maximum blade thicknesses. Measure the maximum blade thicknesses at the radii prescribed in 3.2.4.2.

3.2.4.6 Blade track. Measure each blade track at the 0.95 radius for each blade.

3.2.4.7 Fairness. Conduct a fairing survey for each blade, noting all locations and deviations from the prescribed fairness and fairness rate of change tolerances.

3.2.4.8 Surface finish. Using SFLC Std Spec 0740 as guidance, conduct a surface finish survey for all blade surfaces, fillets and palms.

3.2.4.8.1 Blade surfaces from R 0.2 to the tip must have a finish of 63 micro inches or better.

3.2.4.8.2 Blade fillets and hubs must be 125 micro inches or better.

3.2.4.9 Surface inspections. Using SFLC Std Spec 0740 and ABS Part 7, Section 10, Table for acceptance criteria, conduct the following:

3.2.4.9.1 Surface inspection – visual. Conduct a visual inspection of each propeller as guidance; markup and report all discrepant physical condition findings on the form provided in Section 4.

3.2.4.9.2 Surface inspection – Nondestructive test (NDT). Conduct a dye penetrant inspection on all component surfaces, including the hubs.

3.2.4.9.3 Surface inspection reports. Markup and report all discrepant visual and NDT findings on the forms (blades) provided in Section 4 for each surface inspected.

NOTE

The Section 4 forms are provided for convenience and the Contractor may opt to use clearer forms in their submission.

3.3 Overhaul/repair. If a Change Request has been authorized and released by the KO, the Contractor must make all recommended repairs (or as amended by the KO) for the affected blade(s) in accordance with the following:

3.3.1 Tolerances. The repair tolerances must be in accordance with ISO 484/2, **Class II** in conjunction with Coast Guard Drawing 160WLIC-4400-003.

3.3.2 Welding specifics.

3.3.2.1 Critical blade areas are described as the pressure face of a blade between the fillet and the .4 radius, starting at the leading edge encompassing 80% of the chord length taken at the 0.4 radius (see Figure 1 of DOD-STD-2185).

WARNING!

Welding required between the 0.2 and 0.25 radii must not be taken without prior KO approval.

3.3.2.3 All welding performed must be documented on the visual inspection sheets for each blade; each weld must be dimensionally identified by location, length, width, and depth.

3.3.2.6 Provide photo documentation to the KO during in-process welding repairs and any discontinuities during dye penetrant inspection.

3.3.2.6.1 Each photograph shall include the component serial number and date the photograph was taken.

3.3.2.6.2 Color photographs must be taken with a digital camera and the images provided electronically in "**jpg format**" to the KO during:

3.3.3 Surface finish. Blade surfaces must be ground fair and polished to the following finishes in accordance with SAE-J-448A:

- Blade surfaces from 0.2R to tip – 63 micro inches Ra;
- Hub exterior surfaces – 125 micro inches Ra.
- Remove all high spots, burrs, abrasions, knicks, corrosion/oxidation, and foreign matter from the propeller keyways, glands, hub bores, flanges and mating surfaces.
- Chase and tap exposed threaded areas where necessary

3.3.4 Balancing. Each propeller must be single plane balanced in accordance with MIL-STD-167-1A, paragraph 5.2.2.2 and as follows:

NOTE

All balancing must be accomplished by means of balancing equipment that requires work piece rotation.

3.3.4.1 Prior to performing any balance tests, the Contractor must demonstrate the balance machine sensitivity using a weight determined by the following formula:

$Ws = 0.1(U)/r$

- Where, Ws = sensitivity weight
- U = residual unbalance tolerance;
- r = radial location of the weight.

NOTE

Weight addition/removal shall be easily detected and discernable to the balance machine operator.

Material removed to balance shall be taken from the suction face of the heavy blade(s).

For blades, the area from which metal is taken must not come from within 10 percent of the chord length adjacent to the leading or trailing edges.

Any material alterations effect must not exceed any dimensional/geometrical tolerances.

3.3.4.2 Document the final, actual unbalance amount for each blade set in the Final Inspection Report.

3.3.5 Residual imbalance. The residual imbalance in each component plane of correction must not exceed the value calculated via the following formula:

$U = 4000W/N^2$

- Where, U = maximum allowable residual unbalance in oz.-in;
- W = weight of rotating part in pounds;

- N = maximum operating speed of unit.

3.4 Final nspection and report. The Contractor shall accomplish the following:

NOTE
Final inspections, tests and/or measurements that were not affected by repairs, and previously recorded in the OIR, are not required to be redone. However, the Final Inspection Report must include all the unaffected pre-repair data as post repair data.

3.4.1 In areas affected by repairs, again conduct the applicable inspections under 3.2.4 and follow-on paragraphs for the final inspections and tests.

3.4.2 Provide the final inspection and test results to the KO in the Final Inspection Report, including the final balancing data.

3.5 This section is not applicable to this work item.

3.6 QA inspection.

3.6.1 Following KO acceptance and approval of the Final Inspection Report and prior to conducting any preservation, packing and packaging, the Contractor must schedule the Coast Guard SFLC QA inspection.

3.6.2 A copy of the Final Inspection Report must be provided to the Coast Guard QA Representative upon arrival for final inspection.

3.6.3 The KO must be given 10-calendar day advance notice ahead of desired inspection date.

3.7 Photography requirements. The Contractor shall provide photographs (.jpg format or similar) for the following evolutions:

3.7.1 During initial propeller receipt; photos must show the suction and pressure faces, fillets and hubs, plus four photographs of the shipping crate sides and top taken at 90° intervals.

3.7.2 Prior to damaged area repairs affecting remarkable cost and/or time; close-up views showing the affected areas before and after those repairs must be provided.

3.7.3 Pre-repair, failed NDT areas.

3.7.4 In-process repairs in areas requiring significant welding and/or machining.

3.7.5 Following final inspection and prior to preservation/packaging, photograph suction and pressure sides of blade(s), hub(s), surface texture/finish, including stamped markings.

3.7.6 Prior to packing, photograph each propeller showing strippable compound application and installed blade edge protection.

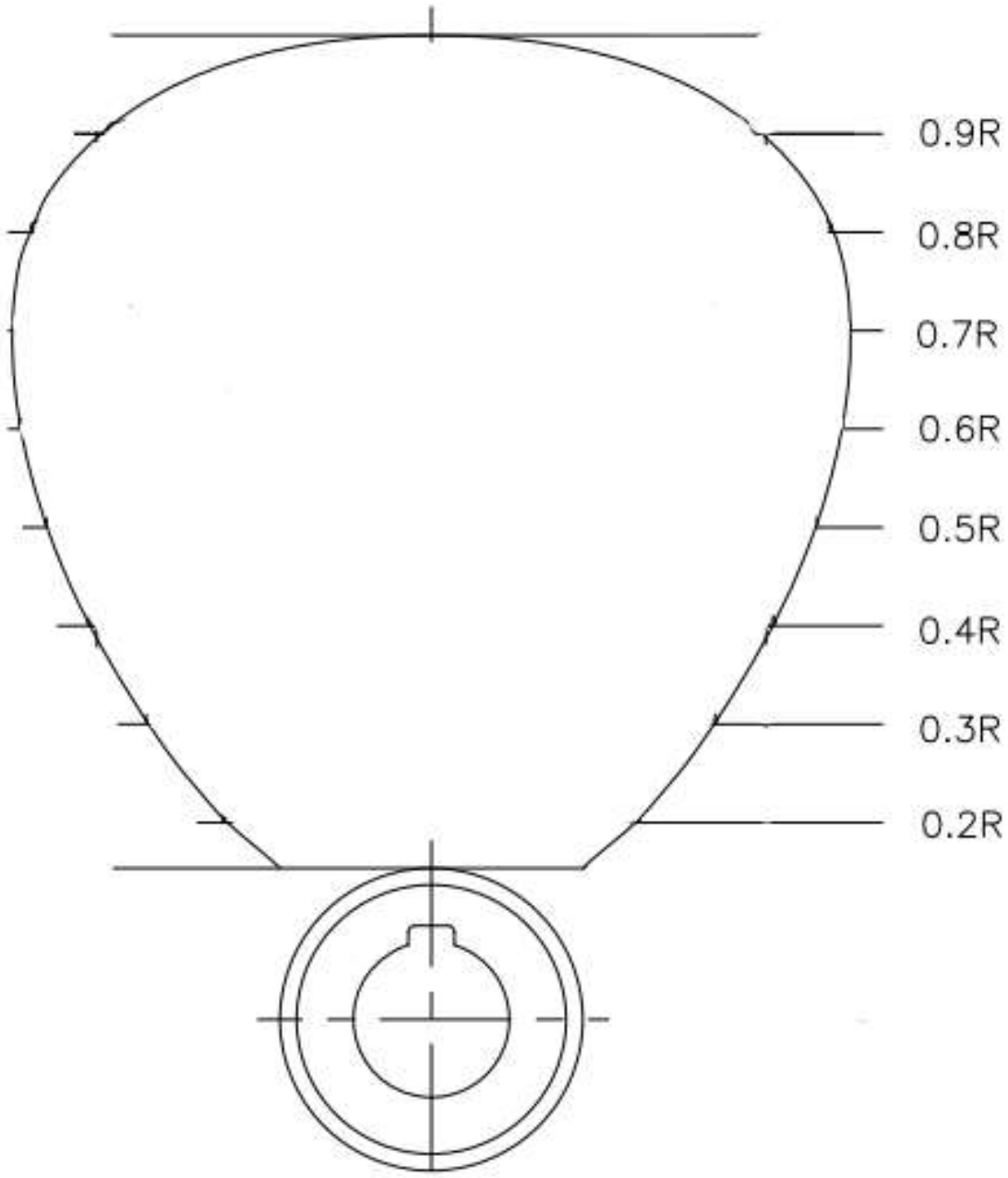
3.7.7 Prior to shipping, photograph all container markings.

4. NOTES

4.1 Post-repair/overhaul activities. Refer to the General Requirements work item, Section 5, for the preservation, packaging, packing, and shipping requirements.

4.2 Reference sources. Refer to General Requirements work item, Section 6, for referenced document sources.

4.3 Blade and hub image.



Pressure side _____ Suction side _____

5. Supplementary Requirements and Information

NOTE
This information is specific to the serviced components and supplements the General Requirements work item. Where information between the General Requirements work item and herein conflict, the information here takes precedence.

5.1 Markings example.

a. Left-hand propeller

STOCK NUMBER 2010-01-036-7597
ITEM NAME PROPELLER, LH
PART NUMBER 160-WLIC-4400-LH
SERIAL NUMBER *See propeller markings*
CONTRACT NUMBER *As indicated on the contract*
SHIPPING WEIGHT *As determined by Contractor*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL

b. Right-hand propeller

STOCK NUMBER 2010-01-037-7295
ITEM NAME PROPELLER, RH
PART NUMBER 160-WLIC-4400-RH
SERIAL NUMBER *See propeller markings*
CONTRACT NUMBER *As indicated on the contract*
SHIPPING WEIGHT *As determined by Contractor*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL

WORK ITEM 6: Blade(s), Controllable Pitch Propeller (CPP), 225 WLB Class, Inspect and Repair

1. SCOPE

1.1 Intent – This work item defines the requirements to inspect and repair for 225' Class CPP blade(s) to a serviceable, A-condition.

1.2 Government furnished property (GFP). The listed items are property of and managed by the United States Coast Guard (USCG) Surface Forces Logistics Center (SFLC), Baltimore MD and will be issued to the contractor as issuance of a contract or contract delivery order.

ITEM DESCRIPTION	NATIONAL STOCK NUMBER (NSN) PART NUMBER (P/N)
Blade Set, Propeller, Right Hand (RH)	NSN: 2010-01-421-8904 P/N: 110252110
Dummy Hub, Propeller RH	ACN: 2010-01-F04-0341

2. REFERENCES

COAST GUARD DRAWINGS

Coast Guard Drawing 225-WLB-245-203, Rev E, CPP Propeller Blade Right Hand

COAST GUARD PUBLICATIONS

Coast Guard Specification D-000-0100, Rev G, Bar Coding for USCG Surface Forces Logistics Center Procured Material

Surface Forces Logistics Center Standard Specification 0740 (SFLC Std Spec 0740), 2022, Welding and Allied Processes

OTHER REFERENCES

American Bureau of Shipbuilding (ABS) Rules for Survey After Construction 2021 - Guide for Bronze and Stainless-Steel Propeller Castings, Part 7 Appendix 1, Section 10

ASTM E1417/E1417M, Dated 9/1/2021 – Standard Practice for Liquid Penetrant Testing

DOD-STD-2185 (SH) – Requirements for Repair and Straightening of Bronze Naval Ship Propellers

NAVSEA Technical Manual, NAVSEA S9245-AR-TSM-010/PROP - Technical Manual Marine Propeller Inspection, Repair and Certification

SAE-J-448A - Surface Texture Standard

3. REQUIREMENTS

3.1 General.

3.1.1 Inspection, repair and overhaul - general. All inspections, repairs and overhaul must be accomplished in accordance with the requirements set within this work item.

3.1.2 Workmanship. Upon completion of all work, all propellers must have a polished, professional finish and be free of dirt, grease, burrs, sharp edges, etc.

3.2 Inspections. Referring to the General Requirements work item for guidance, for each blade set received, the Contractor must accomplish the following inspections and submit an Open and Inspect Report (OIR) on all of the following:

3.2.1 Arrival inspection.

3.2.2 Visual Preservation Inspection (VPI).

3.2.3 Visual and Technical Inspections (VTI). The Contractor must conduct all inspections required under paragraph 3.2.4 and follow-on paragraphs.

3.2.4 Geometrical/dimensional inspections. Prior to overhaul/repair, while using Coast Guard Drawing 225-WLB-245-203 and NAVSEA S9245-AR-TSM-010/PROP as guidance, the Contractor must conduct the following inspections and measurements, recording all results and deviations outside of prescribed tolerances.

NOTES
NAVSEA S9245-AR-TSM-010/PROP, Table 6-1, Class II is the guiding document for the inspections and repairs to be made. Class II measurements and tolerances apply unless explicitly stated otherwise.

3.2.4.1 Blade radius length. Measure each blade radius length.

3.2.4.2 Section pitch. Measure the pitch of each blade at the following radii: 0.5, 0.6, 0.7, 0.8, 0.9, and 0.95.

3.2.4.3 Blade pitch average. Calculate the average blade pitch using the radii prescribed in the above paragraph.

3.2.4.4 Blade section widths. Measure each blade section width at the following radii: 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, and 0.95.

3.2.4.5 Maximum blade thicknesses. Measure the maximum blade thicknesses the following radii: 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, and 0.95.

3.2.4.6 Blade track. Measure each blade track at the 0.95 radius for each blade.

3.2.4.7 Fairness. Conduct a fairing survey for each blade, noting all locations and deviations from the prescribed fairness and fairness rate of change tolerances.

3.2.4.8 Surface finish. Using SAE-J-448A as guidance, conduct a surface finish survey for all blade surfaces, fillets and palms.

3.2.4.9 Surface inspections.

3.2.4.9.1 Surface inspection – visual. Conduct a visual inspection of each component while using MIL-STD-2035, Section 4 as guidance; markup and report all discrepant physical condition findings on the forms (blades and palms) provided in Section 4.

3.2.4.9.2 Surface inspection – Nondestructive test (NDT). Using SFLC Std Spec 0740 as guidance, conduct a dye penetrant inspection on all component surfaces including the palm top and bottom surfaces, and fillets while using MIL-STD-2035, Table IV as acceptance criteria.

3.2.4.9.3 Surface inspection reports. Markup and report all discrepant visual and NDT findings on the forms (blades and palms) provided in Section 4 for each surface inspected.

NOTE

The Section 4 forms are provided for convenience and the Contractor may opt to use clearer forms in their submission.

3.2.4.10 Material composition. Determine the material composition for each blade.

3.2.4.11 Palm bolt and dowel pin holes. Measure all bolt and dowel pin holes for each blade palm.

3.2.4.12 Dowel hole centers survey. Measure the center-to-center dimensions between all dowel pin holes for each blade.

3.2.4.13 Bolt hole contact face measurements. For each blade, measure the parallel dimensions.

3.2.4.14 Palm dimension survey. For each blade, measure all palm dimensions shown on the applicable drawings.

3.2.4.15 Sealing surfaces survey. Determine and record the surface finishes and conditions for each blade sealing surface.

3.3 Overhaul/repair. If a Change Request has been authorized and released by the KO, the Contractor must make all recommended repairs (or as amended by the KO) for the affected blade(s) in accordance with the following:

3.3.1 Tolerances. The repair tolerances must be in accordance with NAVSEA S9245-AR-TSM-010/PROP, Table 6-1, **Class II** in conjunction with Coast Guard Drawings 225-WLB-245-203 as applicable.

3.3.2 Welding specifics.

3.3.2.1 Critical blade areas are described as the pressure face of a blade between the fillet and the .4 radius, starting at the leading edge encompassing 80% of the chord length taken at the 0.4 radius (see Figure 1 of DOD-STD-2185).

WARNING!

Welding on the pressure face in the critical area must not be taken without prior KO approval.

3.3.2.2 All welding performed must be documented on the visual inspection sheets for each blade; each weld must be dimensionally identified by location, length, width, and depth.

3.3.2.3 Provide photo documentation to the KO during in-process welding repairs and any discontinuities during dye penetrant inspection.

3.3.2.3.1 Each photograph shall include the component serial number and date the photograph was taken.

3.3.2.3.2 Color photographs must be taken with a digital camera and the images provided electronically in "**jpg format"** to the KO during:

3.3.3 Surface finish. Blade and palm surfaces must be ground fair and polished to the following finishes in accordance with SAE-J-448A:

- Blade surfaces - 63 micro inches or better;
- Blade fillets and palms – 125 micro inches or better.
- Propeller sealing surfaces – 16 micro inches or better

NOTE

Hand finishing may be required to obtain the 16 micro inch finish.

3.3.4 Balancing. While using the Government-furnished dummy hub, each blade set must be single plane balanced as follows:

NOTE

All balancing must be accomplished by means of balancing equipment that requires work piece rotation.

3.3.4.1 Prior to performing any balance tests, the Contractor must demonstrate the balance machine sensitivity using a weight determined by the following formula:

$Ws = 0.1(U)/r$

- Where, Ws = sensitivity weight
- U = residual unbalance tolerance;
- r = radial location of the weight.

3.3.4.2 In the presence of the Coast Guard Inspector and prior to using with attached blades, the Contractor must inspect the dummy hub for squareness, confirm the dowel pin locations, and be balanced using the determined parameters detailed in 3.3.5.

3.3.4.3 Following hub balancing, blades must be balanced as a set of 4 and be marked (i.e., 1, 2, 3, 4) from a defined datum, and ascending in number, counter to rotation direction.

NOTE

This numbering method ensures reassembly in the same positions in which they were balanced.

Weight addition/removal shall be easily detected and discernable to the balance machine operator.

Material removed to balance shall be taken from the suction face of the heavy blade(s).

For blades, the area from which metal is taken must not come from within 10 percent of the chord length adjacent to the leading or trailing edges.

3.3.4.4 After the initial balance, the blades must be removed and rotated 90 degrees on the dummy hub.

3.3.4.5 Re-check balance after blade rotation to ensure that any corrections made are not attributable to changes in the dummy hub.

3.3.4.6 Document the final, actual unbalance amount for each blade set in the Final Inspection Report.

3.3.4.7 The residual imbalance in each component plane of correction must not exceed the value calculated via the following formula:

$U = 4000W/N^2$

- Where, U = maximum allowable residual unbalance in oz.-in;
- W = weight of rotating part in pounds;
- N = maximum operating speed of unit.

3.3.5 Bolt hole thickness. Measure the palm thicknesses around the perimeter of each bolt shank hole; mark the locations and record those measuring less than 95% of the minimum, adjacent palm thickness indicated in the applicable drawing.

CAUTION!

Thickness must not be less than 2.256 inches.

3.3.6 Sealing surface finish. Sealing surfaces must have surface finishes of 32 micro inches or better (unless otherwise stated on the applicable drawing). Seal wear or rough surfaces must be machined to restore to 32 micro inches.

3.4 Final Inspection Report. The Contractor shall accomplish the following:

NOTE

Final inspections, tests and/or measurements that were not affected by repairs, and previously recorded in the OIR, are not required to be redone. However, the Final Inspection Report must include all the unaffected pre-repair data as post repair data.

3.4.1 In areas affected by repairs, again conduct the applicable inspections under 3.2.4 and follow-on paragraphs for the final inspections and tests.

3.4.2 Provide the final inspection and test results to the KO in the Final Inspection Report, including the final balancing data per paragraph 3.3.4 and follow-on paragraphs.

3.5 Stamping. Following all repairs, the Contractor must accomplish the following:

3.5.1 Each blade must be stamped with the following information (minimum), updated where necessary if the stamping already exists:

a. Repair facility/company name

b. Repair completion date

c. Blade number

d. Stress relief date (if applicable)

e. Blade set serial number

f. Rotation direction (RH)

g. Material type

h. Weight

3.5.2 Stamping must be be at least 1/4" high, legible printing, or the same height of the existing stamping if only corrected stamping is required.

3.6 QA inspection.

3.6.1 Following KO acceptance and approval of the Final Inspection Report and prior to conducting any preservation, packing and packaging, the Contractor must schedule the Coast Guard SFLC QA inspection.

3.6.2 A copy of the Final Inspection Report must be provided to the Coast Guard QA Representative upon arrival for final inspection.

3.6.3 The KO must be given 10-calendar day advance notice ahead of desired inspection date.

3.7 Photography requirements. The Contractor shall provide photographs (.jpg format or similar) for the following evolutions:

3.7.1 During initial blade receipt; photos must show the suction and pressure faces, fillets and palms, plus four photographs of the shipping crate sides and top taken at 90° intervals.

3.7.2 Prior to damaged area repairs affecting remarkable cost and/or time; close-up views showing the affected areas before and after those repairs must be provided.

3.7.3 Pre-repair, failed NDT areas.

3.7.4 In-process repairs in areas requiring significant cropping, welding and/or machining of sealing surfaces.

3.7.5 Following final inspection and prior to preservation/packaging, photograph suction and pressure sides of blade(s), palm(s), sealing face(s) surface texture/finish, including stamped markings.

3.7.6 Prior to packing, photograph each component showing strippable compound application and installed blade edge protection.

3.7.7 Prior to shipping, photograph all container markings.

4. NOTES

4.1 Post-repair/overhaul activities. Refer to the General Requirements work item, Section 5, for the preservation, packaging, packing, and shipping requirements.

4.2 Reference sources. Refer to General Requirements work item, Section 6, for referenced document sources.

4.3 Validation of inspections/tests. The following are required and will be validated by a Government Quality Assurance Representative:

4.3.1 Geometrical/dimensional inspections per the following paragraphs:

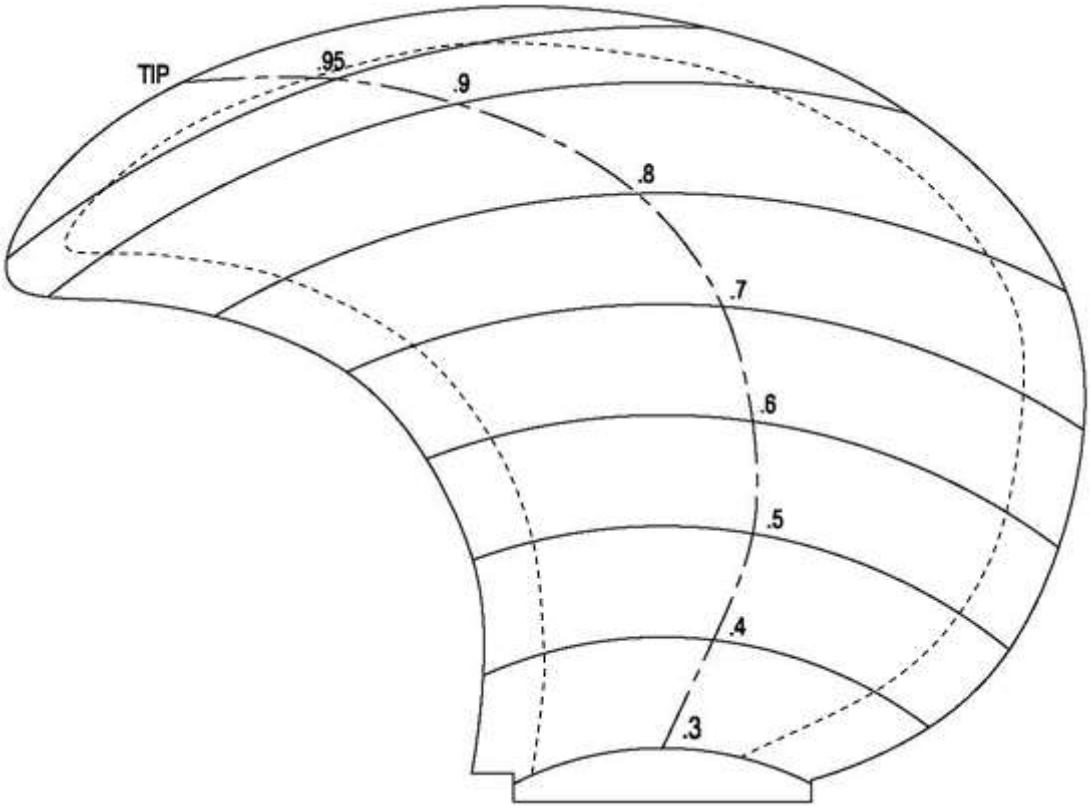
- 3.2.4.1
- 3.2.4.2
- 3.2.4.3
- 3.2.4.4
- 3.2.4.5
- 3.2.4.6
- 3.2.4.7
- 3.2.4.11
- 3.2.4.12
- 3.2.4.13
- 3.2.4.15

4.3.2 Surface inspections per paragraph 3.2.4.9.

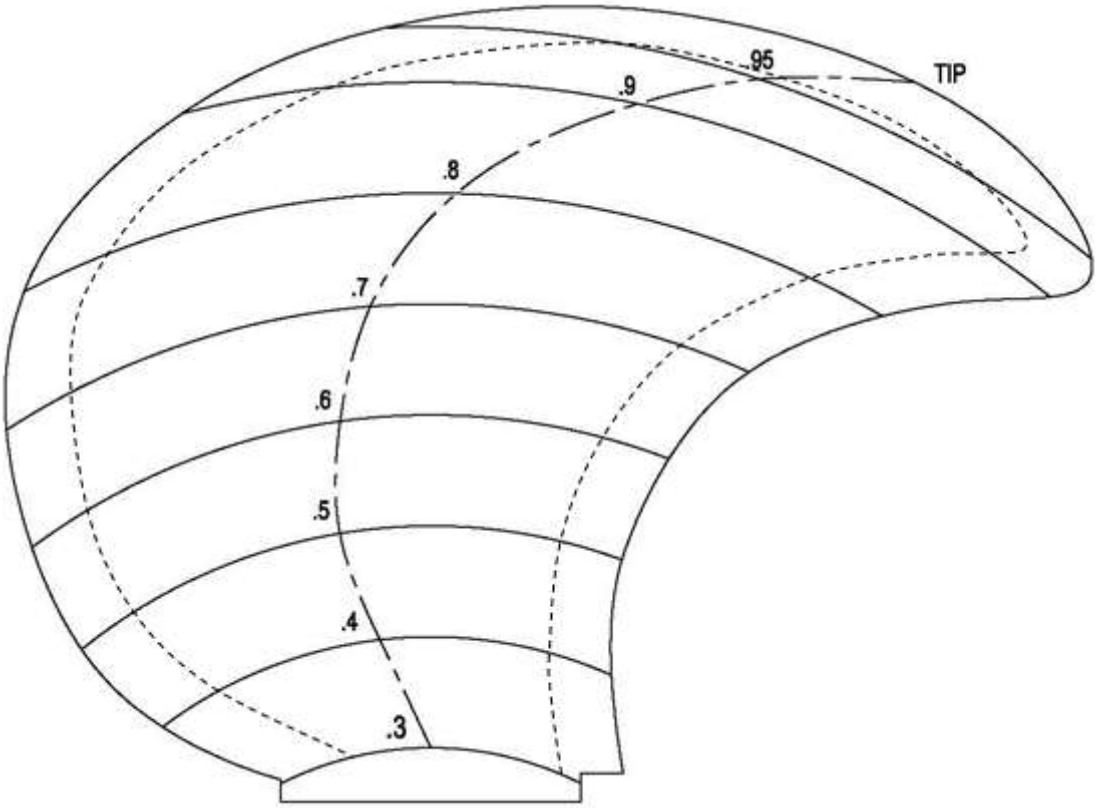
4.3.3 Balance checks per paragraph 3.3.4 and follow-on paragraphs.

4.3.4 Blade stamping per paragraph 3.5.

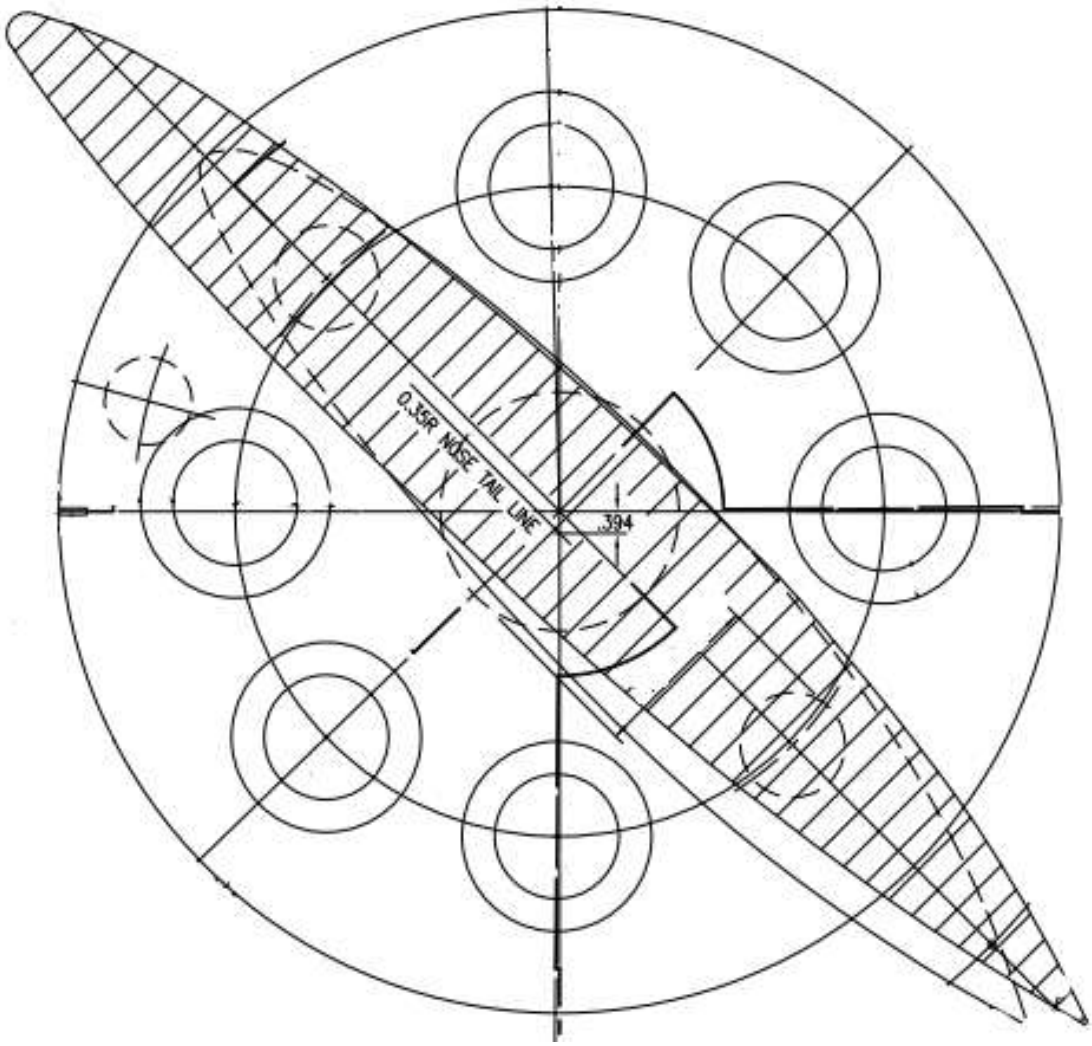
4.4 Component sketches.



Pressure Side



Suction Side



Blade Palm

Top side _____ Bottom side _____

5. Supplementary Requirements and Information

NOTE
This information is specific to the serviced components and supplements the General Requirements work item. Where information between the General Requirements work item and herein conflict, the information here takes precedence.

5.1 Blade and dummy hub-specific preservation and packaging markings.

Markings examples:

a. Type 1 – BLADE SET, RIGHT HAND
STOCK NUMBER 2010-01-421-8904
ITEM NAME BLADE SET RH, PROPELLER
PART NUMBER 110254003
BLADE SERIAL NUMBER *As marked on blade*
BLADE SET SERIAL NUMBERS *List serial numbers of the three Other blades that make up this set*
BLADE NUMBER *As received or as balanced*
SHIPPING WEIGHT *As determined by Contractor*
CONTRACT NUMBER *As indicated on the contract*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - SET
COAST GUARD SFLC MATERIAL
REUSABLE CONTAINER - DO NOT DESTROY

b. DUMMY HUB, RH
ITEM NAME DUMMY HUB, RH
PART NUMBER DUMMY HUB 225 WLB
SHIPPING WEIGHT *As determined by Contractor*
CONTRACT NUMBER *As indicated on the contract*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - SET
COAST GUARD SFLC MATERIAL
REUSABLE CONTAINER - DO NOT DESTROY

24599_175_0126_Rev -

WORK ITEM 7: Propeller, 175' WLM, Manufacture

1. SCOPE

1.1 Intent – This work item defines the requirements to manufacture, certify and provide U.S. Coast Guard 175' WLM left- and right-hand, 5-blade propellers.

NOTE
The KO will provide the quantities sought for each type of propeller in the contract order.

1.2 Government furnished property (GFP). The listed items are property of and managed by the United States Coast Guard (USCG) Surface Forces Logistics Center (SFLC), Baltimore MD and will be issued to the contractor as issuance of a contract or contract delivery order.

None.

1.3 Propeller characteristics – general.

NATIONAL STOCK NUMBER (NSN)	ROTATION	DIAMETER (IN.)	PITCH (IN.)	SHAFT RPMS	HUB BORE SMALL END (IN.)	HUB LENGTH (IN.)
2010-01-F07-1221	LH	57	63	403	7.2850-7.2874	14.842
2010-01-F07-1222	RH					

2. REFERENCES

COAST GUARD DRAWINGS

Coast Guard Drawing 175-WLM-245-002, Rev A, Z-Drive Propeller Details, Modified Design

COAST GUARD PUBLICATIONS

Surface Forces Logistics Center Standard Specification 0740 (SFLC Std Spec 0740), 2022, Welding and Allied Processes

OTHER REFERENCES

American Bureau of Shipbuilding (ABS) Rules for Survey After Construction 2021 - Guide for Bronze and Stainless-Steel Propeller Castings, Part 7 Appendix 1, Section 10

International Standard ISO 484/2, Shipbuilding – Ship Screw Propellers – Manufacturing Tolerances

MIL-STD-167-1A, Department of Defense Test Method Equipment, Mechanical Vibrations of Shipboard Equipment

MIL-STD-2035, Department of Defense Test Method: Nondestructive Testing Acceptance Criteria

SAE-J-448A, Surface Texture Standard

3. REQUIREMENTS

3.1 General.

3.1.1 Manufacture.

3.1.1.1 The Contractor must manufacture all 175' WLM propellers from ABS Type 4 Nickel-Aluminum-Bronze in accordance with Coast Guard Drawing 175-WLM-245-002.

3.1.1.2 ISO 484/2, Class II and SAE J755-80, Table 3 tolerances must be used where such details are absent from Coast Guard Drawing 175-WLM-245-002.

3.1.2 Workmanship. All finished propellers must have a polished, professional finish and be free of dirt, grease, burrs, sharp edges, etc.

3.1.3 Material conformance. The Contactor must conduct a material chemical analysis as well as tensile, yield and elongation tests on a sample of each propeller material source. Submit a CFR prior to further manufacturing.

NOTE
Copies of the analyses and tests must be supplied with each propeller at final inspection.

3.2 Inspections.

3.2.1 Geometrical/dimensional inspections. Upon manufacture completion, the Contractor must conduct the following inspections and measurements, recording all results and annotating all deviations outside of prescribed tolerances.

NOTE
Coast Guard Drawing 175-WLM-245-002 is the guiding document for all final tolerances unless noted otherwise; General Notes 7 through 18 apply to the following inspections and measurements.

3.2.1.1 Local pitch. Measure and record the local pitches of each blade at the following radii: 0.5, 0.6, 0.7, 0.8, 0.9 and 0.95; ISO 484/2 Class II measurements and tolerances apply.

3.2.1.2 Blade radius pitch. Measure and record each blade radius pitch for all radii shown on Coast Guard Drawing 175-WLM-245-002.

NOTE

Annotate all pitch variances between adjacent design sections that are beyond 0.75%.

3.2.1.3 Blade mean pitch. Calculate the average blade pitch using all individual radius pitches measured.

3.2.1.4 Mean pitch variance. Annotate any mean pitch variances beyond 0.5% for a propeller.

3.2.1.5 Maximum blade thicknesses. Measure and record the maximum blade thicknesses at each radius shown on Coast Guard Drawing 175-WLM-245-002.

3.2.1.6 Blade section widths. Measure and record each blade section width at each radius shown on Coast Guard Drawing 175-WLM-245-002.

3.2.1.7 Blade radius measurements. Measure and record each blade radius.

3.2.1.8 Angular spacing inspection. Measure and record the angular spacing between each blade center.

3.2.1.9 Blade track. Measure and record the blade track at the tip of each blade.

3.2.1.10 Tip and edge contour inspections.

NOTE

The Government has not provided physical edge gauges for contour assessment. The Contractor may propose their own method for assessing the edge contours to the KO for review and concurrence. Contractor-made physical gauges or virtual artifacts (i.e., CAD renderings for comparison against three-dimensional scans) are conditionally acceptable.

3.2.1.10.1 Tip contours. Assess each tip contour against the tip detail profile shown on Coast Guard Drawing 175-WLM-245-002.

3.2.1.10.2 Anti-singing/trailing edge contours. Assess each trailing edge anti-singing contour against Detail 5-7-A of Coast Guard Drawing 175-WLM-245-002. Annotate all out-of-tolerance measurements.

3.2.1.10.3 Leading edge contours. Using the section table on sheet 7 of Coast Guard Drawing 175-WLM-245-002, assess the edge contour conformance at each radius against design. Annotate all out-of-tolerance measurements.

3.2.1.11 Surface finish. Using SFLC Std Spec 0740 as guidance, conduct a surface visual inspection, roughness inspection, and dye penetrant inspection for all blade, fillet and hub surfaces.

3.2.1.11.1 All surfaces must be polished to 125 micro inches or better.

3.2.1.11.2 Dye penetrant acceptance criteria must be in accordance with Table IV of MIL-STD-2035.

3.2.1.11.3 Markup and report all discrepant visual, roughness and NDT findings on the forms provided in Section 4 for each surface inspected.

NOTE

The Section 4 forms are provided for convenience and the Contractor may opt to use clearer forms in their submission; hub imagery is not provided herein.

3.2.2 Balancing. Each propeller must be single plane balanced in accordance with MIL-STD-167-1A, paragraph 5.2.2.2 and as follows:

NOTE

All balancing must be accomplished by means of balancing equipment that requires work piece rotation.

3.2.2.1 Prior to performing any balance tests, the Contractor must demonstrate the balance machine sensitivity using a weight determined by the following formula:

$Ws = 0.1(U)/r$

- Where, Ws = sensitivity weight
- U = residual unbalance tolerance;
- r = radial location of the weight.

NOTE

Weight addition/removal shall be easily detected and discernable to the balance machine operator.

Material removed to balance shall be taken from the suction face of the heavy blade(s).

For blades, the area from which metal is taken must not come from within 10 percent of the chord length adjacent to the leading or trailing edges.

Any material alterations effect must not exceed any dimensional/geometrical tolerances.

3.2.2.2 Document the final, actual unbalance amount for each propeller in the Final Inspection Report.

3.2.2.3 The residual imbalance in each component plane of correction must not exceed the value calculated via the following formula:

$U = 4000W/N^2$

- Where, U = maximum allowable residual unbalance in oz.-in;
- W = weight of rotating part in pounds;
- N = maximum operating speed of unit.

3.3 Final inspection report. The Contractor must provide a report for each propeller detailing the results from all inspections under paragraph 3.2. Submit these reports to the KO for USCG Quality Assurance (QA) desk audit prior to scheduling final, onsite QA inspections.

3.4 Stamping.

3.4.1 The Contractor must stamp each finished propeller with the following:

a. Diameter (mm)

b. Pitch (mm)

c. Rotation (left-hand, LH or right-hand, RH)

d. Serial number

e. Manufacturer name and date

3.4.2 Stamping must be legible and located on the outside diameter of the hub aft end, clear of the fillets; letters and numbers must be ¼" to ½" high.

3.5 QA inspections.

3.6.1 Following KO acceptance and approval of the Final Inspection Report and prior to conducting any preservation, packing and packaging, the Contractor must schedule the Coast Guard SFLC QA inspection.

3.6.2 A copy of the Final Inspection Report must be provided to the Coast Guard QA Representative upon arrival for final inspection.

3.6.3 The KO must be given 7-calendar days advance notice ahead of desired inspection date.

3.7 Preservation, packaging, packing and marking. USCG QA must be present for the final preservation through crate marking evolution for each propeller.

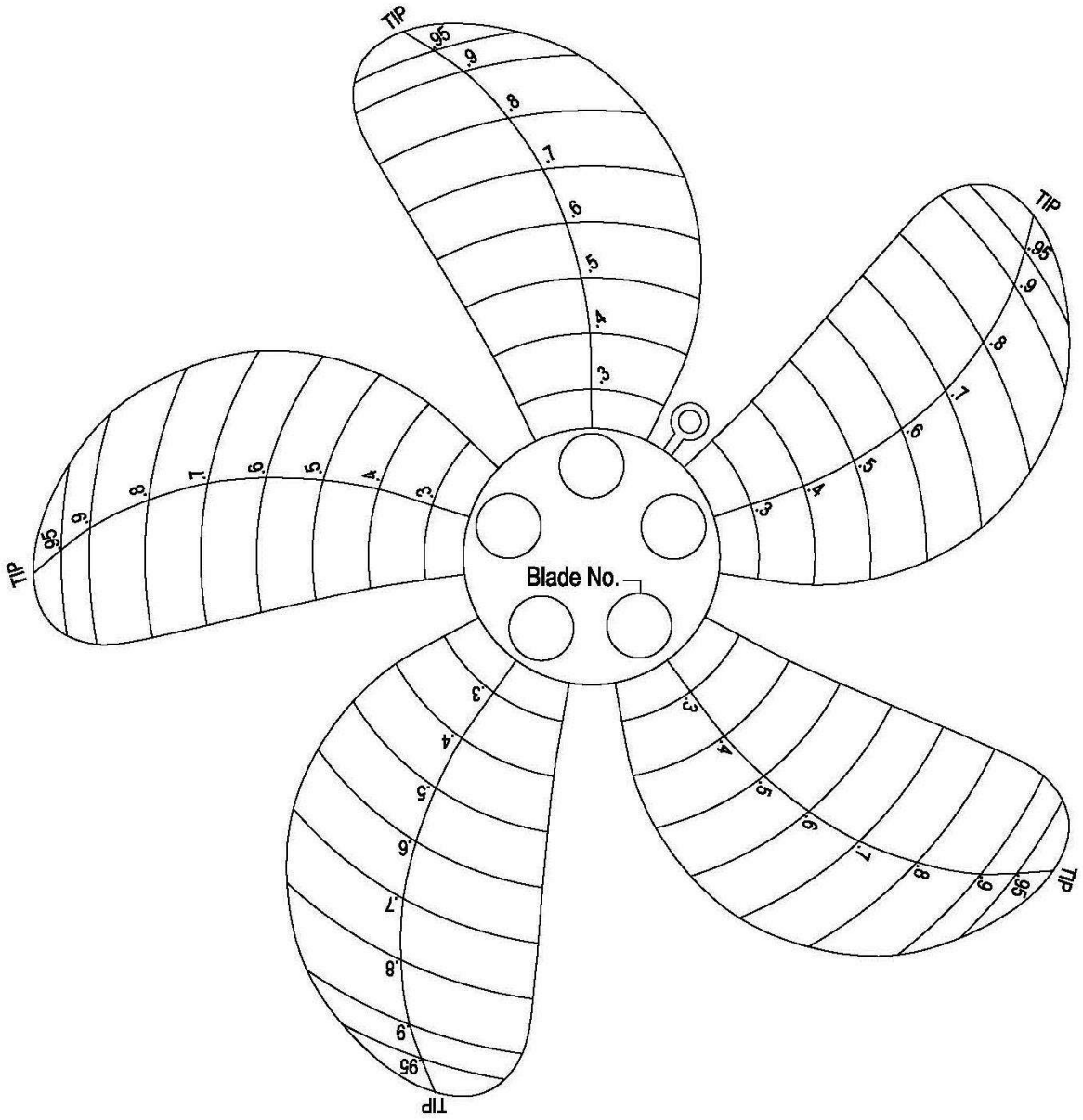
NOTE

Details for the post-inspection shipping and storage preparations are provided in Section 5 of the General Requirements work item.

4. NOTES

4.1 Reference sources. Refer to General Requirements work item, Section 6, for referenced document sources.

4.2 Propeller blades image. (See below)



Pressure side _____ Suction side _____

5. Supplementary Requirements and Information

NOTE
This information is specific to the serviced components and supplements the General Requirements work item. Where information between the General Requirements work item and herein conflict, the information here takes precedence.

5.1 Markings example.

a. Left-hand propeller

STOCK NUMBER 2010-01-F07-1221
ITEM NAME PROPELLER, Marine (LH) WLM 5-Blade
PART NUMBER 175-WLM-245-002-LH
SERIAL NUMBER *To be provided by the KO*
CONTRACT NUMBER *As indicated on the contract*
DELIVERY ORDER NUMBER *As indicated on the contract*
SHIPPING WEIGHT *As determined by Contractor*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL

b. Right-hand propeller

STOCK NUMBER 2010-01-F07-1222
ITEM NAME PROPELLER, Marine (RH) WLM 5-Blade
PART NUMBER 175-WLM-245-002-RH
SERIAL NUMBER *To be provided by the KO*
CONTRACT NUMBER *As indicated on the contract*
DELIVERY ORDER NUMBER *As indicated on the contract*
SHIPPING WEIGHT *As determined by Contractor*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL

24599_87_MWS_1225_Rev -

WORK ITEM 8: Propeller, 87 WPB - Inspect, Repair/Overhaul

1. SCOPE

1.1 Intent – This work item defines the requirements for repair and overhaul of US Coast Guard 87' Patrol Boats.

1.2 Government furnished property (GFP). The listed items are property of and managed by the United States Coast Guard (USCG) Surface Forces Logistics Center (SFLC), Baltimore MD and will be issued to the contractor as issuance of a contract or contract delivery order.

ITEM DESCRIPTION	NSN P/N CAGE
Propeller, Right Hand	NSN: 2010-01-457-0573 P/N: 706-3351.00 RH CAGE: 81340
Propeller, Left Hand	NSN: 2010-01-459-0421 P/N: 706-3350.00 LH CAGE: 81340
Shipping Crate, Reusable	NSN: N/A PN: N/A CAGE: N/A

2. REFERENCES

COAST GUARD DRAWINGS/RENDERINGS

Coast Guard Drawing 87 WPB 245-003, Rev. A – 87' Coastal Patrol Boat Propeller Details

COAST GUARD PUBLICATIONS

87 Propeller Inspection Compliance Forms

OTHER REFERENCES

ABS Rules for Survey After Construction 2021 - Guide for Bronze and Stainless-Steel Propeller Castings, Part 7 Appendix 1, Section 10

ASTM E1417/E1417M, Dated 9/1/2021 – Standard Practice for Liquid Penetrant Testing

ISO 484-2:2015(E) Second Edition, Dated 12/01/2015 – Shipbuilding-Ship Screw Propellers-Manufacturing Tolerances - Part 2: Propellers of Diameter Between 0.80 and 2.50 m Inclusive

3. REQUIREMENTS

3.1 General.

3.1.1 Inspection, repair and overhaul - general. All inspections, repairs and overhaul must be accomplished in accordance with the requirements set within this work item. Coast Guard Drawing 87 WPB 245-003 must be used for the baseline design criteria and ISO 484/2, Class 1 (unless otherwise noted) for the inspection processes.

3.1.2 Workmanship. Upon completion of all work, all propellers must have a polished, professional finish and be free of dirt, grease, burrs, sharp edges, etc.

3.2 Inspections. The Contractor must accomplish the following inspections for each 87 propeller received:

3.2.1 Arrival inspection.

3.2.2 Visual Preservation Inspection (VPI).

3.2.3 Visual and Technical Inspections (VTI).

3.2.4 Geometrical/dimensional inspections. Prior to overhaul/repair, the Contractor must conduct the following inspections and measurements, recording all results in the 87 Propeller Compliance Forms.

NOTES

ISO 484/2 is the guiding document for the inspections to be made. Class 1 measurements and tolerances apply unless explicitly stated otherwise.

The Compliance Forms tolerance bands are derived from Coast Guard Drawing 87 WPB 245-003 with ISO 484/2, Class 1 tolerances applied (unless otherwise noted).

The pitch data derivations for the Compliance Forms incorporate a 0.5 inch exclusion each from the trailing edge AND the leading edge. While entire chord lengths are actually measured, the exclusions in the pitch derivations negate the effect of the edge contours on the pitch measurements.

3.2.4.1 Propeller hub inspection (Compliance Form Sections 2 and 3). Conduct the propeller hub inspections required to record in section 2 and 3 of the Compliance Forms.

CAUTION!

The propeller hub bore inspection shall be accomplished before any other inspections or tests required in this work item. If the propeller fails this inspection, the contractor shall not perform any additional tests or inspections without approval of the KO.

3.2.4.2 Surface finish (Compliance Form Section 4). Visually identify and record the roughest surface finish on each blade and the hub/bore. Mark all areas on the propeller with out-of-tolerance surface finishes.

NOTE

As part of Section 6 of the compliance forms, a sketch or photograph showing UNSAT surface finish may be provided in lieu of a filled-in Section 4 of the compliance forms.

3.2.4.3 Balancing (Compliance Form Section 5). Unless a visual inspection reveals an obvious out-of-balance condition, conduct and record results from a static balance test.

WARNING!

There shall be no machining, welding or material addition or removal to the propeller after final balance check is completed.

3.2.4.4 Surface inspection (Compliance Form Section 6). Conduct a visual inspection of the propeller and mark up the accompanying figure on Compliance Form Section 6.

NOTE

This requirement may be fulfilled via the VTI and is not intended to be a duplicate of that earlier effort.

3.2.4.4.1 Perform a dye penetrant inspection over 100 percent of the blade, fillet, and hub surfaces in accordance with ASTM E1417 while using ABS Part 7, Appendix, Section 10, Table 1 as acceptance criteria. The inspection shall be performed by a certified Level II NDT Technician.

3.2.4.4.2 Document all propeller defects resulting from the visual and dye penetrant inspections in Compliance Form Section 6. These defects shall be indicated by type, size, and acceptability on visual inspection sheets. Each propeller will require individual inspection sheets for the pressure face of the blades, suction face of the blades, the fillet, and the hub.

3.2.4.4.3 All visual defects, even though deemed acceptable, shall be documented on the inspection report.

3.2.4.4.4 A copy of the dye penetrant inspection report shall be included as part of the final inspection report.

3.2.4.4.5 Provide photo documentation to the KO during in-process welding repairs of the casting (if applicable) and any discontinuities of the propeller casting during dye penetrant inspection. Each photograph shall include the propeller serial number and date the photograph was taken. The color photographs shall be taken with a digital camera and the images provided electronically in "**jpg format**" to the KO during:

- the dye penetrant inspection showing any linear/non-linear discontinuities of the propeller casting.
- repair of the propeller whenever welding is required and approved.

3.2.4.5 Geometrical/dimensional data (Compliance Form Section 7). Measure and record the following:

a. Propeller blade radii

CAUTION – ALL PITCH MEASUREMENTS
Shorter, yet in-tolerance chord lengths may yield pitches outside of those presented in the Compliance Forms. Likewise, measuring equipment (other than CMM) may require "exclusions", i.e., small lengths from each end (up to a half inch permissible), to ascertain pitch measurements. With review and approval from the KO, adjustments to the reference pitches and tolerance bands may be considered. The Contractor must demonstrate how the numbers were adjusted to determine the proposed figures and be replicable by the Coast Guard to gain approval.

b. Local pitches (three equal segments)

c. Section pitch

d. Mean pitch per blade

e. Mean propeller pitch

f. Blade section widths

g. Maximum thickness at prescribed stations (see drawing table of offsets to make location determination)

h. Track deviation/rake

i. Edge conditions

j. Angular spacing of blade center axis

k. Surface finish of blade, hub and bore areas

l. Surface inspection

m. Hub bore inspections and fit

n. Material composition

o. Balancing data

p. Fairness

3.2.4.6 Pre-overhaul/repair report. Provide the inspection results from above via the applicable portions of the Compliance Forms, highlighting all out-of-tolerance measurements, and note the necessary repairs to be made, for KO review and approval. Indicate anticipated effects on propeller performance (if any) from the discrepancies.

3.3 Propeller overhaul/repair. If a Change Request has been authorized and released by the KO, the Contractor must make all recommended repairs (or as amended by the KO) for the affected propeller(s).

3.3.1 General notes for overhaul/repair.

3.3.1.1 Critical areas: The critical areas are described in section 1.5.5 (b), Figure 3 of the ABS Part 7.

3.3.1.2 Severity Zones: The following apply to the welding in Severity Zones as defined by ABS Part 7, Section 10, paragraph 1.5.5 (b), and subparagraphs for *High-Skew propellers*.

3.3.1.2.1 Zone A is the area on the pressure face contained within the blade root fillet and a line running from the junction of the leading edge with the root fillet to the trailing edge at the 0.9R and passing through the mid-point of the blade chord at 0.7R and a point situated at 0.3 of the chord length edge at 0.4R. It also includes an area along the trailing edge on the suction side of the blade from the root to 0.9R and with its inner boundary at 0.15 of the chord lengths from the trailing edge.

3.3.1.2.2. Zone B constitutes the whole of the remaining blade surfaces.

3.3.1.3 Welding required to repair cavitation erosion in the critical area, but not to include the blade fillets located between the 0.2 and the 0.25 radius, shall be undertaken as the contractor deems necessary.

3.3.1.4 Welding repairs of the propellers shall meet the requirements of ABS Part 7 Appendix 1, Section 10.

3.3.1.5 The contractor shall document all welding performed on the visual inspection sheets for each propeller. Each weld shall be dimensionally identified by location, length, width, and depth.

3.3.1.6 Material removed to affect balance shall be taken from the suction face on as large an area as practicable and shall not approach the leading or trailing edges within (10) ten percent of the blade width.

3.3.1.7 Care shall be taken to assure that removal of material shall not cause the tolerances for thickness, surface contour, edge contour, width or pitch to be exceeded.

3.3.1.8 There shall be no machining or grinding on the propeller after final balance check.

3.4 Post-repair/overhaul inspections and tests.

3.4.1 Only for those initial inspection and test results affected by repair and/or overhaul must the Contractor redo those inspection(s) and test(s).

3.4.2 Record all final results on a second set of Compliance Forms and submit to the KO for review and approval. Provide a brief written narrative as part of the final submission detailing each propeller's finished condition.

3.5 Ensure the proper markings exist (see Compliance Form Sections 7.a-j) or affix those that are missing on the propeller hub.

3.6 QA inspection. Following KO acceptance and approval of the final Compliance Forms and prior to conducting any preservation, packing and packaging, the Contractor must schedule Coast Guard SFLC

QA inspection. A copy of the final Compliance Forms must be provided to the Coast Guard QA Representative upon arrival for final inspection.

4. NOTES

4.1 Post-repair/overhaul activities. Refer to the General Requirements work item, Section 5, for the preservation, packaging, packing, and shipping requirements.

4.2 Reference sources. Refer to General Requirements work item, Section 6, for referenced document sources.

4.3 87 Compliance Forms. (See below)

87 Propeller Inspection Compliance Forms

Initial Inspection/Test: **Final Inspection/Test:**

Propeller serial no: **Date:**

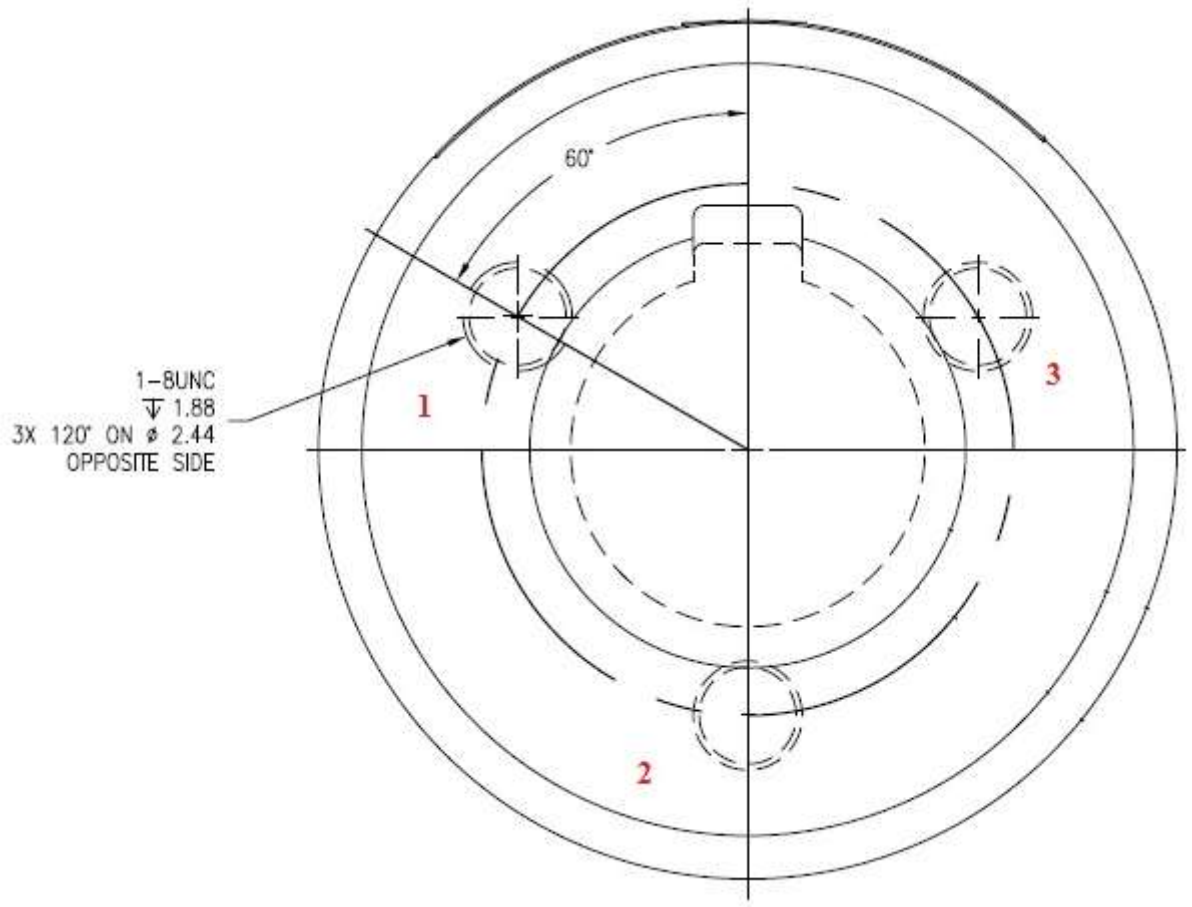
Contractor inspector name/title:

1. Material Composition (per ABS 7, Section 10, Type 4)

This section is not applicable to overhaul and repair.

2. Bolt Hole Inspections – NOTE: Using a go/no-go gauge, this inspection is a decision point. If either is UNSAT or requires weld repair, immediately notify the KO.

Threads fully engage? (check one below):



Hole 1 ☐GO ☐NO-GO

Hole 2 ☐GO ☐NO-GO

Hole 3 ☐GO ☐NO-GO

Lifting hole threads fully engaged: ☐GO ☐NO-GO

Contractor inspector (written/signature): /
USCG (written/signature): /

3. Hub Bore Inspection - NOTE: The bore dimensional inspection is a decision point. Report any failed measurement to the KO immediately upon finding.

Inspection	Requirement	Measured	Pass/Fail
Bore dimensional inspection (for comparison to Coast Guard Drawing 87 WPB 245-003)	Large end dia: 4.000" +2%, -1.5% Small end dia.: 3.250" +2%, -1.5% Hub length: 12.000" +2%, -1.5% Keyway width: 1.000", +1/8", -1/16" Keyway depth: 0.250", +/-2%	Large end dia: Small end dia.: Hub length: Keyway width: Keyway depth:	
Contractor inspector (written/signature): /			
USCG (written/signature): /			

4. Surface Finish

Locations	Required	Measured
Blade 1 from radius 0.2 outward	**63 micro inches Ra**	
Blade 2 from radius 0.2 outward		
Blade 3 from radius 0.2 outward		
Blade 4 from radius 0.2 outward		
Blade 5 from radius 0.2 outward		
Hub forward end	**125 micro inches Ra**	
Hub aft end		
Bore/Keyway	**63 micro inches Ra**	
Contractor inspector (written/signature): /		
USCG (written/signature): /		

5. Balancing

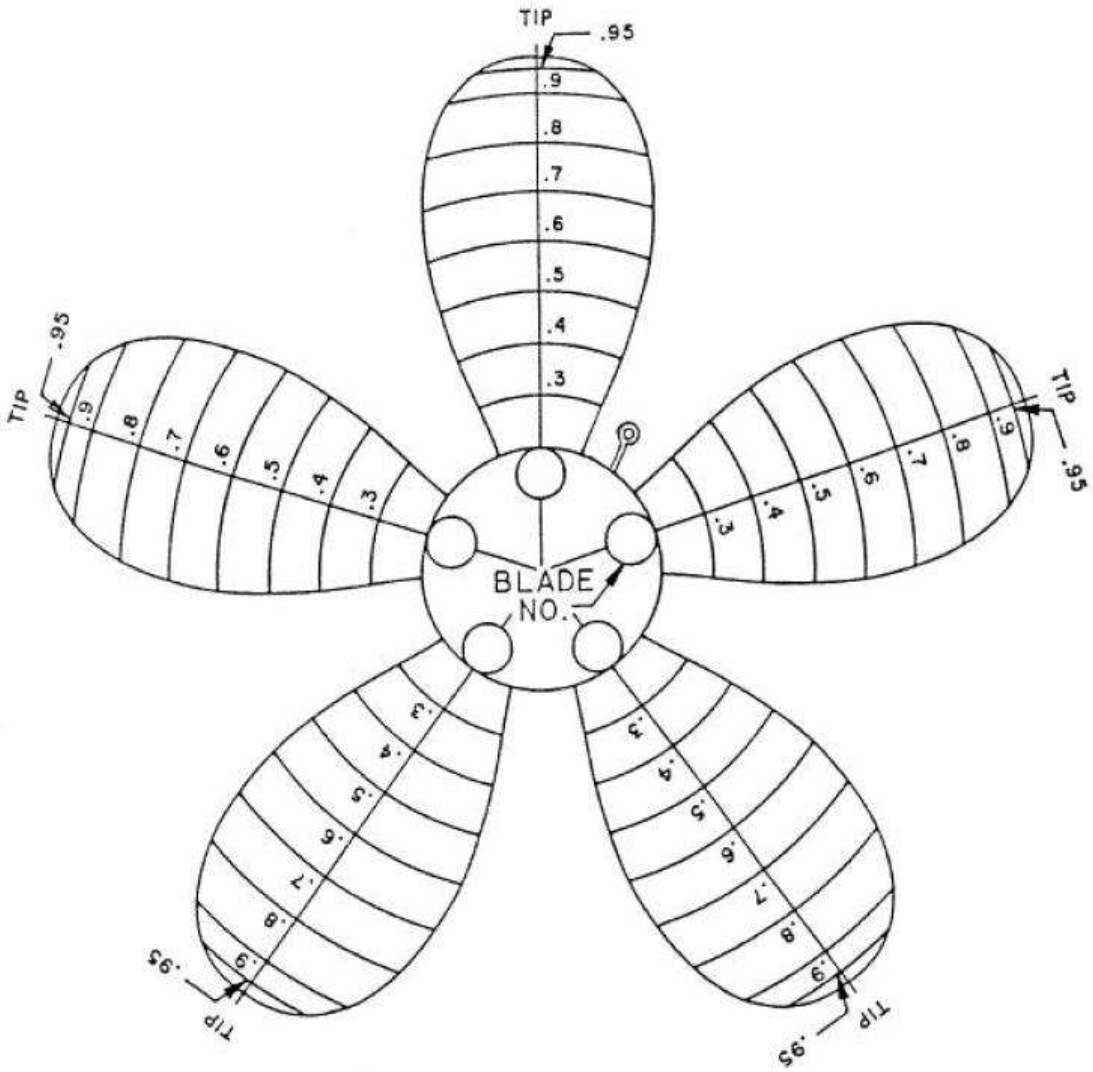
	Requirement	Measured
Mandrel/concentric ring TIR	**<0.001"**	
RPMs	**853**	
Propeller weight	**Estimated ~337 lbs**	
Residual unbalance* **	**Max: 5.9 oz-in**	
Contractor inspector (written/signature): /		
USCG (written/signature): /		

*****Residual unbalance determined via U = 6GW/N, where G = 2.5 mm/s, W = 337 lbs and N = 853 RPMs (Source: MIL-STD-167-1A, paragraph 5.2.2.2).**

6. Surface Inspection

Document ALL defects on the following sheets. For the dye penetrant inspection, highlight/annotate ALL defects that fall outside of the allowable parameters set by ABS Part 7, Section 10, Table 1. Provide two sheets, one per face and label pages 5a and 5b.

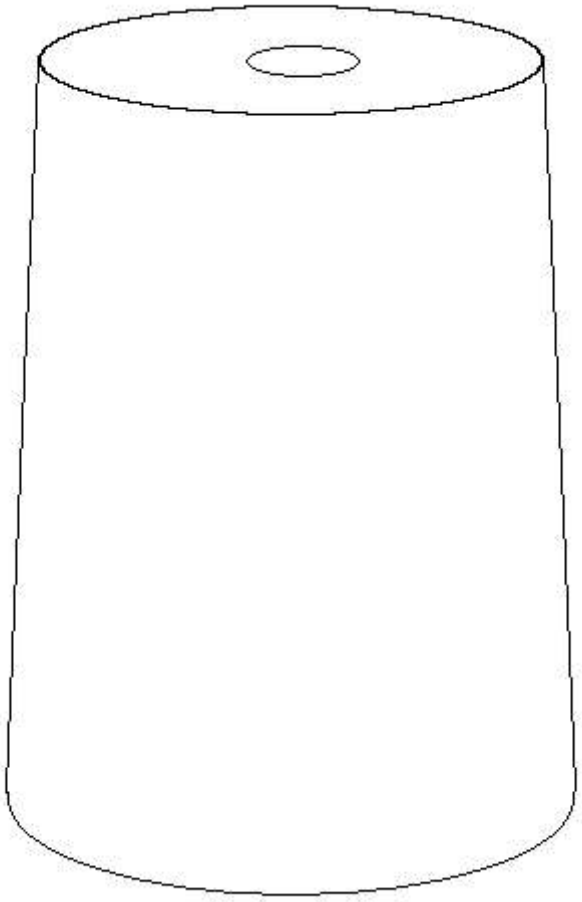
NOTE: Photographs may be inserted in place of these inspection forms provided the photos collectively encompass the entire propeller and adhere to the instructions for documenting/highlighting/annotating defects. The photographs must be labeled such that the blades, hub locations and defect locations are identifiable. See the following page for the hub diagram.



☐ **Pressure Face** ☐ **Suction Face**

Contractor inspector (written/signature): /

USCG (written/signature): /



Propeller Hub – Sketch and label the adjacent blades in the above diagram.

NOTE: Photographs may be inserted in place of these inspection forms provided the photos collectively encompass the entire hub and adhere to the instructions for documenting/highlighting/annotating defects. The photographs must be labeled such that the blades, hub locations and defect locations are identifiable.

Contractor inspector (written/signature): /
USCG (written/signature): /

7. Inspection Report Data

a. Propeller Blade Radii

Location	Required	Measured
Blade 1	**40.94" +/- .08"** (40.86" to 41.02")	
Blade 2		
Blade 3		
Blade 4		
Blade 5		

b. Local Pitches (measured over three equal segments with a 0.50" exclusion from each edge, i.e., chord length minus 1.0" total divided by 3) with +/- 2.0% pitch tolerance (min – max) applied to the requirement.

Blade 1 **TE** **LE**

Radius	Segment 1 requirement	Segment 1 measured	Segment 2 requirement	Segment 2 measured	Segment 3 requirement	Segment 3 measured
.4R	**48.40"** (47.73" – 49.36")		**49.59"** (48.60" – 50.59")		**52.51"** (51.46" – 53.56")	
.5R	**52.39"** (51.34" – 53.43")		**50.48"** (49.47" – 51.49")		**51.05"** (50.03" – 52.07")	
.6R	**53.16"** (52.10" – 54.23")		**50.44"** (49.44" – 51.45")		**49.90"** (48.90" – 50.90")	
.7R	**53.75"** (52.67" – 54.82")		**49.60"** (48.60" – 50.59")		**47.13"** (46.19" – 48.07")	
.8R	**53.37"** (52.30" – 54.44")		**47.59"** (46.64" – 48.54")		**44.87"** (43.97" – 45.76")	
.9R	**51.81"** (50.78" – 52.85")		**44.06"** (43.18" – 44.95")		**40.59"** (39.78" – 41.40")	
.95R	**49.84"** (48.84" – 50.84")		**41.30"** (40.47" – 42.12")		**38.97"** (38.19" – 39.75")	

Blade 2

Radius	Segment 1 requirement	Segment 1 measured	Segment 2 requirement	Segment 2 measured	Segment 3 requirement	Segment 3 measured
.4R	**48.40"** (47.73" – 49.36")		**49.59"** (48.60" – 50.59")		**52.51"** (51.46" – 53.56")	
.5R	**52.39"** (51.34" – 53.43")		**50.48"** (49.47" – 51.49")		**51.05"** (50.03" – 52.07")	
.6R	**53.16"** (52.10" – 54.23")		**50.44"** (49.44" – 51.45")		**49.90"** (48.90" – 50.90")	
.7R	**53.75"** (52.67" – 54.82")		**49.60"** (48.60" – 50.59")		**47.13"** (46.19" – 48.07")	
.8R	**53.37"** (52.30" – 54.44")		**47.59"** (46.64" – 48.54")		**44.87"** (43.97" – 45.76")	
.9R	**51.81"** (50.78" – 52.85")		**44.06"** (43.18" – 44.95")		**40.59"** (39.78" – 41.40")	
.95R	**49.84"** (48.84" – 50.84")		**41.30"** (40.47" – 42.12")		**38.97"** (38.19" – 39.75")	

Blade 3

Radius	Segment 1 requirement	Segment 1 measured	Segment 2 requirement	Segment 2 measured	Segment 3 requirement	Segment 3 measured
.4R	**48.40”** (47.73” – 49.36”)		**49.59”** (48.60” – 50.59”)		**52.51”** (51.46” – 53.56”)	
.5R	**52.39”** (51.34” – 53.43”)		**50.48”** (49.47” – 51.49”)		**51.05”** (50.03” – 52.07”)	
.6R	**53.16”** (52.10” – 54.23”)		**50.44”** (49.44” – 51.45”)		**49.90”** (48.90” – 50.90”)	
.7R	**53.75”** (52.67” – 54.82”)		**49.60”** (48.60” – 50.59”)		**47.13”** (46.19” – 48.07”)	
.8R	**53.37”** (52.30” – 54.44”)		**47.59”** (46.64” – 48.54”)		**44.87”** (43.97” – 45.76”)	
.9R	**51.81”** (50.78” – 52.85”)		**44.06”** (43.18” – 44.95”)		**40.59”** (39.78” – 41.40”)	
.95R	**49.84”** (48.84” – 50.84”)		**41.30”** (40.47” – 42.12”)		**38.97”** (38.19” – 39.75”)	

Blade 4

Radius	Segment 1 requirement	Segment 1 measured	Segment 2 requirement	Segment 2 measured	Segment 3 requirement	Segment 3 measured
.4R	**48.40”** (47.73” – 49.36”)		**49.59”** (48.60” – 50.59”)		**52.51”** (51.46” – 53.56”)	
.5R	**52.39”** (51.34” – 53.43”)		**50.48”** (49.47” – 51.49”)		**51.05”** (50.03” – 52.07”)	
.6R	**53.16”** (52.10” – 54.23”)		**50.44”** (49.44” – 51.45”)		**49.90”** (48.90” – 50.90”)	
.7R	**53.75”** (52.67” – 54.82”)		**49.60”** (48.60” – 50.59”)		**47.13”** (46.19” – 48.07”)	
.8R	**53.37”** (52.30” – 54.44”)		**47.59”** (46.64” – 48.54”)		**44.87”** (43.97” – 45.76”)	
.9R	**51.81”** (50.78” – 52.85”)		**44.06”** (43.18” – 44.95”)		**40.59”** (39.78” – 41.40”)	
.95R	**49.84”** (48.84” – 50.84”)		**41.30”** (40.47” – 42.12”)		**38.97”** (38.19” – 39.75”)	

Blade 5

Radius	Segment 1 requirement	Segment 1 measured	Segment 2 requirement	Segment 2 measured	Segment 3 requirement	Segment 3 measured
.4R	**48.40"** (47.73" – 49.36")		**49.59"** (48.60" – 50.59")		**52.51"** (51.46" – 53.56")	
.5R	**52.39"** (51.34" – 53.43")		**50.48"** (49.47" – 51.49")		**51.05"** (50.03" – 52.07")	
.6R	**53.16"** (52.10" – 54.23")		**50.44"** (49.44" – 51.45")		**49.90"** (48.90" – 50.90")	
.7R	**53.75"** (52.67" – 54.82")		**49.60"** (48.60" – 50.59")		**47.13"** (46.19" – 48.07")	
.8R	**53.37"** (52.30" – 54.44")		**47.59"** (46.64" – 48.54")		**44.87"** (43.97" – 45.76")	
.9R	**51.81"** (50.78" – 52.85")		**44.06"** (43.18" – 44.95")		**40.59"** (39.78" – 41.40")	
.95R	**49.84"** (48.84" – 50.84")		**41.30"** (40.47" – 42.12")		**38.97"** (38.19" – 39.75")	

c. Section Pitch

Radius	Requirement	Measured				
		Blade 1	Blade 2	Blade 3	Blade 4	Blade 5
.4R	**50.507"** (49.497" – 51.517")					
.5R	**50.999"** (49.979" – 52.019")					
.6R	**50.757"** (49.742" – 51.772")					
.7R	**50.180"** (49.176" – 51.184")					
.8R	**48.921"** (47.943" – 49.899")					
.9R	**46.031"** (45.110" – 46.952")					
.95R	**44.119"** (43.237" – 45.001")					

d. Mean Pitch per Blade

Requirement	Blade 1	Blade 2	Blade 3	Blade 4	Blade 5
48.79" +/- 0.49" (48.30" – 49.28")					

e. Mean Propeller Pitch

Requirement	Measured
48.78" +/- 0.49" (48.30" – 49.28")	

f. Blade Section Widths

Blade 1

Radius	Requirement, full width	Full width, measured
.5R	**17.350”** (17.003” – 17.697”)	
.6R	**17.836”** (17.479” – 18.193”)	
.7R	**17.776”** (17.420” – 18.132”)	
.8R	**16.258”** (15.933” – 16.583”)	
.9R	**12.576”** (12.325” – 12.828”)	
.95R	**9.304”** (9.118” – 9.490”)	

Blade 2

Radius	Requirement, full width	Full width, measured
.5R	**17.350”** (17.003” – 17.697”)	
.6R	**17.836”** (17.479” – 18.193”)	
.7R	**17.776”** (17.420” – 18.132”)	
.8R	**16.258”** (15.933” – 16.583”)	
.9R	**12.576”** (12.325” – 12.828”)	
.95R	**9.304”** (9.118” – 9.490”)	

Blade 3

Radius	Requirement, full width	Full width, measured
.5R	**17.350”** (17.003” – 17.697”)	
.6R	**17.836”** (17.479” – 18.193”)	
.7R	**17.776”** (17.420” – 18.132”)	
.8R	**16.258”** (15.933” – 16.583”)	
.9R	**12.576”** (12.325” – 12.828”)	
.95R	**9.304”** (9.118” – 9.490”)	

Blade 4

Radius	Requirement, full width	Full width, measured
.5R	**17.350”** (17.003” – 17.697”)	
.6R	**17.836”** (17.479” – 18.193”)	
.7R	**17.776”** (17.420” – 18.132”)	
.8R	**16.258”** (15.933” – 16.583”)	
.9R	**12.576”** (12.325” – 12.828”)	
.95R	**9.304”** (9.118” – 9.490”)	

Blade 5

Radius	Requirement, full width	Full width, measured
.5R	**17.350”** (17.003” – 17.697”)	
.6R	**17.836”** (17.479” – 18.193”)	
.7R	**17.776”** (17.420” – 18.132”)	
.8R	**16.258”** (15.933” – 16.583”)	
.9R	**12.576”** (12.325” – 12.828”)	
.95R	**9.304”** (9.118” – 9.490”)	

g. Maximum Thickness at Prescribed Stations (all units in inches with new manufacture tolerance of +/- 0.005")

Blade _____ {← insert blade number} – thicknesses (Indicate MAX thickness measurement, only)

.4R

	P	O	N	M	**L**	K	J	H	G	F	E	C
Design	.635	.760	.928	.984	**.995**	.979	.940	.879	.782	.701	.584	.406
Measured												

.5R

	P	O	N	M	**L**	**K**	J	H	G	F	E	C
Design	.479	.595	.748	.823	**.844**	**.844**	.819	.770	.681	.601	.491	.425
Measured												

.6R

	P	O	N	M	**L**	K	J	H	G	F	E	C
Design	.364	.463	.593	.677	**.697**	.695	.678	.643	.578	.510	.424	.283
Measured												

.7R

	P	O	N	M	**L**	K	J	H	G	F	E	C
Design	.280	.359	.481	.544	**.556**	.551	.538	.518	.463	.411	.347	.259
Measured												

.8R

	P	O	N	M	**L**	K	J	H	G	F	E	C
Design	.226	.289	.395	.456	**.462**	.455	.438	.414	.383	.360	.324	.245
Measured												

.9R

	P	O	N	M	**L**	K	J	H	G	F	E	C
Design	.177	.213	.271	.334	**.355**	.354	.344	.330	.310	.289	.253	.190
Measured												

.95R

	P	O	N	M	L	**K**	J	H	G	F	E	C
Design	.158	.186	.234	.279	.292	**.296**	.295	.284	.260	.241	.216	.159
Measured												

h. Track Deviation/Rake

Note: ISO 484/2, Section 13 provides locations for measurement

	Rake
Requirement (Max deviation, +/- 1% propeller diameter), +/- .409"	**Point B Measured**
Blade 1	
Blade 2	
Blade 3	
Blade 4	
Blade 5	
Max deviation between ANY two blades (max – min)	

i. Edge conditions, smooth, not sharp edges – Acceptance of data presented in Section 6 herein fulfills this requirement?

☐ Yes / ☐ No

j. Angular Spacing of Blade Center Axis

Requirement	Blade 1 & 2 Measured	Blade 2 & 3 Measured	Blade 3 & 4 Measured	Blade 4 & 5 Measured	Blade 5 & 1 Measured
72.0° +/- 0.5°					

k. Surface Finish of Blade, Hub and Bore Areas – Acceptance of data presented in Section 5 herein fulfills this requirement?

☐ Yes / ☐ No

l. Surface Inspection (Visual and 100 Percent Dye Penetrant) – Acceptance of data presented in Sections 4 and 5 herein fulfills this requirement?

☐ Yes / ☐ No

m. Hub Bore Inspections and Fit – Acceptance of data presented in Section 3 fulfills this requirement?

☐ Yes / ☐ No

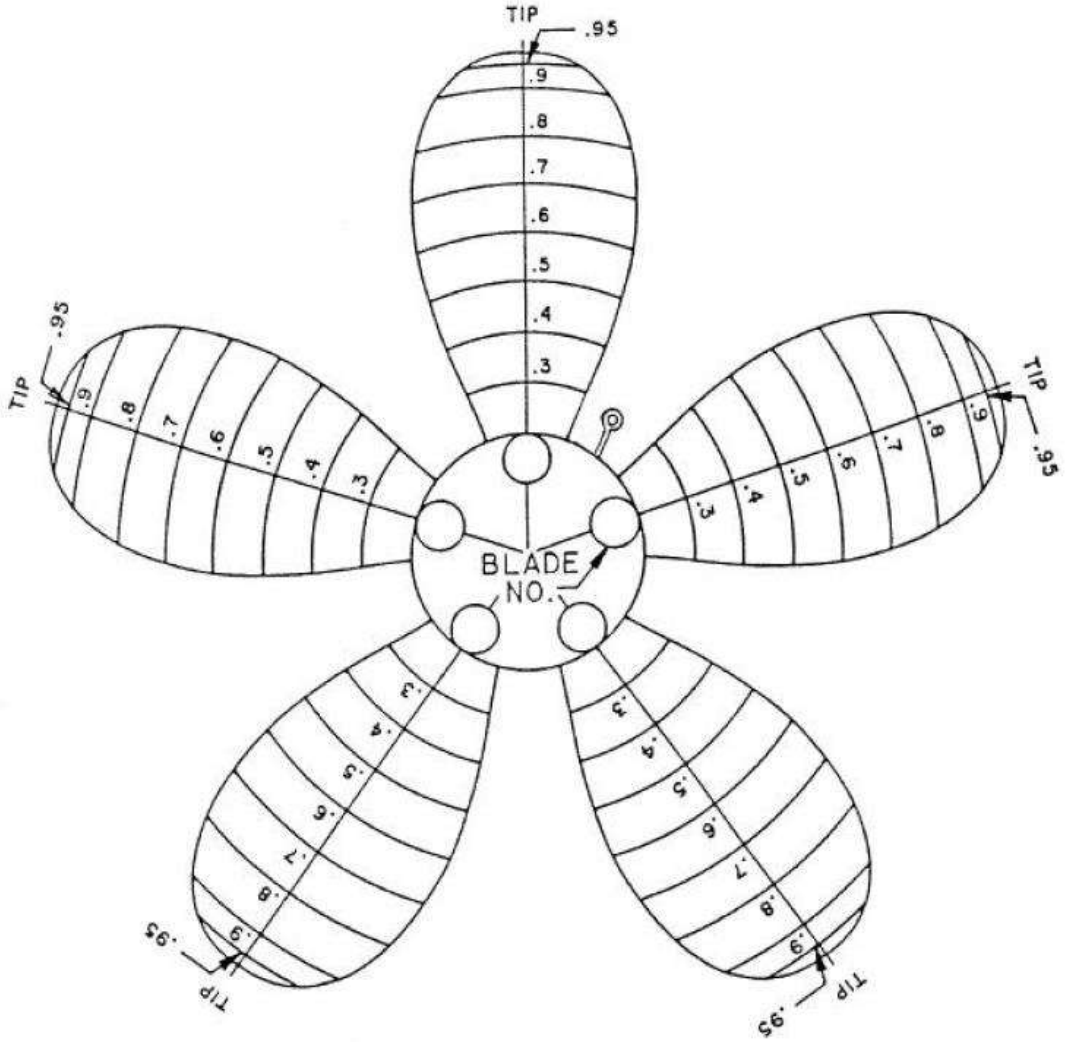
n. Material Composition – Acceptance of data presented in Section 1 herein fulfills this requirement?

☐ Yes / ☐ No

o. Balancing Data – Acceptance of data presented in Section 6 herein fulfills the requirement?

☐ Yes / ☐ No

p. Fairness – Indicate areas of unacceptable fairness. **Provide two sheets, one per face and label pages 18a and 18b.**



☐ **Pressure Face** ☐ **Suction Face**

9. Propeller Identification Markings (P-245-0612, Section 3.15)
The following are marked in ¼" to ½" high text on all newly manufactured propellers (check beside each box when verified):

☐ **a. Serial number (provided by Contracting Officer)**

☐ **b. Ship class – 87 WPB**

☐ **c. Starboard or Port**

☐ **d. Rotation direction (from aft looking forward)**

☐ **e. National Stock Number (NSN)**

☐ **f. Design diameter – 40.94 inches**

☐ **g. Design pitch at .7R – 50.18 inches**

☐ **h. Manufacturer name/date of manufacture**

☐ **i. Actual propeller weight**

☐ **j. Material grade – ABS Grade 4**

Contractor inspector (written/signature): /
USCG (written/signature): /

10. Photo Documentation Phases (P-245-0612, Section 3.16.1 and 3.16.2)
Provide photographs in accordance with Sections 3.17.1 and 3.17.2

Contractor inspector (written/signature): /
USCG (written/signature): /

WORK ITEM 9: 154 WPC Propeller, Inspect, Repair/Overhaul

1. SCOPE

1.1 Intent – This work item defines the requirements for repair and overhaul of US Coast Guard 154' FRC Patrol Boats.

1.2 Government furnished property (GFP). The listed items are property of and managed by the United States Coast Guard (USCG) Surface Forces Logistics Center (SFLC), Baltimore MD and will be issued to the contractor as issuance of a contract or contract delivery order.

ITEM DESCRIPTION	NSN P/N CAGE
Propeller, Right Hand	NSN: 2010-01-627-9761 P/N: 531914 CAGE: 76455
Propeller, Left Hand	NSN: 2010-01-628-0276 P/N: 531915 CAGE: 76455
Shipping Crate, Reusable	NSN: N/A PN: N/A CAGE: N/A

2. REFERENCES

COAST GUARD DRAWINGS/RENDERINGS

Coast Guard Drawing 154 WPC 245-303, Rev. - – 154FT Fast Response Cutter Propeller Plug Gauge and Shaft Ring Gauge Details for Propeller Shaft

Coast Guard Drawing 154 WPC 245-304, Rev. B – 154FT Fast Response Cutter Propeller Plans and Data Six Blade Propeller

Coast Guard Drawing 154 WPC 245-901, LH-Reference-Model (95 correction). IGS

NOTE
The right-hand propeller model artifact is attained by creating a mirrored version of the 154 WPC 245-901 LH-Reference-Model (95 correction) file

COAST GUARD PUBLICATIONS

Surface Forces Logistics Center 154 Fast Response Cutter (FRC) Propeller Inspection Compliance Forms Rev. 1

OTHER REFERENCES

ABS Rules for Survey After Construction 2021 - Guide for Bronze and Stainless-Steel Propeller Castings, Part 7 Appendix 1, Section 10

ASTM E1417/E1417M, Dated 9/1/2021 – Standard Practice for Liquid Penetrant Testing

ISO 484-2:2015(E) Second Edition, Dated 12/01/2015 – Shipbuilding-Ship Screw Propellers-Manufacturing Tolerances - Part 2: Propellers of Diameter Between 0.80 and 2.50 m Inclusive

CAUTION!

The Contractor must adhere to the "Limited Rights Notice" on Coast Guard Drawings 154 WPC-245-303 and 154 WPC-245-304.

3. REQUIREMENTS

3.1 General.

3.1.1 Inspection, repair and overhaul - general. All inspections, repairs and overhaul must be accomplished in accordance with the requirements set within this work item. Coast Guard Drawing 154 WPC 245-304, supplemented by Coast Guard Drawing 154 WPC 245-901, must be used for the baseline design criteria and ISO 484/2, Class 1 (unless otherwise noted) for the inspection processes.

NOTES

The 154 WPC 245-901 rendering represents the as-built artifact and takes precedence over the 154 WPC 245-304 drawing for any conflicting data.

The right-hand propeller artifact is simply a mirror of the left-hand rendering.

3.1.2 Workmanship. Upon completion of all work, all propellers must have a polished, professional finish and be free of dirt, grease, burrs, sharp edges, etc.

3.2 Inspections. The Contractor must accomplish the following inspections for each FRC propeller received:

3.2.1 Arrival inspection.

3.2.2 Visual Preservation Inspection (VPI).

3.2.3 Visual and Technical Inspections (VTI).

3.2.4 Geometrical/dimensional inspections. Prior to overhaul/repair, the Contractor must conduct the following inspections and measurements, recording all results in the 154 (FRC) Propeller Compliance Forms.

NOTES

ISO 484/2 is the guiding document for the inspections to be made. Class 1 measurements and tolerances apply unless explicitly stated otherwise.

The Compliance Forms tolerance bands are derived from Coast Guard Drawings 154 WPC 245-304 and 154 WPC-245-901 with the ISO 484/2, Class 1 tolerances applied (unless otherwise noted).

The pitch data derivations for the Compliance Forms incorporate a 0.5 inch exclusion each from the trailing edge AND the leading edge. While entire chord lengths are actually measured, the exclusions in the pitch derivations negate the effect of the edge contours on the pitch measurements.

3.2.4.1 Propeller hub inspection (Compliance Form Section 2). Conduct the propeller hub dimensional inspections required to record in section 2 of the compliance forms.

CAUTION!

The propeller hub bore inspection shall be accomplished before any other inspections or tests required in this work item. If the propeller fails this inspection, the contractor shall not perform any additional tests or inspections without approval of the KO.

3.2.4.1.1 If ring and plug gauges are not provided, yet CMM scanning and virtual fit-up/overlay capabilities permit an assessment, the Contractor may submit a proposal via Change Request (CR) to the KO for consideration.

3.2.4.1.2 If ring and plug gauges are provided as GFP, conduct the procedures and checks as detailed in Coast Guard Drawing 154 WPC 245-303. The following warning and notes apply:

WARNING

At no time is anyone to stand in front of the hydraulic assembly when removing the plug gauge. Serious personnel injury may occur.

NOTES

1. **Temperature differences between the ring and plug gauges will result in UNSAT contact. If the contact criteria is not initially met, allow each component to reach the same temperature and repeat.**
2. **It is recommended to apply a blue coating of .0002" to .0004" thick as measured with a wet film thickness gauge for best results.**
3. **Disregard the comment on General Note 4 in Step 7 of the blue check and draw procedure. There is no mention of draw in General Note 4. The draw reading shall only be measured and recorded.**

3.2.4.2 Surface finish (Compliance Form Section 3). Visually identify and record the roughest surface finish on each blade and the hub/bore. Mark all areas on the propeller with out-of-tolerance surface finishes.

NOTE
As part of Section 5 of the compliance forms, a sketch or photograph showing excessive surface finish may be provided in lieu of a filled-in Section 3 of the compliance forms.

3.2.4.3 Balancing (Compliance Form Section 4). Unless a visual inspection reveals an obvious out-of-balance condition, conduct and record results from a static balance test.

3.2.4.4 Surface inspection (Compliance Form Section 5). Conduct a visual inspection of the propeller and mark up the accompanying figure on Compliance Form Section 5.

NOTE
This requirement may be fulfilled via the VTI and is not intended to be a duplicate of that earlier effort.

3.2.4.4.1 Perform a dye penetrant inspection over 100 percent of the blade, fillet, and hub surfaces in accordance with ASTM E1417 while using ABS Part 7, Appendix, Section 10, Table 1 as acceptance criteria. The inspection shall be performed by a certified Level II NDT Technician.

3.2.4.4.2 Document all propeller defects resulting from the visual and dye penetrant inspections in Compliance Form Section 5. These defects shall be indicated by type, size, and acceptability on visual inspection sheets. Each propeller will require individual inspection sheets for the pressure face of the blades, suction face of the blades, the fillet, and the hub.

3.2.4.4.3 All visual defects, even though deemed acceptable, shall be documented on the inspection report.

3.2.4.4.4 A copy of the dye penetrant inspection report shall be included as part of the final inspection report.

3.2.4.4.5 Provide photo documentation to the KO during in-process welding repairs of the casting (if applicable) and any discontinuities of the propeller casting during dye penetrant inspection. Each photograph shall include the propeller serial number and date the photograph was taken. The color photographs shall be taken with a digital camera and the images provided electronically in "**jpg format**" to the KO during:

- the dye penetrant inspection showing any linear/non-linear discontinuities of the propeller casting.
- repair of the propeller whenever welding is required and approved.

3.2.4.5 Geometrical/dimensional data (Compliance Form Section 6). Measure and record the following:

a. Propeller blade radii

CAUTION – ALL PITCH MEASUREMENTS
Shorter, yet in-tolerance chord lengths may yield pitches outside of those presented in the Compliance Forms. Likewise, measuring equipment (other than CMM) may require "exclusions", i.e., small lengths from each end (up to a half inch permissible), to ascertain pitch measurements. With review and approval from the KO, adjustments to the reference pitches and tolerance bands may be considered. The Contractor must demonstrate how the numbers were adjusted to determine the proposed figures and be replicable by the Coast Guard to gain approval.

b. Local pitches (three equal segments)

c. Section pitch

d. Mean pitch per blade

e. Mean propeller pitch

f. Blade section widths

g. Maximum thickness at prescribed stations (see drawing table of offsets to make location determination)

h. Track deviation/rake

i. Edge conditions

j. Blade center axis angular spacing

k. Propeller Hub Inspection

l. Surface finish of blade, hub and bore areas

m. Balancing data

n. Surface inspection

o. Fairness

3.2.4.6 Pre-overhaul/repair report. Provide the inspection results from above via the applicable portions of the Compliance Forms, highlighting all out-of-tolerance measurements, and note the necessary repairs to be made, for KO review and approval. Indicate anticipated effects on propeller performance (if any) from the discrepancies.

3.3 Propeller overhaul/repair. If a Change Request has been authorized and released by the KO, the Contractor must make all recommended repairs (or as amended by the KO) for the affected propeller(s).

3.3.1 General notes for overhaul/repair.

3.3.1.1 Critical areas: The critical areas are described in section 1.5.5 (b), Figure 3 of the ABS Part 7.

3.3.1.2 Severity Zones: The following apply to the welding in Severity Zones as defined by ABS Part 7, Section 10, paragraph 1.5.5 (b), and subparagraphs for *High-Skew propellers*.

3.3.1.2.1 Zone A is the area on the pressure face contained within the blade root fillet and a line running from the junction of the leading edge with the root fillet to the trailing edge at the 0.9R and passing through the mid-point of the blade chord at 0.7R and a point situated at 0.3 of the chord length edge at 0.4R. It also includes an area along the trailing edge on the suction side of the blade from the root to 0.9R and with its inner boundary at 0.15 of the chord lengths from the trailing edge.

3.3.1.2.2. Zone B constitutes the whole of the remaining blade surfaces.

3.3.1.3 Welding required to repair cavitation erosion in the critical area, but not to include the blade fillets located between the 0.2 and the 0.25 radius, shall be undertaken as the contractor deems necessary.

3.3.1.4 Welding repairs of the propellers shall meet the requirements of ABS Part 7 Appendix 1, Section 10.

3.3.1.5 The contractor shall document all welding performed on the visual inspection sheets for each propeller. Each weld shall be dimensionally identified by location, length, width, and depth.

3.3.1.6 Material removed to affect balance shall be taken from the suction face on as large an area as practicable and shall not approach the leading or trailing edges within (10) ten percent of the blade width.

3.3.1.7 Care shall be taken to assure that removal of material shall not cause the tolerances for thickness, surface contour, edge contour, width or pitch to be exceeded.

3.3.1.8 There shall be no machining or grinding on the propeller after final balance check.

3.4 Post-repair/overhaul inspection and report.

3.4.1 Only for those initial inspection and test results affected by repair and/or overhaul must the Contractor redo those inspection(s) and test(s).

3.4.2 Record all final results on a second set of Compliance Forms and submit to the KO for review and approval. Provide a brief written narrative as part of the final submission detailing each propeller's finished condition.

3.5 Ensure the proper markings exist (see Compliance Form Sections 7.a-j) or affix those that are missing on the propeller hub.

3.6 QA inspection. Following KO acceptance and approval of the final Compliance Forms and prior to conducting any preservation, packing and packaging, the Contractor must schedule Coast Guard SFLC QA inspection. A copy of the final Compliance Forms must be provided to the Coast Guard QA Representative upon arrival for final inspection.

4. NOTES

4.1 Post-repair/overhaul activities. Refer to the General Requirements work item, Section 5, for the preservation, packaging, packing, marking and shipping requirements.

4.2 Reference sources. Refer to General Requirements work item, Section 6, for referenced document sources.

4.3 154' Compliance Forms. (See below)

154 (FRC) Propeller Inspection Compliance Forms

Initial Inspection: **Final Inspection:**

Propeller serial no: **Date:**

Contractor inspector name/title:

1. Material Composition (per ABS 7, Section 10, Type 4)

This section is not applicable to overhaul and repair.

2. Hub Bore Inspection - NOTE: The bore dimensional inspection is a decision point. Report any failed measurement to the KO immediately upon finding.

Inspection	Requirement	Measured	Pass/Fail
Bore dimensional inspection (for comparison to Coast Guard Drawing 154 WPC 245-304)	Large end dia: 202.968 mm +2%, -1.5% Hub length: 550.00 mm +2%, -1.5% Bore taper 1:20 Helical groove depth (minimum):	Large end dia: Hub length: Calculated taper: Measured groove depth (min.):	
Blue fit	Go/No-Go (85% minimum)		
Draw			
Contractor inspector (written/signature): /			
USCG (written/signature): /			

3. Surface Finish – NOTE: As part of Section 5 of the compliance forms, a sketch or photograph showing excessive surface finish may be provided in lieu of filling in the below table.

Locations	Required	Measured
Blade 1 from radius 0.2 outward	**<3 micrometers Ra (Class 1)**	
Blade 2 from radius 0.2 outward		
Blade 3 from radius 0.2 outward		
Blade 4 from radius 0.2 outward		
Blade 5 from radius 0.2 outward		
Blade 6 from radius 0.2 outward		
Hub/bore	**<3 micrometers Ra (Class 1)**	
Contractor inspector (written/signature): /		
USCG (written/signature): /		

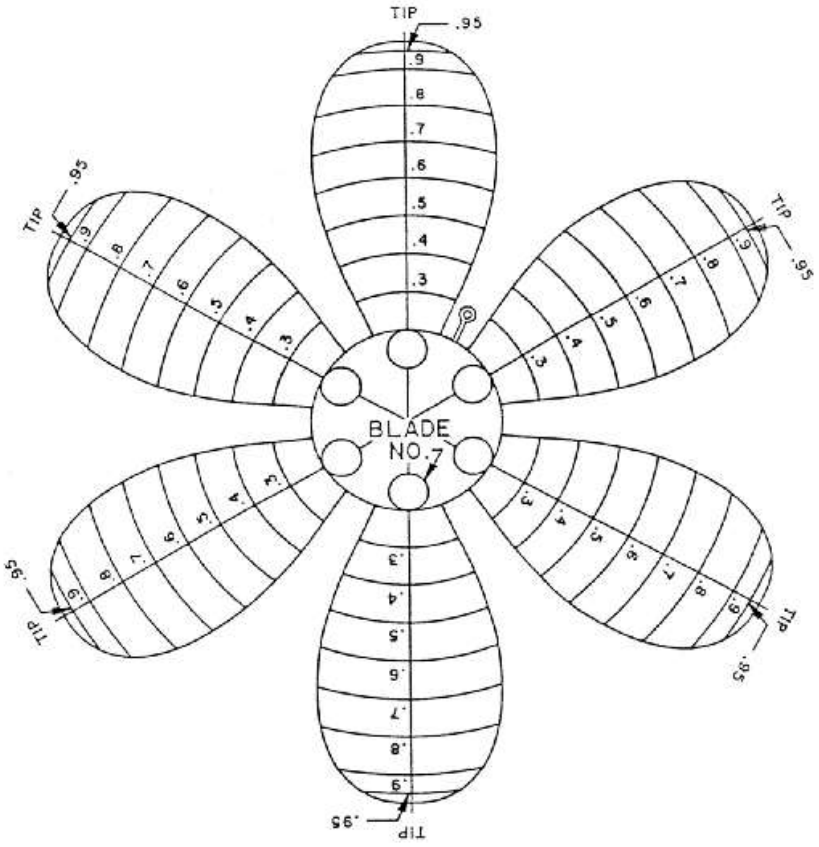
4. Balancing

Class 1 per ISO 484/1 (static balanced)	**SAT**	**UNSAT**
Contractor inspector (written/signature): /		
USCG (written/signature): /		

5. Surface Inspection

Document ALL defects on the following sheets. For the dye penetrant inspection, highlight/annotate ALL defects that fall outside of the allowable parameters set by ABS Part 7, Section 10, Table 1. Provide two sheets, one per face and label pages 5a and 5b.

NOTE: Photographs may be inserted in place of these inspection forms provided the photos collectively encompass the entire propeller and adhere to the instructions for documenting/highlighting/annotating defects. The photographs must be labeled such that the blades, hub locations and defect locations are identifiable. See the following page for the hub diagram.



☐ **Pressure Face** ☐ **Suction Face**

Contractor inspector (written/signature): /

USCG (written/signature): /

6. Inspection Report Data

a. Propeller Blade Radii

Location	Required	Measured
Blade 1	**933.5 mm +/- 0.3%** (930.7 mm to 936.3 mm)	
Blade 2		
Blade 3		
Blade 4		
Blade 5		
Blade 6		

b. Local Pitches (measured over three equal segments) with +/- 2.0% pitch tolerance (ISO 484/2, Class 1) applied to the requirement.

Blade 1

Radius		Segment 1 (mm) LE	Segment 1 measurement (mm)	Segment 2 (mm)	Segment 2 measurement (mm)	Segment 3 (mm) TE	Segment 3 measurement (mm)
.3R	Ref	3077		2476		1996	
	-2%	3016		2426		1956	
	+2%	3139		2525		2036	
.4R	Ref	2824		2554		2306	
	-2%	2767		2503		2259	
	+2%	2880		2606		2352	
.5R	Ref	2637		2528		2472	
	-2%	2584		2478		2423	
	+2%	2690		2579		2522	
.6R	Ref	2442		2502		2553	
	-2%	2393		2452		2502	
	+2%	2491		2552		2604	
.7R	Ref	2405		2436		2578	
	-2%	2357		2387		2526	
	+2%	2453		2484		2629	
.8R	Ref	2319		2318		2515	
	-2%	2273		2271		2465	
	+2%	2365		2364		2566	
.9R	Ref	2125		2058		2245	
	-2%	2082		2017		2200	
	+2%	2167		2099		2290	
.95R	Ref	1962		1836		1948	
	-2%	1923		1799		1909	
	+2%	2001		1872		1987	

Blade 2

Radius		Segment 1 (mm) LE	Segment 1 measurement (mm)	Segment 2 (mm)	Segment 2 measurement (mm)	Segment 3 (mm) TE	Segment 3 measurement (mm)
.3R	Ref	3077		2476		1996	
	-2%	3016		2426		1956	
	+2%	3139		2525		2036	
.4R	Ref	2824		2554		2306	
	-2%	2767		2503		2259	
	+2%	2880		2606		2352	
.5R	Ref	2637		2528		2472	
	-2%	2584		2478		2423	
	+2%	2690		2579		2522	
.6R	Ref	2442		2502		2553	
	-2%	2393		2452		2502	
	+2%	2491		2552		2604	
.7R	Ref	2405		2436		2578	
	-2%	2357		2387		2526	
	+2%	2453		2484		2629	
.8R	Ref	2319		2318		2515	
	-2%	2273		2271		2465	
	+2%	2365		2364		2566	
.9R	Ref	2125		2058		2245	
	-2%	2082		2017		2200	
	+2%	2167		2099		2290	
.95R	Ref	1962		1836		1948	
	-2%	1923		1799		1909	
	+2%	2001		1872		1987	

Blade 3

Radius		Segment 1 (mm) LE	Segment 1 measurement (mm)	Segment 2 (mm)	Segment 2 measurement (mm)	Segment 3 (mm) TE	Segment 3 measurement (mm)
.3R	Ref	3077		2476		1996	
	-2%	3016		2426		1956	
	+2%	3139		2525		2036	
.4R	Ref	2824		2554		2306	
	-2%	2767		2503		2259	
	+2%	2880		2606		2352	
.5R	Ref	2637		2528		2472	
	-2%	2584		2478		2423	
	+2%	2690		2579		2522	
.6R	Ref	2442		2502		2553	
	-2%	2393		2452		2502	
	+2%	2491		2552		2604	
.7R	Ref	2405		2436		2578	
	-2%	2357		2387		2526	
	+2%	2453		2484		2629	
.8R	Ref	2319		2318		2515	
	-2%	2273		2271		2465	
	+2%	2365		2364		2566	
.9R	Ref	2125		2058		2245	
	-2%	2082		2017		2200	
	+2%	2167		2099		2290	
.95R	Ref	1962		1836		1948	
	-2%	1923		1799		1909	
	+2%	2001		1872		1987	

Blade 4

Radius		Segment 1 (mm) LE	Segment 1 measurement (mm)	Segment 2 (mm)	Segment 2 measurement (mm)	Segment 3 (mm) TE	Segment 3 measurement (mm)
.3R	Ref	3077		2476		1996	
	-2%	3016		2426		1956	
	+2%	3139		2525		2036	
.4R	Ref	2824		2554		2306	
	-2%	2767		2503		2259	
	+2%	2880		2606		2352	
.5R	Ref	2637		2528		2472	
	-2%	2584		2478		2423	
	+2%	2690		2579		2522	
.6R	Ref	2442		2502		2553	
	-2%	2393		2452		2502	
	+2%	2491		2552		2604	
.7R	Ref	2405		2436		2578	
	-2%	2357		2387		2526	
	+2%	2453		2484		2629	
.8R	Ref	2319		2318		2515	
	-2%	2273		2271		2465	
	+2%	2365		2364		2566	
.9R	Ref	2125		2058		2245	
	-2%	2082		2017		2200	
	+2%	2167		2099		2290	
.95R	Ref	1962		1836		1948	
	-2%	1923		1799		1909	
	+2%	2001		1872		1987	

Blade 5

Radius		Segment 1 (mm) LE	Segment 1 measurement (mm)	Segment 2 (mm)	Segment 2 measurement (mm)	Segment 3 (mm) TE	Segment 3 measurement (mm)
.3R	Ref	3077		2476		1996	
	-2%	3016		2426		1956	
	+2%	3139		2525		2036	
.4R	Ref	2824		2554		2306	
	-2%	2767		2503		2259	
	+2%	2880		2606		2352	
.5R	Ref	2637		2528		2472	
	-2%	2584		2478		2423	
	+2%	2690		2579		2522	
.6R	Ref	2442		2502		2553	
	-2%	2393		2452		2502	
	+2%	2491		2552		2604	
.7R	Ref	2405		2436		2578	
	-2%	2357		2387		2526	
	+2%	2453		2484		2629	
.8R	Ref	2319		2318		2515	
	-2%	2273		2271		2465	
	+2%	2365		2364		2566	
.9R	Ref	2125		2058		2245	
	-2%	2082		2017		2200	
	+2%	2167		2099		2290	
.95R	Ref	1962		1836		1948	
	-2%	1923		1799		1909	
	+2%	2001		1872		1987	

Blade 6

Radius		Segment 1 (mm) LE	Segment 1 measurement (mm)	Segment 2 (mm)	Segment 2 measurement (mm)	Segment 3 (mm) TE	Segment 3 measurement (mm)
.3R	Ref	3077		2476		1996	
	-2%	3016		2426		1956	
	+2%	3139		2525		2036	
.4R	Ref	2824		2554		2306	
	-2%	2767		2503		2259	
	+2%	2880		2606		2352	
.5R	Ref	2637		2528		2472	
	-2%	2584		2478		2423	
	+2%	2690		2579		2522	
.6R	Ref	2442		2502		2553	
	-2%	2393		2452		2502	
	+2%	2491		2552		2604	
.7R	Ref	2405		2436		2578	
	-2%	2357		2387		2526	
	+2%	2453		2484		2629	
.8R	Ref	2319		2318		2515	
	-2%	2273		2271		2465	
	+2%	2365		2364		2566	
.9R	Ref	2125		2058		2245	
	-2%	2082		2017		2200	
	+2%	2167		2099		2290	
.95R	Ref	1962		1836		1948	
	-2%	1923		1799		1909	
	+2%	2001		1872		1987	

c. Section Pitch

Radius	Requirement (mm)	Measured (mm)					
		Blade 1	Blade 2	Blade 3	Blade 4	Blade 5	Blade 6
.3R	2451 (2414 – 2488)						
.4R	2548 (2509 – 2586)						
.5R	2544 (2505 – 2582)						
.6R	2517 (2479 – 2555)						
.7R	2471 (2434 – 2508)						
.8R	2383 (2347 – 2418)						
.9R	2141 (2109 – 2173)						
.95R	1914 (1885 – 1943)						

d. Mean Pitch per Blade

Requirement	mm	Blade 1	Blade 2	Blade 3	Blade 4	Blade 5	Blade 6
Ref	2371						
-1%	2347						
+1%	2395						

e. Mean Propeller Pitch

Requirement (mm) (+/- 0.75%)	Measured
2371 (2353 – 2389)	

f. Blade Section Widths

Blade 1

Radius	Requirement, full width, mm	Full width, measured
.7R	756.1 (741.0 - 771.2)	
.8R	692.3 (678.4 - 706.1)	
.9R	533.3 (522.6 – 544.0)	
.95R	373.6 (366.1 – 381.1)	

Blade 2

Radius	Requirement, full width, mm	Full width, measured
.7R	756.1 (741.0 - 771.2)	
.8R	692.3 (678.4 - 706.1)	
.9R	533.3 (522.6 – 544.0)	
.95R	373.6 (366.1 – 381.1)	

Blade 3

Radius	Requirement, full width, mm	Full width, measured
.7R	756.1 (741.0 - 771.2)	
.8R	692.3 (678.4 - 706.1)	
.9R	533.3 (522.6 – 544.0)	
.95R	373.6 (366.1 – 381.1)	

Blade 4

Radius	Requirement, full width, mm	Full width, measured
.7R	756.1 (741.0 - 771.2)	
.8R	692.3 (678.4 - 706.1)	
.9R	533.3 (522.6 – 544.0)	
.95R	373.6 (366.1 – 381.1)	

Blade 5

Radius	Requirement, full width, mm	Full width, measured
.7R	756.1 (741.0 - 771.2)	
.8R	692.3 (678.4 - 706.1)	
.9R	533.3 (522.6 – 544.0)	
.95R	373.6 (366.1 – 381.1)	

Blade 6

Radius	Requirement, full width, mm	Full width, measured
.7R	756.1 (741.0 - 771.2)	
.8R	692.3 (678.4 - 706.1)	
.9R	533.3 (522.6 – 544.0)	
.95R	373.6 (366.1 – 381.1)	

g. Maximum Thickness at Prescribed Stations (all units in mm with new manufacture tolerance of +3% (1 mm, min)/-1.5% (1 mm, min)

Blade 1 – thicknesses (Indicate MAX thickness measurement, only)

Radius (Xc mm, max point at design)	Design (mm)	Measured (mm)
3R (353.90)	59.92	
4R (379.70)	47.93	
5R (402.23)	38.36	
6R (379.86)	31.40	
7R (415.85)	31.77	
8R (380.77)	27.94	
9R (293.37)	17.94	
95R (205.51)	11.11	

Blade 2 – thicknesses

Radius (Xc mm, max point at design)	Design (mm)	Measured (mm)
3R (353.90)	59.92	
4R (379.70)	47.93	
5R (402.23)	38.36	
6R (379.86)	31.40	
7R (415.85)	31.77	
8R (380.77)	27.94	
9R (293.37)	17.94	
95R (205.51)	11.11	

Blade 3 – thicknesses

Radius (Xc mm, max point at design)	Design (mm)	Measured (mm)
3R (353.90)	59.92	
4R (379.70)	47.93	
5R (402.23)	38.36	
6R (379.86)	31.40	
7R (415.85)	31.77	
8R (380.77)	27.94	
9R (293.37)	17.94	
95R (205.51)	11.11	

Blade 4 – thicknesses

Radius (Xc mm, max point at design)	Design (mm)	Measured (mm)
3R (353.90)	59.92	
4R (379.70)	47.93	
5R (402.23)	38.36	
6R (379.86)	31.40	
7R (415.85)	31.77	
8R (380.77)	27.94	
9R (293.37)	17.94	
95R (205.51)	11.11	

Blade 5 – thicknesses

Radius (Xc mm, max point at design)	Design (mm)	Measured (mm)
3R (353.90)	59.92	
4R (379.70)	47.93	
5R (402.23)	38.36	
6R (379.86)	31.40	
7R (415.85)	31.77	
8R (380.77)	27.94	
9R (293.37)	17.94	
95R (205.51)	11.11	

Blade 6 – thicknesses

Radius (Xc mm, max point at design)	Design (mm)	Measured (mm)
3R (353.90)	59.92	
4R (379.70)	47.93	
5R (402.23)	38.36	
6R (379.86)	31.40	
7R (415.85)	31.77	
8R (380.77)	27.94	
9R (293.37)	17.94	
95R (205.51)	11.11	

h. Track Deviation/Rake

Note: ISO 484/2, Section 13 provides locations for measurement

Requirement (Max deviation, +/- 1% propeller diameter)	Rake		
	Point A Measured	Point B Measured	Point C Measured
Blade 1			
Blade 2			
Blade 3			
Blade 4			
Blade 5			
Blade 6			
Max deviation between ANY two blades (max – min)			

i. Edge conditions, smooth, not sharp edges – Acceptance of data presented in Section 6 herein fulfills this requirement?

☐ Yes / ☐ No

j. Blade Center Axis Angular Spacing

Requirement	Blade 1 & 2 Measured	Blade 2 & 3 Measured	Blade 3 & 4 Measured	Blade 4 & 5 Measured	Blade 5 & 6 Measured	Blade 6 & Measur
60.0° +/- 0.5°						

k. Propeller Hub Inspection - Acceptance of data presented in Section 2 herein fulfills this requirement?

☐ Yes / ☐ No

l. Surface Finish of Blade, Hub and Bore Areas – Acceptance of data presented in Section 5 herein fulfills this requirement?

☐ Yes / ☐ No

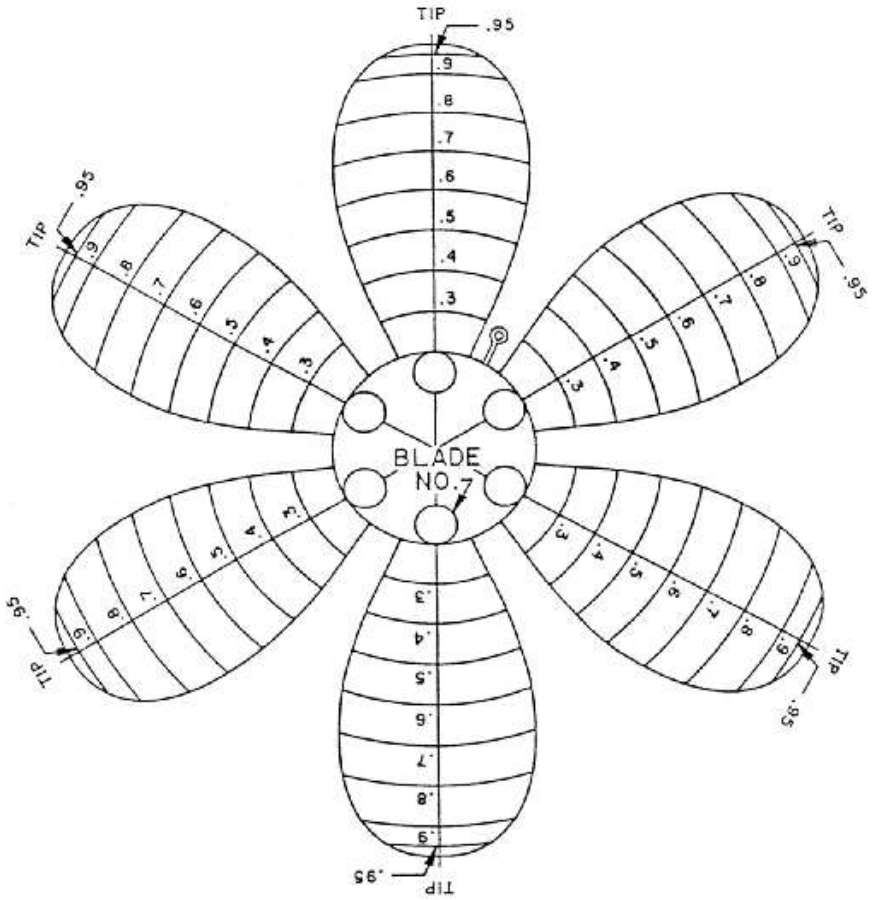
m. Balancing Data – Acceptance of data presented in Section 6 herein fulfills the requirement?

☐ Yes / ☐ No

n. Surface Inspection (Visual and 100 Percent Dye Penetrant) – Acceptance of data presented in Sections 4 and 5 herein fulfills this requirement?

☐ Yes / ☐ No

o. Fairness – Indicate areas of unacceptable fairness. **Provide two sheets, one per face and label pages 18a and 18b.**



☐ **Pressure Face** ☐ **Suction Face**

7. Propeller Identification Markings

The following are marked in ¼" to ½" high text on all newly manufactured propellers (check beside each box when verified):

☐ **a. Serial number (provided by Contracting Officer)**

☐ **b. Ship class – 154 WPC**

☐ **c. Starboard or Port**

☐ **d. Rotation direction (from aft looking forward)**

☐ **e. National Stock Number (NSN)**

☐ **f. Design diameter – 1867 mm**

☐ **g. Design pitch at .7R – 2449 mm**

☐ **h. Manufacturer name/date of manufacture**

☐ **i. Actual propeller weight**

☐ **j. Material grade – ABS Grade 4**

Contractor inspector (written/signature): /
USCG (written/signature): /

24599_210_1225_Rev -

WORK ITEM 10: Blade(s), Controllable Pitch Propeller (CPP), 210 "A" Class, Inspect and Repair

1. SCOPE

1.1 Intent – This work item defines the requirements to inspect and repair for 210 "A" Class CPP blade(s) to a serviceable, A-condition.

1.2 Government furnished property (GFP). The listed items are property of and managed by the United States Coast Guard (USCG) Surface Forces Logistics Center (SFLC), Baltimore MD and will be issued to the contractor as issuance of a contract or contract delivery order.

ITEM DESCRIPTION	NATIONAL STOCK NUMBER (NSN) PART NUMBER (P/N)
Blade Set, Propeller, Type 1 - Left Hand (LH), starboard side	NSN: 2010-00-906-6010 P/N: 615-WPC-4400-51 CCW
Blade Set, Propeller, Type 2 - Right Hand (RH), port side	NSN: 2010-00-906-6009 P/N: 615-WPC-4400-54 CW
Hub, Dummy, Propeller LH & RH	ACN: 2010-01-F88-0014 P/N: DH
Shipping Crate, Reusable	NSN: N/A PN: N/A CAGE: N/A

2. REFERENCES

COAST GUARD DRAWINGS

Coast Guard Drawing 618 WMEC 245-050, Rev C, 210 Ft WMEC Propeller Blade Left Hand Rotation 63/4

Coast Guard Drawing 618 WMEC 245-051, Rev C, 210 Ft WMEC Propeller Blade Right Hand Rotation 63/4

COAST GUARD PUBLICATIONS

Surface Forces Logistics Center Standard Specification 0740 (SFLC Std Spec 0740), 2022, Welding and Allied Processes

OTHER REFERENCES

American Bureau of Shipbuilding (ABS) Rules for Survey After Construction 2021 - Guide for Bronze and Stainless-Steel Propeller Castings, Part 7 Appendix 1, Section 10

ASTM E1417/E1417M, Dated 9/1/2021 – Standard Practice for Liquid Penetrant Testing

DOD-STD-2185 (SH) – Requirements for Repair and Straightening of Bronze Naval Ship Propellers

NAVSEA Technical Manual, NAVSEA S9245-AR-TSM-010/PROP - Technical Manual Marine Propeller Inspection, Repair and Certification

SAE-J-448A - Surface Texture Standard

3. REQUIREMENTS

3.1 General.

3.1.1 Inspection, repair and overhaul - general. All inspections, repairs and overhaul must be accomplished in accordance with the requirements set within this work item.

3.1.2 Workmanship. Upon completion of all work, all propellers must have a polished, professional finish and be free of dirt, grease, burrs, sharp edges, etc.

3.2 Inspections. Referring to the General Requirements work item for guidance, for each blade set received, the Contractor must accomplish the following inspections and submit an Open and Inspect Report (OIR) on all of the following:

3.2.1 Arrival inspection.

3.2.2 Visual Preservation Inspection (VPI).

3.2.3 Visual and Technical Inspections (VTI). The Contractor must conduct all inspections required under paragraph 3.2.4 and follow-on paragraphs.

3.2.4 Geometrical/dimensional inspections. Prior to overhaul/repair, while using Coast Guard Drawings 618 WMEC 245-050 and 618 WMEC 245-051 and NAVSEA S9245-AR-TSM-010/PROP as guidance, the Contractor must conduct the following inspections and measurements, recording all results and deviations outside of prescribed tolerances.

NOTES
NAVSEA S9245-AR-TSM-010/PROP, Table 6-1, Class I is the guiding document for the inspections and repairs to be made. Class 1 measurements and tolerances apply unless explicitly stated otherwise.

3.2.4.1 Blade radius length. Measure each blade radius length.

3.2.4.2 Section pitch. Measure the pitch of each blade at the following radii: 0.5, 0.6, 0.7, 0.8, 0.9, 0.95, 0.975.

3.2.4.3 Blade pitch average. Calculate the average blade pitch using the radii prescribed in the above paragraph.

3.2.4.4 Blade section widths. Measure each blade section width at the radii prescribed in 3.2.4.2.

3.2.4.5 Maximum blade thicknesses. Measure the maximum blade thicknesses at the radii prescribed in 3.2.4.2.

3.2.4.6 Blade track. Measure each blade track at the 0.95 radius for each blade.

3.2.4.7 Fairness. Conduct a fairing survey for each blade, noting all locations and deviations from the prescribed fairness and fairness rate of change tolerances.

3.2.4.8 Surface finish. Using SAE-J-448A as guidance, conduct a surface finish survey for all blade surfaces, fillets and palms.

3.2.4.8.1 Blade surfaces must have a finish of 63 micro inches or better.

3.2.4.8.2 Blade fillets and palms, unless otherwise noted on the applicable drawings, must be 125 micro inches or better.

3.2.4.9 Surface inspections.

3.2.4.9.1 Surface inspection – visual. Conduct a visual inspection of each component while using MIL-STD-2035, Section 4 as guidance; markup and report all discrepant physical condition findings on the forms (blades and palms) provided in Section 4.

3.2.4.9.2 Surface inspection – Nondestructive test (NDT). Using SFLC Std Spec 0740 as guidance, conduct a dye penetrant inspection on all component surfaces.

3.2.4.9.3 Surface inspection reports. Markup and report all discrepant visual and NDT findings on the forms (blades and palms) provided in Section 4 for each surface inspected.

NOTE
The Section 4 forms are provided for convenience and the Contractor may opt to use clearer forms in their submission.

3.2.4.10 Material composition determination. Three types of ABS material (ABS Rules for Survey After Construction, Part 7) have been used for the 210 CPP blades: ABS Type 2 (MnBr), Type 3 (NiMnBr) and Type 4 (NiBrAl); the Contractor must determine the composition for each blade.

3.2.4.11 Palm bolt and dowel pin holes. Measure all bolt and dowel pin holes for each blade palm.

3.2.4.12 Dowel hole centers survey. Measure the center-to-center dimensions between all dowel pin holes for each blade.

3.2.4.13 Bolt hole contact face measurements. For each blade, measure the parallel dimensions.

3.2.4.14 Palm dimension survey. For each blade, measure all palm dimensions shown on the applicable drawings.

3.2.4.15 Sealing surfaces survey. Determine and record the surface finishes and conditions for each blade sealing surface.

3.3 Overhaul/repair. If a Change Request has been authorized and released by the KO, the Contractor must make all recommended repairs (or as amended by the KO) for the affected blade(s) in accordance with the following:

3.3.1 Tolerances. The repair tolerances must be in accordance with NAVSEA S9245-AR-TSM-010/PROP, Table 6-1, **Class I** in conjunction with Coast Guard Drawings 618 WMEC 245-050 and 618 WMEC 245-051 as applicable.

3.3.2 Welding specifics.

3.3.2.1 Prior to any material repairs (i.e., hot work), the Contractor must determine the exact alloy of the work piece(s).

3.3.2.2 Critical blade areas are described as the pressure face of a blade between the fillet and the .4 radius, starting at the leading edge encompassing 80% of the chord length taken at the 0.4 radius (see Figure 1 of DOD-STD-2185).

WARNING!

Welding on the pressure face in the critical area must not be taken without prior KO approval.

3.3.2.3 Where repairs require incorporating a cast/forged patched piece, a zinc equivalent test must be performed to establish weld capability in accordance with DOD-STD-2185, paragraph 5.1.5.

CAUTION!

If the zinc content exceeds 45%, stop all work and notify the KO.

NOTE

Patches may be required for major repairs.

Major repairs may be, but not limited to, missing blade portions and/or cracks greater than 2" long and over 1/8" deep.

3.3.2.4 For hot work repairs done to those blades comprised of ABS Type 2 or Type 3 alloys, after all hot work is complete, the Contractor must stress relieve each affected blade in accordance with DOD-STD-2185.

3.3.2.5 All welding performed must be documented on the visual inspection sheets for each blade; each weld must be dimensionally identified by location, length, width, and depth.

3.3.2.6 Provide photo documentation to the KO during in-process welding repairs and any discontinuities during dye penetrant inspection.

3.3.2.6.1 Each photograph shall include the component serial number and date the photograph was taken.

3.3.2.6.2 Color photographs must be taken with a digital camera and the images provided electronically in "**jpg format"** to the KO during:

3.3.3 Surface finish. Blade and palm surfaces must be ground fair and polished to the following finishes in accordance with SAE-J-448A:

- Blade surfaces - 63 micro inches or better;
- Blade fillets and palms – 125 micro inches or better.

3.3.4 Balancing. While using the Government-furnished dummy hub, each blade set must be single plane balanced as follows:

NOTE

All balancing must be accomplished by means of balancing equipment that requires work piece rotation.

3.3.4.1 Prior to performing any balance tests, the Contractor must demonstrate the balance machine sensitivity using a weight determined by the following formula:

$Ws = 0.1(U)/r$

- Where, Ws = sensitivity weight
- U = residual unbalance tolerance;
- r = radial location of the weight.

3.3.4.2 In the presence of the Coast Guard Inspector and prior to using with attached blades, the Contractor must inspect the dummy hub for squareness, confirm the dowel pin locations, and be balanced using the determined parameters detailed in 3.3.5.

3.3.4.3 Following hub balancing, blades must be balanced as a set of 4 and be marked (i.e., 1, 2, 3, 4) from a defined datum, and ascending in number, counter to rotation direction.

NOTE

This numbering method ensures reassembly in the same positions in which they were balanced.

Weight addition/removal shall be easily detected and discernable to the balance machine operator.

Material removed to balance shall be taken from the suction face of the heavy blade(s).

For blades, the area from which metal is taken must not come from within 10 percent of the chord length adjacent to the leading or trailing edges.

3.3.4.3 After the initial balance, the blades must be removed and rotated 90 degrees on the dummy hub.

3.3.4.4 Re-check balance after blade rotation to ensure that any corrections made are not attributable to changes in the dummy hub.

3.3.4.5 Document the final, actual unbalance amount for each blade set in the Final Inspection Report.

3.3.5 Residual imbalance. The residual imbalance in each component plane of correction must not exceed the value calculated via the following formula:

$U = 4000W/N^2$

- Where, U = maximum allowable residual unbalance in oz.-in;
- W = weight of rotating part in pounds;
- N = maximum operating speed of unit.

3.3.5 Bolt hole thickness. The minimum thickness of each blade bolt hole shall not be less than 95.0 percent of the minimum thickness indicated on the referenced drawing.

ALTERNATE: Measure the palm thicknesses around the perimeter of each bolt shank hole; mark the locations and record those measuring less than 95% of the minimum, adjacent palm thickness indicated in the applicable drawing.

3.3.6 Sealing surface finish. Sealing surfaces must have surface finishes of 32 micro inches or better (unless otherwise stated on the applicable drawing). Seal wear or rough surfaces must be machined to restore to 32 micro inches.

3.4 Final Inspection Report. The Contractor shall accomplish the following:

NOTE
Final inspections, tests and/or measurements that were not affected by repairs, and previously recorded in the OIR, are not required to be redone. However, the Final Inspection Report must include all the unaffected pre-repair data as post repair data.

3.4.1 In areas affected by repairs, again conduct the applicable inspections under 3.2.4 and follow-on paragraphs for the final inspections and tests.

3.4.2 Provide the final inspection and test results to the KO in the Final Inspection Report, including the final balancing data.

3.5 Stamping. Following all repairs, the Contractor must accomplish the following:

3.5.1 Each blade must be stamped with the following information (minimum), updated where necessary if the stamping already exists:

a. Repair facility/company name

b. Repair completion date

c. Blade number

d. Stress relief date (if applicable)

e. Blade set serial number

f. Rotation direction (left hand, LH or right hand, RH)

g. Material type

h. Weight

3.5.2 Stamping must be be at least 1/4" high, legible printing, or the same height of the existing stamping if only corrected stamping is required.

3.6 QA inspection.

3.6.1 Following KO acceptance and approval of the Final Inspection Report and prior to conducting any preservation, packing and packaging, the Contractor must schedule the Coast Guard SFLC QA inspection.

3.6.2 A copy of the Final Inspection Report must be provided to the Coast Guard QA Representative upon arrival for final inspection.

3.6.3 The KO must be given 10-calendar day advance notice ahead of desired inspection date.

3.7 Photography requirements. The Contractor shall provide photographs (.jpg format or similar) for the following evolutions:

3.7.1 during initial blade receipt; photos must show the suction and pressure faces, fillets and palms, plus four photographs of the shipping crate sides and top taken at 90° intervals.

3.7.2 prior to damaged area repairs affecting remarkable cost and/or time; close-up views showing the affected areas before and after those repairs must be provided.

3.7.3 pre-repair, failed NDT areas.

3.7.4 in-process repairs in areas requiring significant cropping, welding and/or machining of sealing surfaces.

3.7.5 following final inspection and prior to preservation/packaging, photograph suction and pressure sides of blade(s), palm(s), sealing face(s) surface texture/finish, including stamped markings.

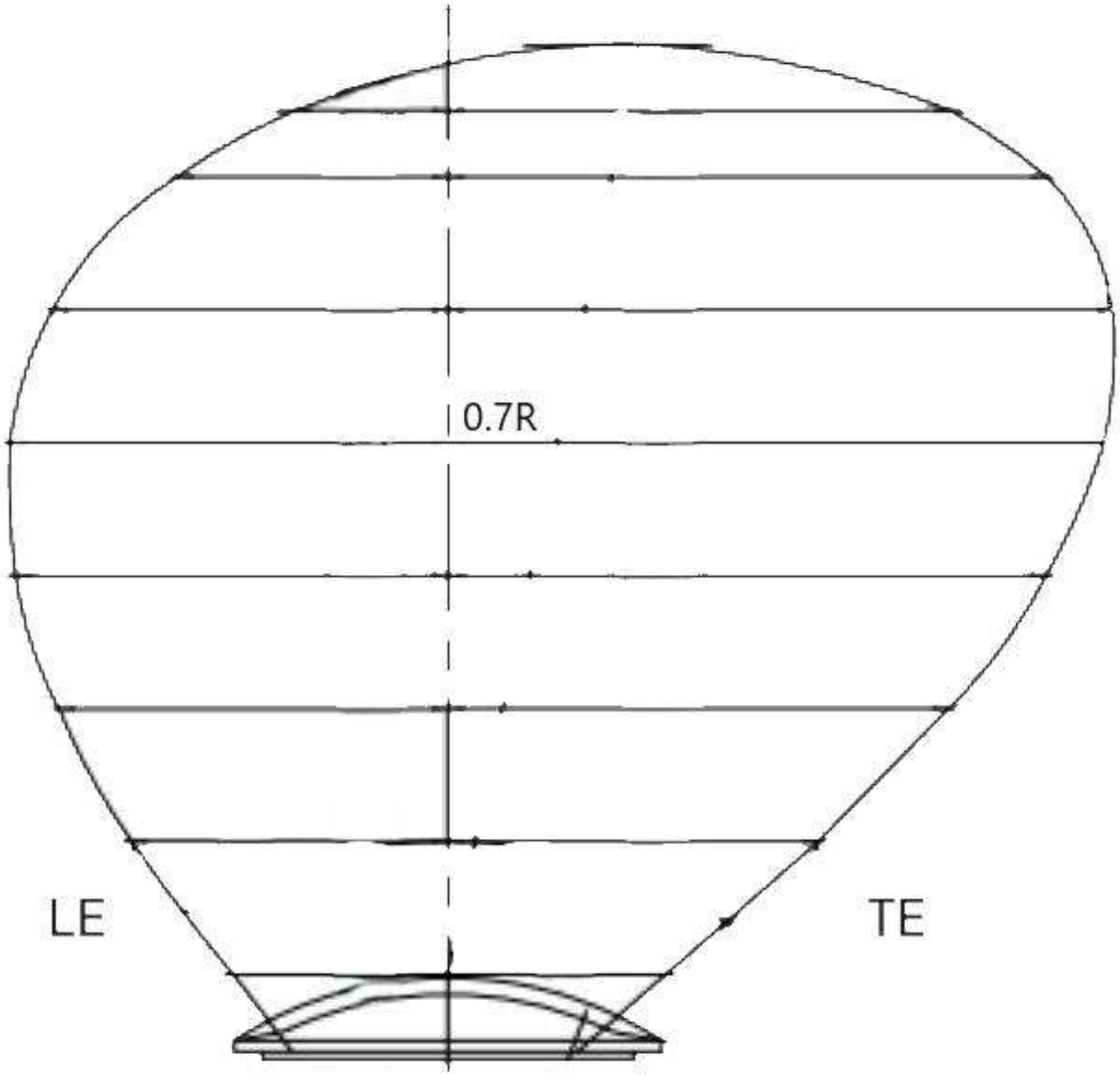
3.7.6 prior to packing, photograph each component showing strippable compound application and installed blade edge protection.

3.7.7 prior to shipping, photograph all container markings.

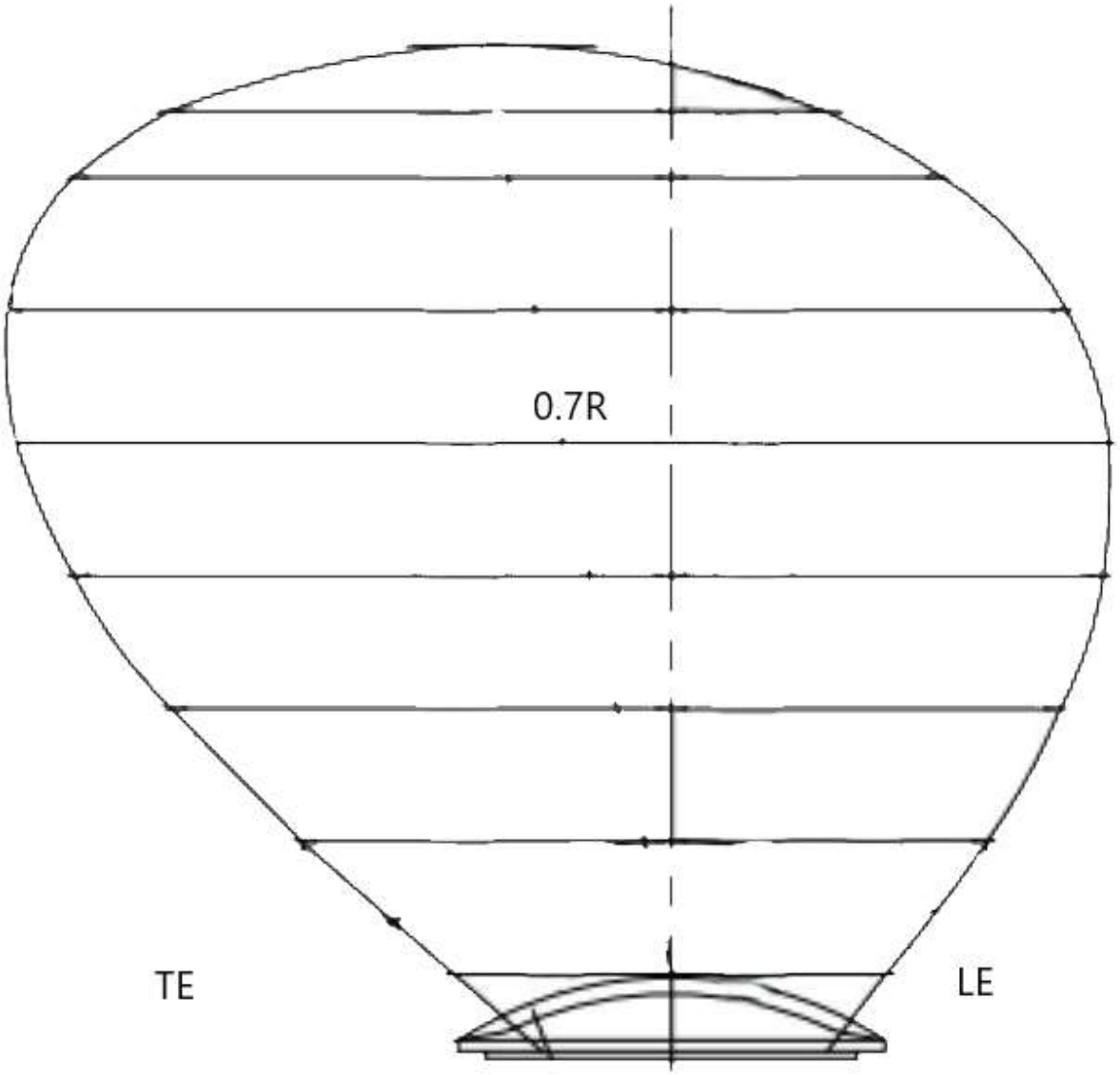
4. NOTES

4.1 Post-repair/overhaul activities. Refer to the General Requirements work item, Section 5, for the preservation, packaging, packing, and shipping requirements.

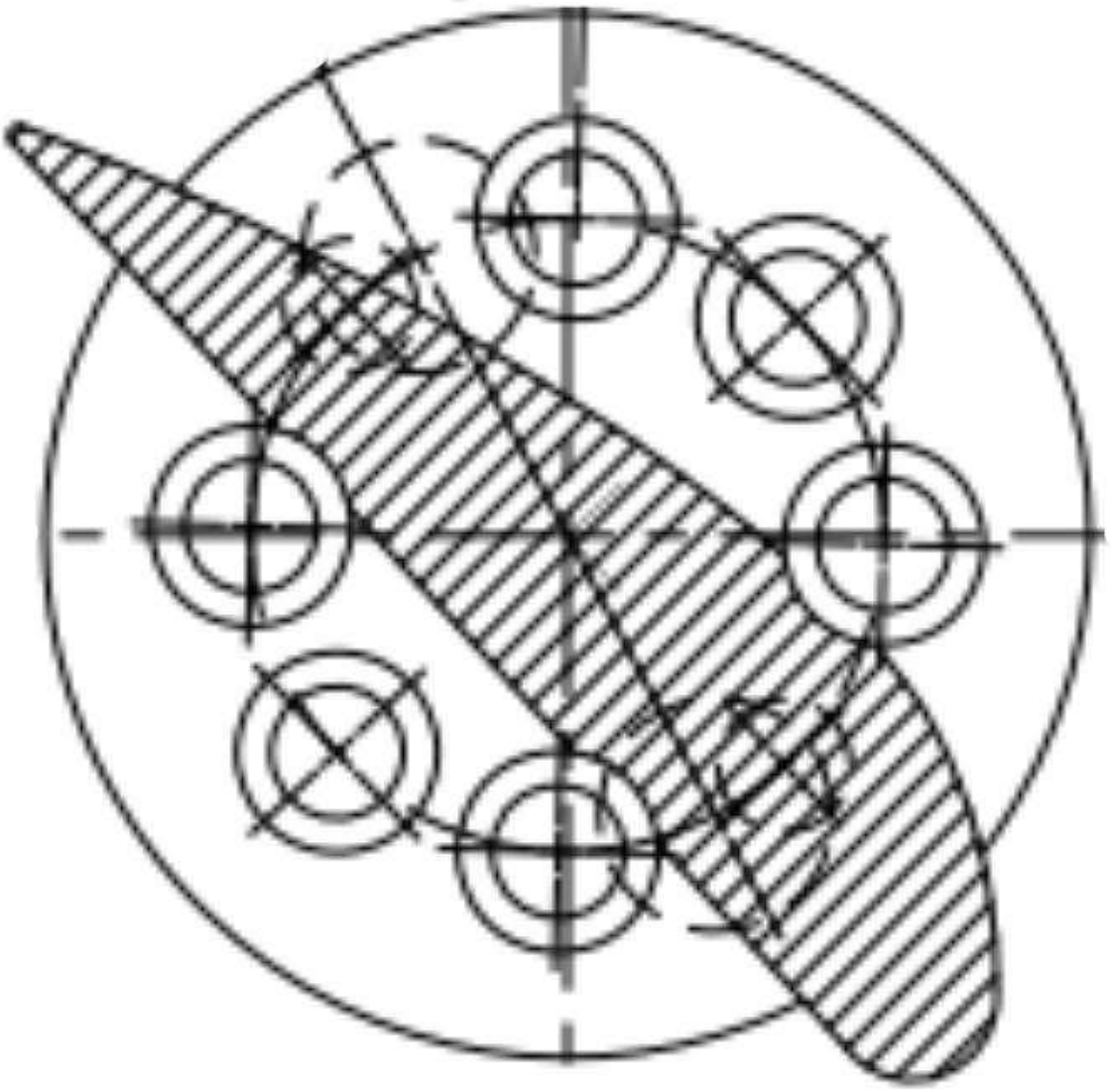
4.2 Reference sources. Refer to General Requirements work item, Section 6, for referenced document sources.



Pressure side _____ Suction side _____



Pressure side _____ Suction side _____



Blade Palm

Top side _____ Bottom side _____

5. Supplementary Requirements and Information

NOTE
This information is specific to the serviced components and supplements the General Requirements work item. Where information between the General Requirements work item and herein conflict, the information here takes precedence.

5.1 Blade and dummy hub-specific preservation and packaging markings.

5.1.1 General Requirements (Work Item 1) Paragraph 5.6.1, "Quantity & unit of issue:" must be "1 – SET" in lieu of "1 – EA".

5.1.2 Beneath all markings per Work Item 1, Paragraph 5.6.1, add separate lines which read as follows:

- "REUSABLE CONTAINER – DO NOT DESTROY".
- For blade set containers, add "BLADE SET, BOX {#} of 4."
- For each blade set container, add the serial numbers for the corresponding, accompanying containers, i.e., "THE OTHER THREE BLADE SERIAL NUMBERS THAT MAKE UP THIS SET INCLUDE {insert three serial numbers}".

5.1.3 Markings examples:

a. Type 1 – BLADE SET, LEFT HAND
STOCK NUMBER 2010-00-906-6010
ITEM NAME BLADE SET LH, PROPELLER
PART NUMBER 615-WPC-4400-51CCW
BLADE SERIAL NUMBER *As marked on blade*
BLADE SET SERIAL NUMBERS *List serial numbers of the three Other blades that make up this set*
BLADE NUMBER *As received or as balanced*
BOX __OF 4
SHIPPING WEIGHT *As determined by Contractor*
CONTRACT NUMBER *As indicated on the contract*
DELIVERY ORDER NUMBER *As indicated on the delivery order*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - SET
COAST GUARD SFLC MATERIAL
REUSABLE CONTAINER - DO NOT DESTROY

b. Type 2 – BLADE SET, RIGHT HAND
STOCK NUMBER 2010-00-906-6009
ITEM NAME BLADE SET RH, PROPELLER
PART NUMBER 615-WPC-4400-54CW
BLADE SERIAL NUMBER *As marked on blade*
BLADE SET SERIAL NUMBERS *List serial numbers of the three Other blades that make up this set*
BLADE NUMBER *As received or as balanced*
BOX __OF 4
SHIPPING WEIGHT *As determined by Contractor*
CONTRACT NUMBER *As indicated on the contract*
DELIVERY ORDER NUMBER *As indicated on the delivery order*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - SET
COAST GUARD SFLC MATERIAL
REUSABLE CONTAINER - DO NOT DESTROY

c. Dummy Hub - DUMMY HUB RH & LH
STOCK NUMBER 2010-01-F88-0014
ITEM NAME HUB, DUMMY RH & LH
PART NUMBER DH 210A
SHIPPING WEIGHT *As determined by Contractor*
CONTRACT NUMBER *As indicated on the contract*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL
REUSABLE CONTAINER - DO NOT DESTROY

24599_210B_1225_Rev -

WORK ITEM 11: Blade(s), Controllable Pitch Propeller (CPP), 210 "B" Class, Inspect and Repair

1. SCOPE

1.1 Intent – This work item defines the requirements to inspect and repair for 210 "B" Class CPP blade(s) to a serviceable, A-condition.

1.2 Government furnished property (GFP). The listed items are property of and managed by the United States Coast Guard (USCG) Surface Forces Logistics Center (SFLC), Baltimore MD and will be issued to the contractor as issuance of a contract or contract delivery order.

ITEM DESCRIPTION	NATIONAL STOCK NUMBER (NSN) PART NUMBER (P/N)
Blade Set, Propeller, Type 1 - Left Hand (LH), starboard side	NSN: 2010-01-134-0378 P/N: 620-WPC-4400-51-LH
Blade Set, Propeller, Type 2 - Right Hand (RH), port side	NSN: 2010-01-134-7218 P/N: 620-WPC-4400-51-RH
Hub, Dummy, Propeller LH & RH	ACN: 2010-01-F90-0154 P/N: DH 627 WMEC-4400-1
Shipping Crate, Reusable	NSN: N/A PN: N/A CAGE: N/A

2. REFERENCES

COAST GUARD DRAWINGS

Coast Guard Drawing 627 WMEC 245-020, Rev A, 210 Ft "B" Class WMEC Propeller Blade Propeller Blade for 66X/4 HUB

COAST GUARD PUBLICATIONS

Surface Forces Logistics Center Standard Specification 0740 (SFLC Std Spec 0740), 2022, Welding and Allied Processes

OTHER REFERENCES

American Bureau of Shipbuilding (ABS) Rules for Survey After Construction 2021 - Guide for Bronze and Stainless-Steel Propeller Castings, Part 7 Appendix 1, Section 10

ASTM E1417/E1417M, Dated 9/1/2021 – Standard Practice for Liquid Penetrant Testing

DOD-STD-2185 (SH) – Requirements for Repair and Straightening of Bronze Naval Ship Propellers

NAVSEA Technical Manual, NAVSEA S9245-AR-TSM-010/PROP - Technical Manual Marine Propeller Inspection, Repair and Certification

SAE-J-448A - Surface Texture Standard

3. REQUIREMENTS

3.1 General.

3.1.1 Inspection, repair and overhaul - general. All inspections, repairs and overhaul must be accomplished in accordance with the requirements set within this work item.

3.1.2 Workmanship. Upon completion of all work, all propellers must have a polished, professional finish and be free of dirt, grease, burrs, sharp edges, etc.

3.2 Inspections. Referring to the General Requirements work item for guidance, for each blade set received, the Contractor must accomplish the following inspections and submit an Open and Inspect Report (OIR) on all of the following:

3.2.1 Arrival inspection.

3.2.2 Visual Preservation Inspection (VPI).

3.2.3 Visual and Technical Inspections (VTI). The Contractor must conduct all inspections required under paragraph 3.2.4 and follow-on paragraphs.

3.2.4 Geometrical/dimensional inspections. Prior to overhaul/repair, while using Coast Guard Drawing 627 WMEC 245-020 and NAVSEA S9245-AR-TSM-010/PROP as guidance, the Contractor must conduct the following inspections and measurements, recording all results and deviations outside of prescribed tolerances.

NOTES
NAVSEA S9245-AR-TSM-010/PROP, Table 6-1, Class I is the guiding document for the inspections and repairs to be made. Class 1 measurements and tolerances apply unless explicitly stated otherwise.

3.2.4.1 Blade radius length. Measure each blade radius length.

3.2.4.2 Section pitch. Measure the pitch of each blade at the following radii: 0.5, 0.6, 0.7, 0.8, 0.9, 0.95, 0.975.

3.2.4.3 Blade pitch average. Calculate the average blade pitch using the radii prescribed in the above paragraph.

3.2.4.4 Blade section widths. Measure each blade section width at the radii prescribed in 3.2.4.2.

3.2.4.5 Maximum blade thicknesses. Measure the maximum blade thicknesses at the radii prescribed in 3.2.4.2.

3.2.4.6 Blade track. Measure each blade track at the 0.95 radius for each blade.

3.2.4.7 Fairness. Conduct a fairing survey for each blade, noting all locations and deviations from the prescribed fairness and fairness rate of change tolerances.

3.2.4.8 Surface finish. Using SAE-J-448A as guidance, conduct a surface finish survey for all blade surfaces, fillets and palms.

3.2.4.8.1 Blade surfaces must have a finish of 63 micro inches or better.

3.2.4.8.2 Blade fillets and palms, unless otherwise noted on the applicable drawings, must be 125 micro inches or better.

3.2.4.9 Surface inspections.

3.2.4.9.1 Surface inspection – visual. Conduct a visual inspection of each component while using MIL-STD-2035, Section 4 as guidance; markup and report all discrepant physical condition findings on the forms (blades and palms) provided in Section 4.

3.2.4.9.2 Surface inspection – Nondestructive test (NDT). Using SFLC Std Spec 0740 as guidance, conduct a dye penetrant inspection on all component surfaces.

3.2.4.9.3 Surface inspection reports. Markup and report all discrepant visual and NDT findings on the forms (blades and palms) provided in Section 4 for each surface inspected.

NOTE
The Section 4 forms are provided for convenience and the Contractor may opt to use clearer forms in their submission.

3.2.4.10 Material composition determination. Three types of ABS material (ABS Rules for Survey After Construction, Part 7) have been used for the 210 CPP blades: ABS Type 2 (MnBr), Type 3 (NiMnBr) and Type 4 (NiBrAl); the Contractor must determine the composition for each blade.

3.2.4.11 Palm bolt and dowel pin holes. Measure all bolt and dowel pin holes for each blade palm.

3.2.4.12 Dowel hole centers survey. Measure the center-to-center dimensions between all dowel pin holes for each blade.

3.2.4.13 Bolt hole contact face measurements. For each blade, measure the parallel dimensions.

3.2.4.14 Palm dimension survey. For each blade, measure all palm dimensions shown on the applicable drawings.

3.2.4.15 Sealing surfaces survey. Determine and record the surface finishes and conditions for each blade sealing surface.

3.3 Overhaul/repair. If a Change Request has been authorized and released by the KO, the Contractor must make all recommended repairs (or as amended by the KO) for the affected blade(s) in accordance with the following:

3.3.1 Tolerances. The repair tolerances must be in accordance with NAVSEA S9245-AR-TSM-010/PROP, Table 6-1, **Class I** in conjunction with Coast Guard Drawing 627 WMEC 245-020 as applicable.

3.3.2 Welding specifics.

3.3.2.1 Prior to any material repairs (i.e., hot work), the Contractor must determine the exact alloy of the work piece(s).

3.3.2.2 Critical blade areas are described as the pressure face of a blade between the fillet and the .4 radius, starting at the leading edge encompassing 80% of the chord length taken at the 0.4 radius (see Figure 1 of DOD-STD-2185).

WARNING!

Welding on the pressure face in the critical area must not be taken without prior KO approval.

3.3.2.3 Where repairs require incorporating a cast/forged patched piece, a zinc equivalent test must be performed to establish weld capability in accordance with DOD-STD-2185, paragraph 5.1.5.

CAUTION!

If the zinc content exceeds 45%, stop all work and notify the KO.

NOTE

Patches may be required for major repairs.

Major repairs may be, but not limited to, missing blade portions and/or cracks greater than 2" long and over 1/8" deep.

3.3.2.4 For hot work repairs done to those blades comprised of ABS Type 2 or Type 3 alloys, after all hot work is complete, the Contractor must stress relieve each affected blade in accordance with DOD-STD-2185.

3.3.2.5 All welding performed must be documented on the visual inspection sheets for each blade; each weld must be dimensionally identified by location, length, width, and depth.

3.3.2.6 Provide photo documentation to the KO during in-process welding repairs and any discontinuities during dye penetrant inspection.

3.3.2.6.1 Each photograph shall include the component serial number and date the photograph was taken.

3.3.2.6.2 Color photographs must be taken with a digital camera and the images provided electronically in "**jpg format"** to the KO during:

3.3.3 Surface finish. Blade and palm surfaces must be ground fair and polished to the following finishes in accordance with SAE-J-448A:

- Blade surfaces - 63 micro inches or better;
- Blade fillets and palms – 125 micro inches or better.

3.3.4 Balancing. While using the Government-furnished dummy hub, each blade set must be single plane balanced as follows:

NOTE

All balancing must be accomplished by means of balancing equipment that requires work piece rotation.

3.3.4.1 Prior to performing any balance tests, the Contractor must demonstrate the balance machine sensitivity using a weight determined by the following formula:

$Ws = 0.1(U)/r$

- Where, Ws = sensitivity weight
- U = residual unbalance tolerance;
- r = radial location of the weight.

3.3.4.2 In the presence of the Coast Guard Inspector and prior to using with attached blades, the Contractor must inspect the dummy hub for squareness, confirm the dowel pin locations, and be balanced using the determined parameters detailed in 3.3.5.

3.3.4.3 Following hub balancing, blades must be balanced as a set of 4 and be marked (i.e., 1, 2, 3, 4) from a defined datum, and ascending in number, counter to rotation direction.

NOTE

This numbering method ensures reassembly in the same positions in which they were balanced.

Weight addition/removal shall be easily detected and discernable to the balance machine operator.

Material removed to balance shall be taken from the suction face of the heavy blade(s).

For blades, the area from which metal is taken must not come from within 10 percent of the chord length adjacent to the leading or trailing edges.

3.3.4.3 After the initial balance, the blades must be removed and rotated 90 degrees on the dummy hub.

3.3.4.4 Re-check balance after blade rotation to ensure that any corrections made are not attributable to changes in the dummy hub.

3.3.4.5 Document the final, actual unbalance amount for each blade set in the Final Inspection Report.

3.3.5 Residual imbalance. The residual imbalance in each component plane of correction must not exceed the value calculated via the following formula:

$U = 4000W/N^2$

- Where, U = maximum allowable residual unbalance in oz.-in;
- W = weight of rotating part in pounds;
- N = maximum operating speed of unit.

3.3.5 Bolt hole thickness. The minimum thickness of each blade bolt hole shall not be less than 95.0 percent of the minimum thickness indicated on the referenced drawing.

ALTERNATE: Measure the palm thicknesses around the perimeter of each bolt shank hole; mark the locations and record those measuring less than 95% of the minimum, adjacent palm thickness indicated in the applicable drawing.

3.3.6 Sealing surface finish. Sealing surfaces must have surface finishes of 32 micro inches or better (unless otherwise stated on the applicable drawing). Seal wear or rough surfaces must be machined to restore to 32 micro inches.

3.4 Final Inspection Report. The Contractor shall accomplish the following:

NOTE
Final inspections, tests and/or measurements that were not affected by repairs, and previously recorded in the OIR, are not required to be redone. However, the Final Inspection Report must include all the unaffected pre-repair data as post repair data.

3.4.1 In areas affected by repairs, again conduct the applicable inspections under 3.2.4 and follow-on paragraphs for the final inspections and tests.

3.4.2 Provide the final inspection and test results to the KO in the Final Inspection Report, including the final balancing data.

3.5 Stamping. Following all repairs, the Contractor must accomplish the following:

3.5.1 Each blade must be stamped with the following information (minimum), updated where necessary if the stamping already exists:

a. Repair facility/company name

b. Repair completion date

c. Blade number

d. Stress relief date (if applicable)

e. Blade set serial number

f. Rotation direction (left hand, LH or right hand, RH)

g. Material type

h. Weight

3.5.2 Stamping must be be at least 1/4" high, legible printing, or the same height of the existing stamping if only corrected stamping is required.

3.6 QA inspection.

3.6.1 Following KO acceptance and approval of the Final Inspection Report and prior to conducting any preservation, packing and packaging, the Contractor must schedule the Coast Guard SFLC QA inspection.

3.6.2 A copy of the Final Inspection Report must be provided to the Coast Guard QA Representative upon arrival for final inspection.

3.6.3 The KO must be given 10-calendar day advance notice ahead of desired inspection date.

3.7 Photography requirements. The Contractor shall provide photographs (.jpg format or similar) for the following evolutions:

3.7.1 During initial blade receipt; photos must show the suction and pressure faces, fillets and palms, plus four photographs of the shipping crate sides and top taken at 90° intervals.

3.7.2 Prior to damaged area repairs affecting remarkable cost and/or time; close-up views showing the affected areas before and after those repairs must be provided.

3.7.3 Pre-repair failed NDT areas.

3.7.4 In-process repairs in areas requiring significant cropping, welding and/or machining of sealing surfaces.

3.7.5 Following final inspection and prior to preservation/packaging, photograph suction and pressure sides of blade(s), palm(s), sealing face(s) surface texture/finish, including stamped markings.

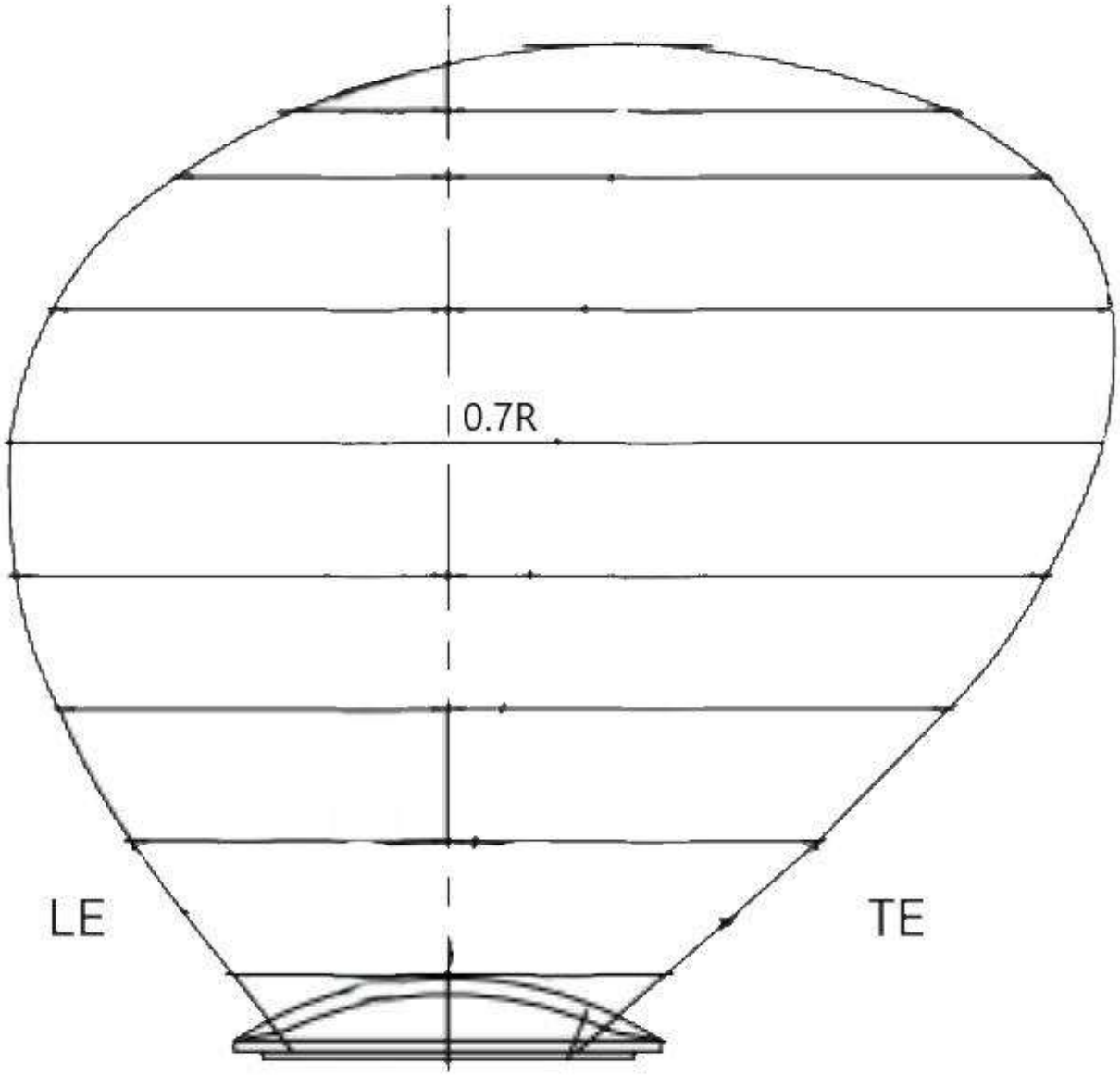
3.7.6 Prior to packing, photograph each component showing strippable compound application and installed blade edge protection.

3.7.7 Prior to shipping, photograph all container markings.

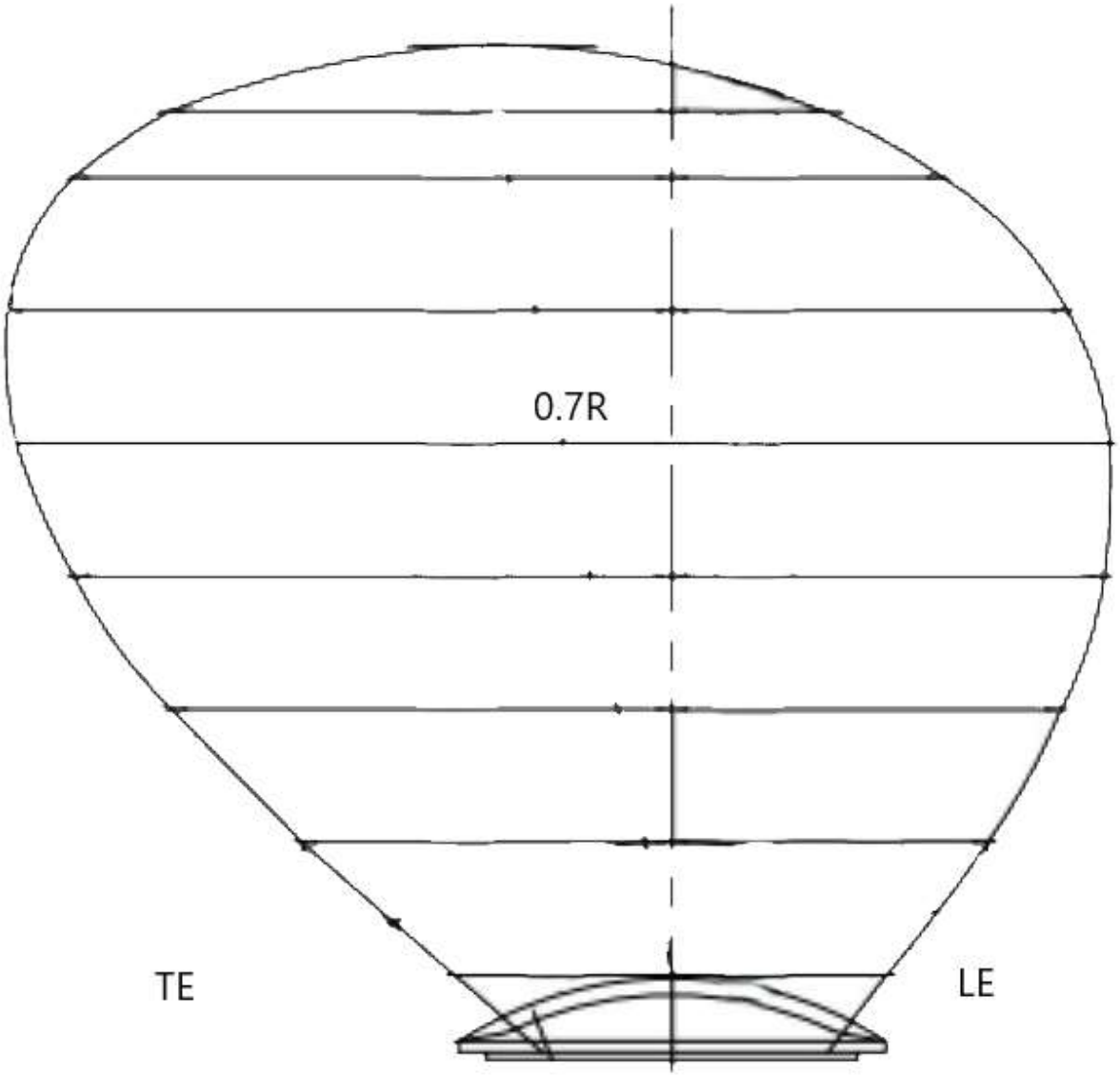
4. NOTES

4.1 Post-repair/overhaul activities. Refer to the General Requirements work item, Section 5, for the preservation, packaging, packing, and shipping requirements.

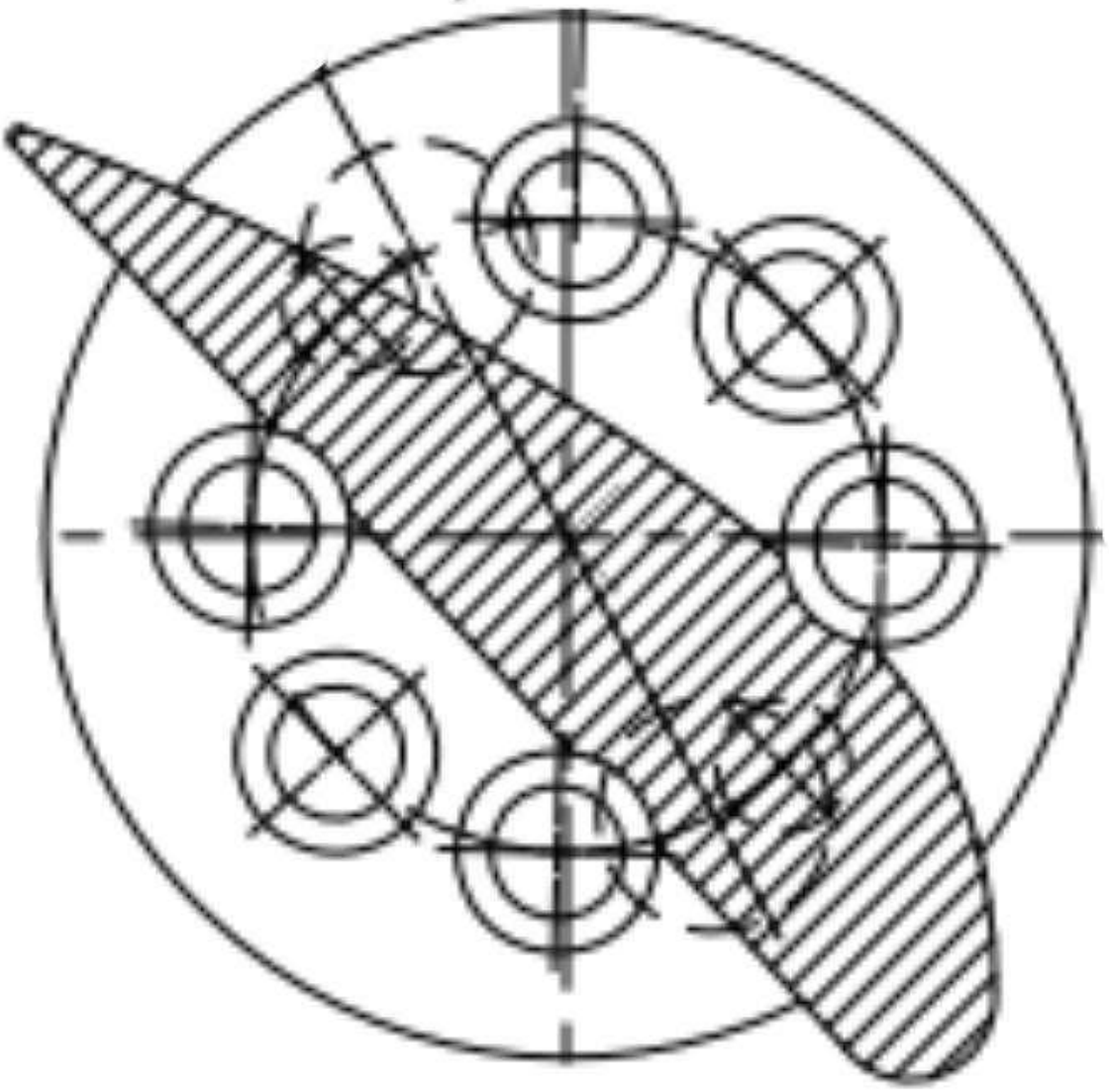
4.2 Reference sources. Refer to General Requirements work item, Section 6, for referenced document sources.



Pressure side _____ Suction side _____



Pressure side _____ Suction side _____



Blade Palm

Top side _____ Bottom side _____

5. Supplementary Requirements and Information

NOTE
This information is specific to the serviced components and supplements the General Requirements work item. Where information between the General Requirements work item and herein conflict, the information here takes precedence.

5.1 Blade and dummy hub-specific preservation and packaging markings.

5.1.1 General Requirements (Work Item 1) Paragraph 5.6.1, "Quantity & unit of issue:" must be "1 – SET" in lieu of "1 – EA".

5.1.2 Beneath all markings per Work Item 1, Paragraph 5.6.1, add separate lines which read as follows:

- "REUSABLE CONTAINER – DO NOT DESTROY".
- For blade set containers, add "BLADE SET, BOX {#} of 4."
- For each blade set container, add the serial numbers for the corresponding, accompanying containers, i.e., "THE OTHER THREE BLADE SERIAL NUMBERS THAT MAKE UP THIS SET INCLUDE {insert three serial numbers}".

5.1.3 Markings examples:

a. Type 1 – BLADE SET, LEFT HAND
STOCK NUMBER 2010-01-134-0378
ITEM NAME BLADE SET LH, PROPELLER
PART NUMBER 620-WPC-4400-51-LH
BLADE SERIAL NUMBER *As marked on blade*
BLADE SET SERIAL NUMBERS *List serial numbers of the three Other blades that make up this set*
BLADE NUMBER *As received or as balanced*
BOX __OF 4
SHIPPING WEIGHT *As determined by Contractor*
CONTRACT NUMBER *As indicated on the contract*
DELIVERY ORDER NUMBER *As indicated on the delivery order*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - SET
COAST GUARD SFLC MATERIAL
REUSABLE CONTAINER - DO NOT DESTROY

b. Type 2 – BLADE SET, RIGHT HAND
STOCK NUMBER 2010-01-134-7238
ITEM NAME BLADE SET RH, PROPELLER
PART NUMBER 620-WPC-4400-51-RH
BLADE SERIAL NUMBER *As marked on blade*
BLADE SET SERIAL NUMBERS *List serial numbers of the three Other blades that make up this set*
BLADE NUMBER *As received or as balanced*
BOX __OF 4
SHIPPING WEIGHT *As determined by Contractor*
CONTRACT NUMBER *As indicated on the contract*
DELIVERY ORDER NUMBER *As indicated on the delivery order*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - SET
COAST GUARD SFLC MATERIAL
REUSABLE CONTAINER - DO NOT DESTROY

c. Dummy Hub - DUMMY HUB RH & LH
STOCK NUMBER 2010-01-F90-0154
ITEM NAME HUB, DUMMY RH & LH
PART NUMBER DH 627 WMEC-4400-1
SHIPPING WEIGHT *As determined by Contractor*
CONTRACT NUMBER *As indicated on the contract*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL
REUSABLE CONTAINER - DO NOT DESTROY

24599_270_1225_Rev -

WORK ITEM 12: Blade(s), Controllable Pitch Propeller (CPP), 270 Class, Inspect and Repair

1. SCOPE

1.1 Intent – This work item defines the requirements to inspect and repair for 270' Class CPP blade(s) to a serviceable, A-condition.

1.2 Government furnished property (GFP). The listed items are property of and managed by the United States Coast Guard (USCG) Surface Forces Logistics Center (SFLC), Baltimore MD and will be issued to the contractor as issuance of a contract or contract delivery order.

ITEM DESCRIPTION	NATIONAL STOCK NUMBER (NSN) PART NUMBER (P/N)
Blade Set, Propeller, Type 1 - Left Hand (LH), starboard side	NSN: 2010-01-120-2871 P/N: 8-350-255 CCW
Blade Set, Propeller, Type 2 - Right Hand (RH), port side	NSN: 2010-01-119-3972 P/N: 8-350-254 CW
Hub, Dummy, Propeller LH & RH	ACN: 2010-01-FST-0069 P/N: 901-WMEC-245-007
Shipping Crate, Reusable	NSN: N/A PN: N/A CAGE: N/A

2. REFERENCES

COAST GUARD DRAWINGS

Coast Guard Drawing 901 WMEC 245-004, Rev E, Controllable Pitch Propeller Escher Wyss Blade and Palm

COAST GUARD PUBLICATIONS

Coast Guard Specification D-000-0100, Rev G, Bar Coding for USCG Surface Forces Logistics Center Procured Material

Surface Forces Logistics Center Standard Specification 0740 (SFLC Std Spec 0740), 2022, Welding and Allied Processes

OTHER REFERENCES

American Bureau of Shipbuilding (ABS) Rules for Survey After Construction 2021 - Guide for Bronze and Stainless-Steel Propeller Castings, Part 7 Appendix 1, Section 10

ASTM E1417/E1417M, Dated 9/1/2021 – Standard Practice for Liquid Penetrant Testing

DOD-STD-2185 (SH) – Requirements for Repair and Straightening of Bronze Naval Ship Propellers

NAVSEA Technical Manual, NAVSEA S9245-AR-TSM-010/PROP - Technical Manual Marine Propeller Inspection, Repair and Certification

SAE-J-448A - Surface Texture Standard

3. REQUIREMENTS

3.1 General.

3.1.1 Inspection, repair and overhaul - general. All inspections, repairs and overhaul must be accomplished in accordance with the requirements set within this work item.

3.1.2 Workmanship. Upon completion of all work, all propellers must have a polished, professional finish and be free of dirt, grease, burrs, sharp edges, etc.

3.2 Inspections. Referring to the General Requirements work item for guidance, for each blade set received, the Contractor must accomplish the following inspections and submit an Open and Inspect Report (OIR) on all of the following:

3.2.1 Arrival inspection.

3.2.2 Visual Preservation Inspection (VPI).

3.2.3 Visual and Technical Inspections (VTI). The Contractor must conduct all inspections required under paragraph 3.2.4 and follow-on paragraphs.

3.2.4 Geometrical/dimensional inspections. Prior to overhaul/repair, while using Coast Guard Drawing 901WMEC 245-004 and NAVSEA S9245-AR-TSM-010/PROP as guidance, the Contractor must conduct the following inspections and measurements, recording all results and deviations outside of prescribed tolerances.

NOTES
NAVSEA S9245-AR-TSM-010/PROP, Table 6-1, Class II is the guiding document for the inspections and repairs to be made. Class II measurements and tolerances apply unless explicitly stated otherwise.

3.2.4.1 Blade radius length. Measure each blade radius length.

3.2.4.2 Section pitch. Measure the pitch of each blade at the following radii: 0.5, 0.6, 0.7, 0.8, 0.9, 0.95, 0.975.

3.2.4.3 Blade pitch average. Calculate the average blade pitch using the radii prescribed in the above paragraph.

3.2.4.4 Blade section widths. Measure each blade section width at the radii prescribed in 3.2.4.2.

3.2.4.5 Maximum blade thicknesses. Measure the maximum blade thicknesses at the radii prescribed in 3.2.4.2.

3.2.4.6 Blade track. Measure each blade track at the 0.95 radius for each blade.

3.2.4.7 Fairness. Conduct a fairing survey for each blade, noting all locations and deviations from the prescribed fairness and fairness rate of change tolerances.

3.2.4.8 Surface finish. Using SAE-J-448A as guidance, conduct a surface finish survey for all blade surfaces, fillets and palms.

3.2.4.9 Surface inspections.

3.2.4.9.1 Surface inspection – visual. Conduct a visual inspection of each component while using MIL-STD-2035, Section 4 as guidance; markup and report all discrepant physical condition findings on the forms (blades and palms) provided in Section 4.

3.2.4.9.2 Surface inspection – Nondestructive test (NDT). Using SFLC Std Spec 0740 as guidance, conduct a dye penetrant inspection on all component surfaces.

3.2.4.9.3 Surface inspection reports. Markup and report all discrepant visual and NDT findings on the forms (blades and palms) provided in Section 4 for each surface inspected.

NOTE
The Section 4 forms are provided for convenience and the Contractor may opt to use clearer forms in their submission.

3.2.4.10 Deleted.

3.2.4.11 Palm bolt and dowel pin holes. Measure all bolt and dowel pin holes for each blade palm.

3.2.4.12 Dowel hole centers survey. Measure the center-to-center dimensions between all dowel pin holes for each blade.

3.2.4.13 Bolt hole contact face measurements. For each blade, measure the parallel dimensions.

3.2.4.14 Palm dimension survey. For each blade, measure all palm dimensions shown on the applicable drawings.

3.2.4.15 Sealing surfaces survey. Determine and record the surface finishes and conditions for each blade sealing surface.

3.3 Overhaul/repair. If a Change Request has been authorized and released by the KO, the Contractor must make all recommended repairs (or as amended by the KO) for the affected blade(s) in accordance with the following:

3.3.1 Tolerances. The repair tolerances must be in accordance with NAVSEA S9245-AR-TSM-010/PROP, Table 6-1, **Class II** in conjunction with Coast Guard Drawings 901 WMEC 245-004 as applicable.

3.3.2 Welding specifics.

3.3.2.1 Critical blade areas are described as the pressure face of a blade between the fillet and the .4 radius, starting at the leading edge encompassing 80% of the chord length taken at the 0.4 radius (see Figure 1 of DOD-STD-2185).

WARNING!

Welding on the pressure face in the critical area must not be taken without prior KO approval.

3.3.2.2 All welding performed must be documented on the visual inspection sheets for each blade; each weld must be dimensionally identified by location, length, width, and depth.

3.3.2.3 Provide photo documentation to the KO during in-process welding repairs and any discontinuities during dye penetrant inspection.

3.3.2.3.1 Each photograph shall include the component serial number and date the photograph was taken.

3.3.2.3.2 Color photographs must be taken with a digital camera and the images provided electronically in "**jpg format"** to the KO during:

3.3.3 Surface finish. Blade and palm surfaces must be ground fair and polished to the following finishes in accordance with SAE-J-448A:

- Blade surfaces - 63 micro inches or better;
- Blade fillets and palms – 125 micro inches or better.

3.3.4 Balancing. While using the Government-furnished dummy hub, each blade set must be single plane balanced as follows:

NOTE

All balancing must be accomplished by means of balancing equipment that requires work piece rotation.

3.3.4.1 Prior to performing any balance tests, the Contractor must demonstrate the balance machine sensitivity using a weight determined by the following formula:

$Ws = 0.1(U)/r$

- Where, Ws = sensitivity weight
- U = residual unbalance tolerance;
- r = radial location of the weight.

3.3.4.2 In the presence of the Coast Guard Inspector and prior to using with attached blades, the Contractor must inspect the dummy hub for squareness, confirm the dowel pin locations, and be balanced using the determined parameters detailed in 3.3.5.

3.3.4.3 Following hub balancing, blades must be balanced as a set of 4 and be marked (i.e., 1, 2, 3, 4) from a defined datum, and ascending in number, counter to rotation direction.

NOTE

This numbering method ensures reassembly in the same positions in which they were balanced.

Weight addition/removal shall be easily detected and discernable to the balance machine operator.

Material removed to balance shall be taken from the suction face of the heavy blade(s).

For blades, the area from which metal is taken must not come from within 10 percent of the chord length adjacent to the leading or trailing edges.

3.3.4.4 After the initial balance, the blades must be removed and rotated 90 degrees on the dummy hub.

3.3.4.5 Re-check balance after blade rotation to ensure that any corrections made are not attributable to changes in the dummy hub.

3.3.4.6 Document the final, actual unbalance amount for each blade set in the Final Inspection Report.

3.3.4.7 The residual imbalance in each component plane of correction must not exceed the value calculated via the following formula:

$U = 4000W/N^2$

- Where, U = maximum allowable residual unbalance in oz.-in;
- W = weight of rotating part in pounds;
- N = maximum operating speed of unit.

3.3.5 Bolt hole thickness. Measure the palm thicknesses around the perimeter of each bolt shank hole; mark the locations and record those measuring less than 95% of the minimum, adjacent palm thickness indicated in the applicable drawing.

3.3.6 Sealing surface finish. Sealing surfaces must have surface finishes of 32 micro inches or better (unless otherwise stated on the applicable drawing). Seal wear or rough surfaces must be machined to restore to 32 micro inches.

3.4 Final Inspection Report. The Contractor shall accomplish the following:

NOTE

Final inspections, tests and/or measurements that were not affected by repairs, and previously recorded in the OIR, are not required to be redone. However, the Final Inspection Report must include all the unaffected pre-repair data as post repair data.

3.4.1 In areas affected by repairs, again conduct the applicable inspections under 3.2.4 and follow-on paragraphs for the final inspections and tests.

3.4.2 Provide the final inspection and test results to the KO in the Final Inspection Report, including the final balancing data per paragraph 3.3.4 and follow-on paragraphs.

3.5 Stamping. Following all repairs, the Contractor must accomplish the following:

3.5.1 Each blade must be stamped with the following information (minimum), updated where necessary if the stamping already exists:

a. Repair facility/company name

b. Repair completion date

c. Blade number

d. Stress relief date (if applicable)

e. Blade set serial number

f. Rotation direction (left hand, LH or right hand, RH)

g. Material type

h. Weight

3.5.2 Stamping must be be at least 1/4" high, legible printing, or the same height of the existing stamping if only corrected stamping is required.

3.6 QA inspection.

3.6.1 Following KO acceptance and approval of the Final Inspection Report and prior to conducting any preservation, packing and packaging, the Contractor must schedule the Coast Guard SFLC QA inspection.

3.6.2 A copy of the Final Inspection Report must be provided to the Coast Guard QA Representative upon arrival for final inspection.

3.6.3 The KO must be given 10-calendar day advance notice ahead of desired inspection date.

3.7 Photography requirements. The Contractor shall provide photographs (.jpg format or similar) for the following evolutions:

3.7.1 During initial blade receipt; photos must show the suction and pressure faces, fillets and palms, plus four photographs of the shipping crate sides and top taken at 90° intervals.

3.7.2 Prior to damaged area repairs affecting remarkable cost and/or time; close-up views showing the affected areas before and after those repairs must be provided.

3.7.3 Pre-repair, failed NDT areas.

3.7.4 In-process repairs in areas requiring significant cropping, welding and/or machining of sealing surfaces.

3.7.5 Following final inspection and prior to preservation/packaging, photograph suction and pressure sides of blade(s), palm(s), sealing face(s) surface texture/finish, including stamped markings.

3.7.6 Prior to packing, photograph each component showing strippable compound application and installed blade edge protection.

3.7.7 Prior to shipping, photograph all container markings.

4. NOTES

4.1 Post-repair/overhaul activities. Refer to the General Requirements work item, Section 5, for the preservation, packaging, packing, and shipping requirements.

4.2 Reference sources. Refer to General Requirements work item, Section 6, for referenced document sources.

4.3 Validation of inspections/tests. The following are required and will be validated by a Government Quality Assurance Representative:

4.3.1 Geometrical/dimensional inspections per the following paragraphs:

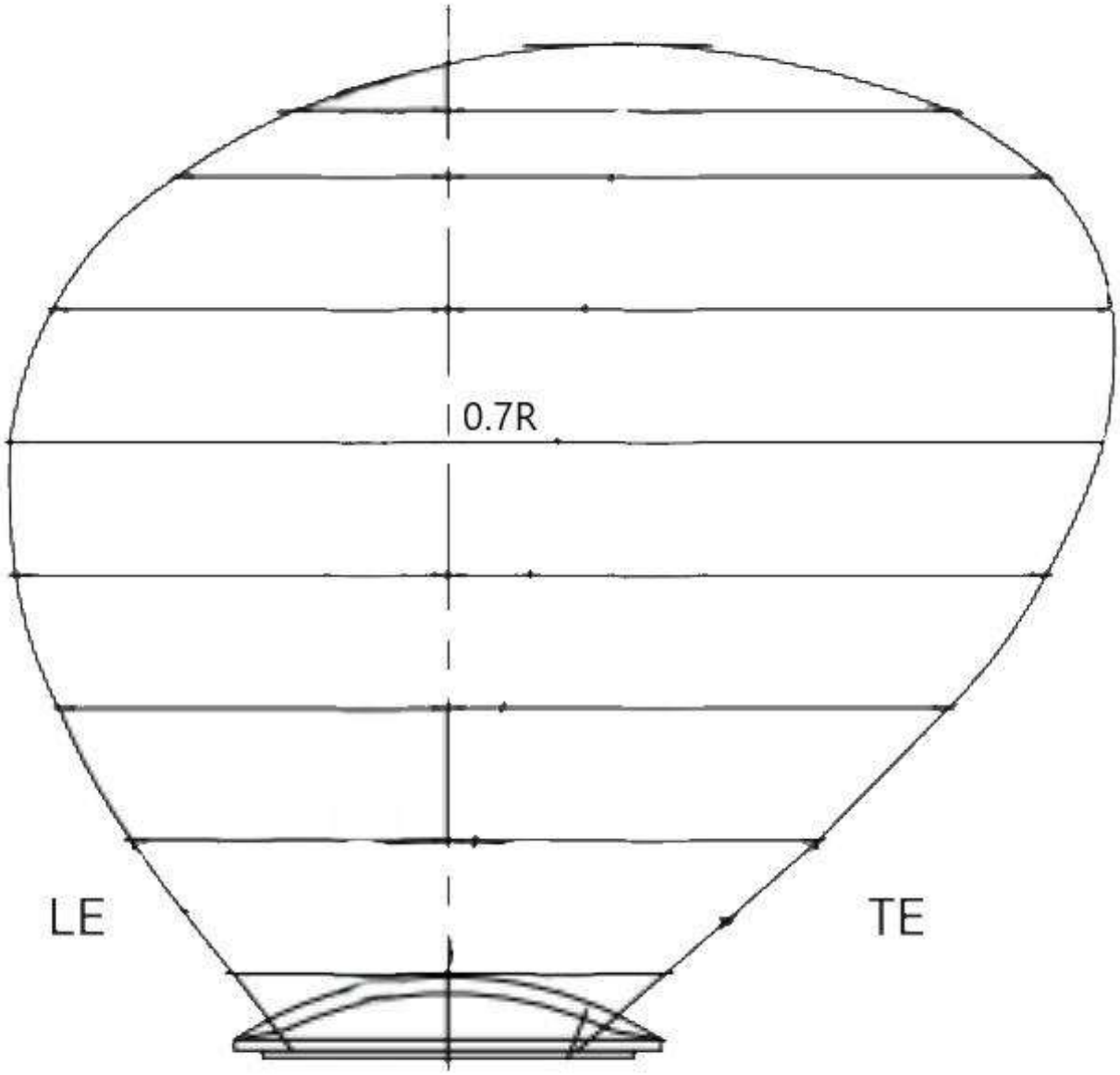
- 3.2.4.1
- 3.2.4.2
- 3.2.4.3
- 3.2.4.4
- 3.2.4.5
- 3.2.4.6
- 3.2.4.7
- 3.2.4.11
- 3.2.4.12
- 3.2.4.13
- 3.2.4.15

4.3.2 Surface inspections per paragraph 3.2.4.9.

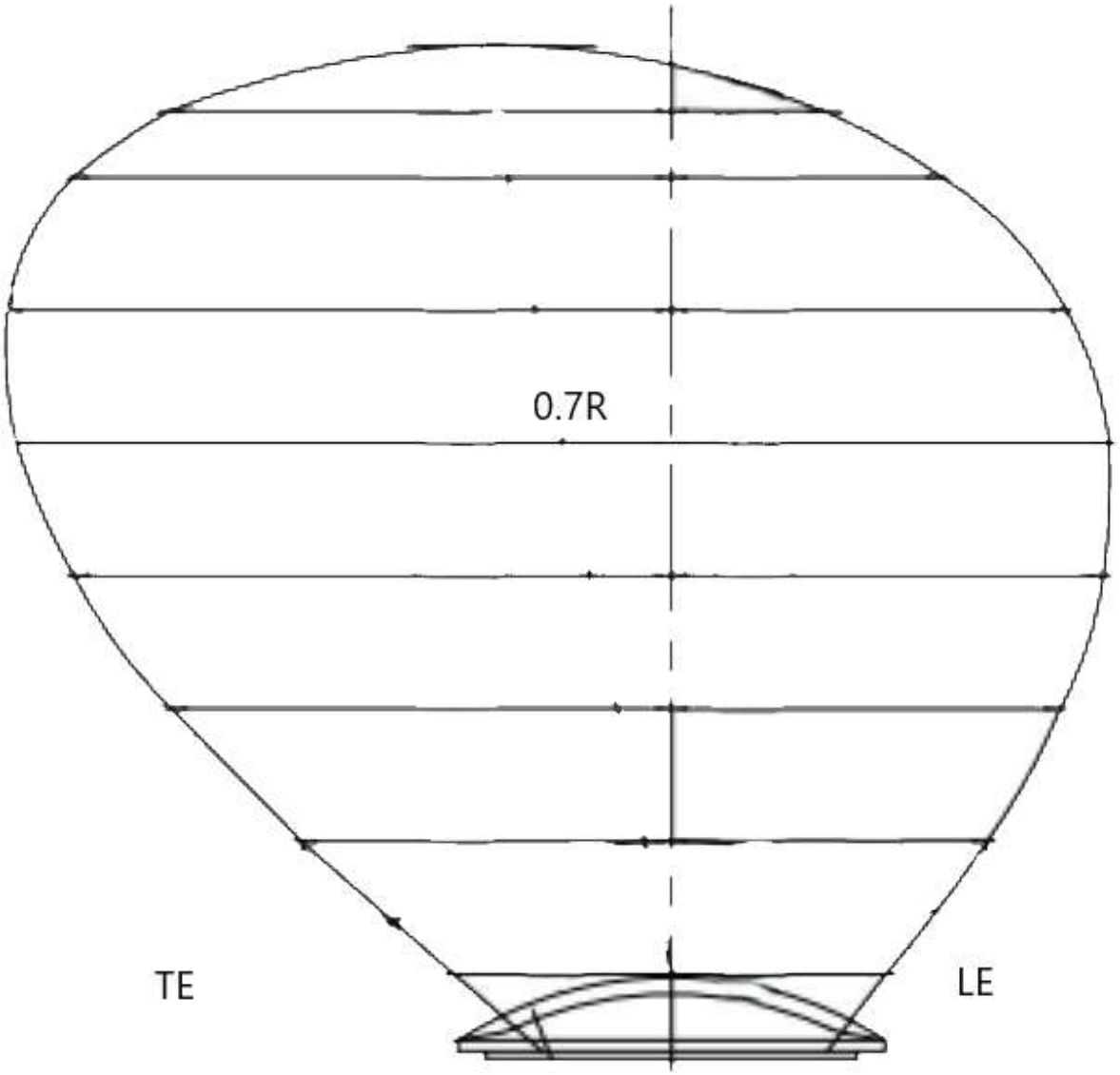
4.3.3 Balance checks per paragraph 3.3.4 and follow-on paragraphs.

4.3.4 Blade stamping per paragraph 3.5.

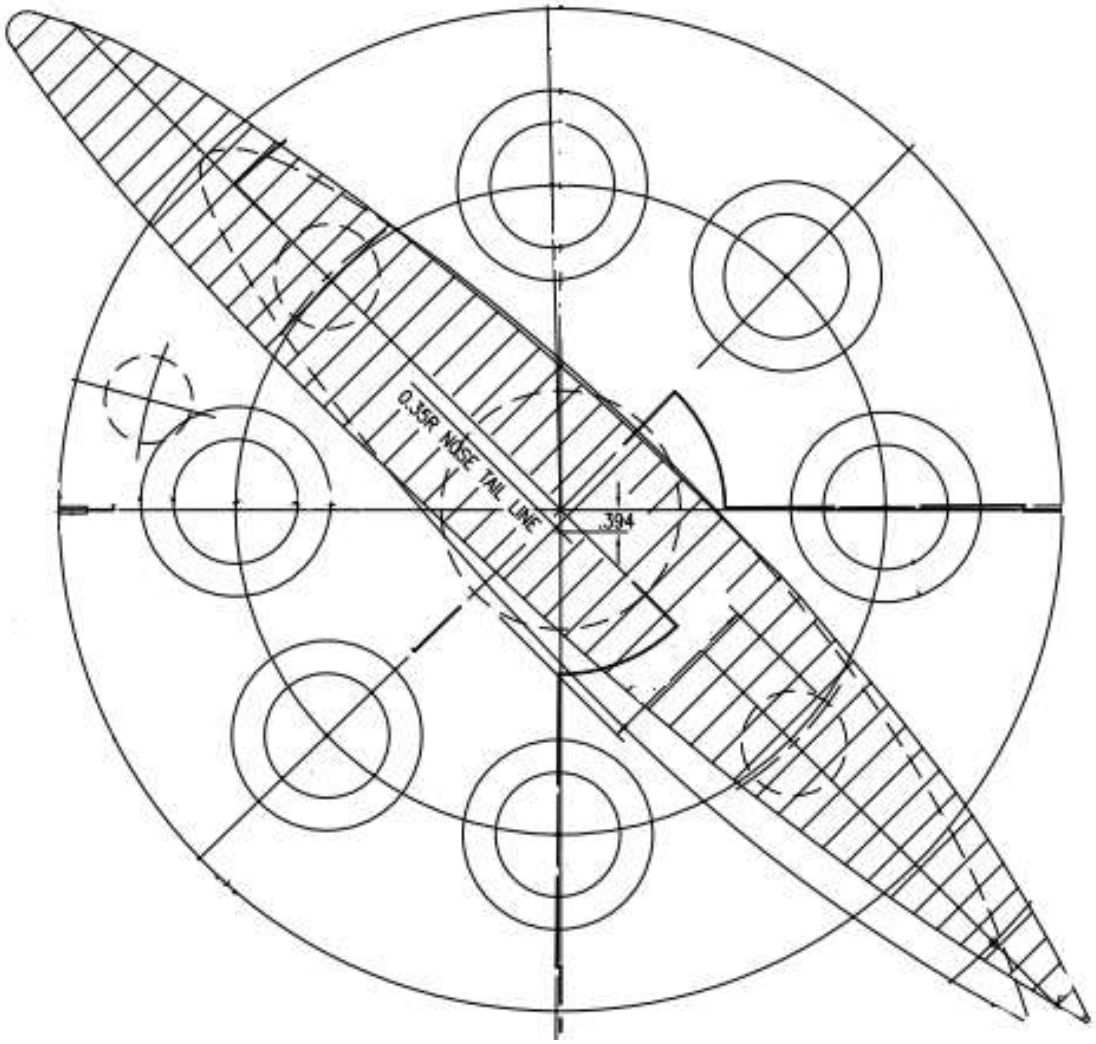
4.4 Component sketches.



Pressure side _____ Suction side _____



Pressure side _____ Suction side _____



Blade Palm

Top side _____ Bottom side _____

LH _____ RH _____

5. Supplementary Requirements and Information

NOTE
This information is specific to the serviced components and supplements the General Requirements work item. Where information between the General Requirements work item and herein conflict, the information here takes precedence.

5.1 Blade and dummy hub-specific preservation and packaging markings.

5.1.1 General Requirements (Work Item 1) Paragraph 5.6.1, modify as follows:

5.1.1.1 In place of "serial number", insert the following

- Blade serial number {as marked on the blade}
- Blade set serial numbers {list the serial numbers of the other three blades included in this set}
- Blade number {as received or as balanced}
- Box {insert} of 4

5.1.1.2 Beneath "Contract number", insert "Delivery order number" {mark as indicated on the delivery order}.

5.1.1.3 The "Quantity & unit of issue:" must be "1 – SET" in lieu of "1 – EA".

5.1.2 Beneath all markings per Work Item 1, Paragraph 5.6.1, add the following:

- "REUSABLE CONTAINER – DO NOT DESTROY".

5.1.3 Markings examples:

a. Type 1 – BLADE SET, LEFT HAND
STOCK NUMBER 2010-01-120-2871
ITEM NAME BLADE SET LH, PROPELLER
PART NUMBER 8-350-255CCW
BLADE SERIAL NUMBER *As marked on blade*
BLADE SET SERIAL NUMBERS *List serial numbers of the three*
Other blades that make up this set
BLADE NUMBER *As received or as balanced*
BOX __OF 4
SHIPPING WEIGHT *As determined by Contractor*
CONTRACT NUMBER *As indicated on the contract*
DELIVERY ORDER NUMBER *As indicated on the delivery order*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - SET
COAST GUARD SFLC MATERIAL
REUSABLE CONTAINER - DO NOT DESTROY

b. Type 2 – BLADE SET, RIGHT HAND
STOCK NUMBER 2010-01-119-3972
ITEM NAME BLADE SET RH, PROPELLER
PART NUMBER 8-350-254 CW
BLADE SERIAL NUMBER *As marked on blade*
BLADE SET SERIAL NUMBERS *List serial numbers of the three Other blades that make up this set*
BLADE NUMBER *As received or as balanced*
BOX __OF 4
SHIPPING WEIGHT *As determined by Contractor*
CONTRACT NUMBER *As indicated on the contract*
DELIVERY ORDER NUMBER *As indicated on the delivery order*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - SET
COAST GUARD SFLC MATERIAL
REUSABLE CONTAINER - DO NOT DESTROY

c. Dummy Hub - DUMMY HUB RH & LH
STOCK NUMBER 2010-01-FST-0069
ITEM NAME HUB, DUMMY RH & LH
PART NUMBER 901 WMEC 245-007
SHIPPING WEIGHT *As determined by Contractor*
CONTRACT NUMBER *As indicated on the contract*
CONDITION CODE CONDITION A
QUANTITY & UNIT OF ISSUE 1 - EA
COAST GUARD SFLC MATERIAL
REUSABLE CONTAINER - DO NOT DESTROY

5.2 270 Bar coding particulars. In lieu of the "General Requirements" bar coding, the 270 containers shall be bar coded as follows:

5.2.1 Actual labels must be in accordance with SFLC Specification D-000-0100, Type "V", Grade "A", Style "2", Composition "b" with plastic laminate.

5.2.2 Each label shall contain encoded data for the national stock number.