NAVSEA
STANDARD ITEM

FY-21

ITEM NO: 009-33
DATE: 01 OCT 2019
CATEGORY: II

1. SCOPE:

1.1 Title: Rotating Electrical Equipment; rewind

2. REFERENCES:

2.1 Standard Items

2.2 Equipment Technical Manual

2.3 S9086-DA-STM-010/CH-100, Hull Structures

2.4 S9086-KC-STM-010/CH-300, Electric Plant - General

2.5 S9086-KE-STM-010/CH-302, Electric Motors and Controllers

2.6 S9086-KN-STM-010/CH-310, Electric Power Generators and Conversion Equipment

2.7 S9086-HN-STM-010/CH-244, Propulsion Bearings and Seals

2.8 S6260-BJ-GTP-010, Electrical Machinery Repair, Electric Motor, Shop Procedures Manual

2.9 MIL-DTL-17060, MOTORS, ALTERNATING CURRENT, INTEGRAL-HORSEPOWER, SHIPBOARD USE

2.10 S9310-AC-HBK-010, Commutator/Slip Ring Maintenance Handbook

2.11 MIL-STD-1310, Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility, Electromagnetic Pulse (EMP) Mitigation, and Safety

2.12 407-5291780, Standard Electromagnetic Interference (EMI) Survey Procedures

3. REQUIREMENTS:

3.1 Disconnect equipment mechanically and remove, including rotating components connected directly to the shaft, using 2.2 for guidance.

3.1.1 Accomplish the following prior to disconnecting: measure air gap readings; measure bearing clearances for sleeve bearing equipment only; measure alignment readings; inspect couplings for cracks, broken segments, wear, and misalignment in excess of tolerances specified in 2.2; measure shaft thrust and run out readings; identify associated cables/wiring and hook-up data. Record data ***in Attachment B-2 or equivalent form that contains the requirements of Attachment B-2.***

3.1.2 Matchmark, identify, and retain chocks, shims, shock mounts, sound damping pads, and other accessories associated with equipment. Record list of accessories ***in Attachment B-2 or equivalent form that contains the requirements of Attachment B-2.***

3.1.3 Remove entire vaneaxial and tubeaxial fan assemblies from the duct system and transport to the shop for repair.

3.2 Accomplish a structural inspection of each foundation in accordance with 2.3. Record data ***in Attachment B-2 or equivalent form that contains the requirements of Attachment B-2.***

3.2.1 Accomplishment of cleaning and painting requirements for foundations of equipment must be in accordance with NAVSEA Standard Items (See 4.7).

3.3 Matchmark, disassemble, inspect, measure, ***and test*** the equipment ***removed in 3.1*** using 2.2 and 2.4 through 2.8 for guidance.

3.3.1 Accomplish a core loss test prior to winding removal in accordance with Paragraphs 300-4.5.6 and 300-4.5.6.1 of 2.4. Inspect for hot spots in accordance with the Core Loss Tester Instruction Manual. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.3.1.1 Accomplish a loop test in accordance with Paragraph 300-4.5.6.1.2 of 2.4 when core indicates a marginal satisfactory reading or when test equipment does not directly support equipment being subjected to testing. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.3.2 Remove each winding, using Paragraph 300-4.5.7.2 of 2.4 for guidance for winding removal and 2.8 for core inspection. Verify the temperature limitations of the core material prior to exercising the burnout oven option. Record winding data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***Verify conformance of recorded data to the manufacturer's winding data.

3.3.2.1 Repeat core loss test and inspection described in 3.3.1 and loop test described in 3.3.1.1 after winding removal. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.3.3 Dip core in a 20 percent solution of varnish MIL-I-24092 and dry. In localities where MIL-I-24092 does not meet state and local Air Pollution Control District (APCD) standards, spray the iron core with a clear air-drying varnish.

3.3.4 Protect machined surfaces. Accomplishment of cleaning and painting for equipment housing exterior, fan(s), core and interior and exterior of each end bell must be in accordance with NAVSEA Standard Items (See Note 4.7).

3.3.5 Inspect and test non-wound rotors for loose or cracked bars, localized overheating, and rubbing in accordance with 2.8. Inspect wound rotors, slip ring leads, and armatures for insulation damage and burns/hot spots. Inspect for loose coils and slot wedges. Inspect slip rings and commutators for damage and for wear limits, using 2.2 for criteria. Inspect brush rigging for cracks, chips, worn areas, distortion, spring condition, and insulating material for cracks and arc paths. Inspect leads and terminal lugs for damage and defects. Identify and tag leads with aluminum wrap-around bands with metal stamped or embossed markings. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.3.6 Inspect and dimensionally measure end bells, frame, rabbet fits, shaft, sleeve and pedestal bearings, keyways, fan and running surfaces for wear, eccentricity, and other defects, using 2.2 for accept or reject criteria, and 2.7 for location and type of measurements to be taken. Record data ***in Attachment C or equivalent form that contains the requirements of Attachment C.***

3.3.7 Accomplish commutator pre-installation and post-installation test, using Table 300-3-9 of 2.4 for guidance. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.4 Rewind the equipment in accordance with Original Equipment Manufacturers (OEM) "for Navy use" winding data. Connect windings permanently only after successful completion of testing of 3.5.1 and 3.5.3 through 3.5.5. Install new material conforming to: Magnet wire, National Electrical Manufacturers Association (NEMA) MW-1000, Table MW 16 (round wire), or NEMA MW-1000, Table MW 20 (rectangular wire), or equivalent to OEM original; Slot and phase insulation, NEMA FI-3-2004; Slot wedge-spacers and fillers, MIL-I-24768/17; Lead wire, stranded, MIL-DTL-16878 except for type EPDM, which may be commercial grade; Glass banding, MIL-I-24178; Temperature detectors in accordance with 2.2.

3.5 Test, inspect, and measure the rewound equipment.

3.5.1 Accomplish a 500-volt megger insulation resistance test, using Paragraphs 300-3.2.2 through 300-3.2.3, 300-3.4.8, 300-3.4.11, and 300-5.3.7.1 of 2.4 for guidance. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.5.2 Disconnect solid-state devices and ground temperature-sensing leads prior to measuring insulation resistance of windings.

3.5.3 Accomplish a phase resistance balance test of windings, using a Wheatstone or Kelvin bridge, or with an ohmmeter capable of resolving one milliohm (0.001 ohm). Record phase balance for multi-phase equipment, using Paragraph 5.21 of 2.8 and 3.6.1 of 2.9 for guidance. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.5.4 Accomplish a voltage surge test in accordance with Paragraphs 300-3.5.4 through 300-3.5.5 of 2.4. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.5.5 Accomplish a DC HI POT test in accordance with Paragraph 300-3.5.2 through 300-3.5.2.3.4 of 2.4. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.6 Connect the windings permanently.

3.6.1 Repeat tests described in 3.5.1 and 3.5.3 through 3.5.5. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.6.2 Accomplish DC bar-to-bar test on commutators after making coil connections to the risers in accordance with Paragraph 300-4.7.11.3 of 2.4. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.6.3 Accomplish a Polarization Index Test in accordance with Paragraph 300-3.4.12 of 2.4. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.7 Select the proper insulating process based on winding insulation classifications and to meet state or local air pollution standards. Select varnish methods and material, using Paragraphs 300-4.5.8 through 300-4.5.8.9 of 2.4 for guidance. Maintain the varnish in accordance with Paragraphs 300-4.5.8.3 through 300-4.5.8.3.3 of 2.4 and the varnish manufacturer's instructions. Maintain a current revision of the varnish manufacturer's instructions on storage, maintenance, and use of the type of varnish to be applied. Maintain a record of varnish temperature, viscosity and, for solventless varnish, gel time tests. Tests must show varnish is within varnish manufacturer's recommendations and have been accomplished in the intervals specified by the varnish manufacturer. The record must also show that the varnish is being stored as recommended by the varnish manufacturer.

3.8 Varnish and bake windings in accordance with Paragraphs 300-4.5.8.4 of 2.4 and the varnish manufacturer's instructions. Do not immerse the leads. Wipe surfaces that affect assembly, such as rabbet fits and mounting flanges, with a cloth moistened with a solvent after draining and before baking. Remove excess varnish run-off from surfaces that affect assembly

after baking. Apply a thin coat of air-dry varnish to metal surfaces exposed by the removal process in accordance with Paragraph 300-4.5.8.5 and 300-4.5.8.6 of 2.4.

3.9 Repeat tests described in 3.5.1 and 3.5.3 through 3.5.5. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.10 Accomplish an AC HI POT test in accordance with Paragraphs 300-3.5.3 through 300-3.5.3.2.9 of 2.4. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.11 True the commutator or collector rings. Eccentricity must not exceed the requirements of 2.10. Resurface or machine each individual collector ring to the same exact diameter to allow symmetrical brush holder to ring clearance spacing. Ensure metal shavings are not permitted to contaminate the rotor or stator assembly. Each cut must not exceed 0.010 inch. Finish thickness must not be less than design wear tolerance as shown in 2.2. Undercut the mica between the commutator bars with the edge of the mica not exceeding a depth of 5/64-inch below the bars. Chamfer the bar edges and remove rough surfaces in accordance with Paragraph 7-4.1.3 of 2.10. Burnish the commutator with a very fine commercial burnishing stone conforming to A-A-58052. Polish collector rings to a mirror finish. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.12 Accomplishment of the balancing requirement for each rotating assembly must be in accordance with NAVSEA Standard Items (See Note 4.6).

3.13 Disassemble the brush rigging. Remove foreign matter. Replace existing cadmium-plated parts with zinc in accordance with ASTM A 153. Recondition threads of plated parts. Assemble brush rigging.

3.14 Install identification markers on wiring in the external connection box.

3.14.1 Markers must be aluminum wrap-around type with metal stamped or embossed markings.

3.15 Repair lightly scored areas of frame, end bells, and shaft by manual methods. Recondition threads and fit key to keyway. Visually inspect keyway for deformed, cracked or chipped edges or high spots. Verify that fit between key and key-seat sides has a minimum clearance of 0.002 inch or maximum interference of 0.0005 inch. High spots in keyway may be removed by machining or grinding. Do not unnecessarily repair any keyway; instead, use a step key up to a maximum of 0.010 inch oversize and, where possible, include a radius in step. If key tightness cannot be corrected with a step key, ***machine*** worn/damaged keyways to recommended over-sizes as follows: Maximum of 0.015 inch oversize for a 1/8-inch key and increasing oversize allowance of 0.010 inch for each 1/8-inch increase in key size up to a maximum of 0.075 inch. If key tightness cannot be corrected by keyway repair, replace part involved. Apply

a thin coat of petrolatum to unpainted mating surfaces except for explosion-proof motors, which must have clean, dry mating surfaces.

3.16 Prepare and refinish equipment. Protect machine surfaces, windings, and nameplates from being painted or otherwise damaged.

3.16.1 Accomplishment of cleaning and painting for housing, fan, and interior and exterior of each end bell must be in accordance with NAVSEA Standard Items (See Note 4.7).

3.17 Accomplish the following on equipment having other than sleeve-type bearings unless otherwise specified in the invoking Work Item, using 2.8 for guidance.

3.17.1 Install new bearings, seals, fittings, lock washers, and locknuts conforming to 2.2, using 2.7 and Chapter 6 of 2.8 for guidance, except as indicated in 3.17.1.1 (utilizing Attachment A for guidance).

3.17.1.1 Install Type 111, Class 8 (double seal) bearings in motors meeting the criteria identified in Chapter 6 of 2.8. Only double seal bearings identified in Chapter 6 of 2.8 are acceptable for this use.

3.17.1.2 Install Type 111, Class 8 (double seal), bearings with a C3 (greater than normal) radial internal clearance, if not originally furnished or already accomplished during previous repair, in place of the Type 111 bearing originally furnished, for vaneaxial and tubeaxial fan motors not meeting the criteria of Chapter 6 of 2.8. Install Type 120 bearings in vaneaxial and tubeaxial fan motors originally furnished with Type 120 bearings.

3.17.1.3 Install new label plates with the inscription "DO NOT LUBRICATE" on equipment using double seal bearings (Type 111, Class 8 or Type 120).

3.17.1.4 Install pipe plugs on all grease fills and drains for equipment converted from re-lubricable bearings to double seal bearings.

3.17.1.5 Prepare a report that reflects the change in the maintenance requirements for the converted motor, for equipment converted from lubricated bearings to double seal bearings. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.17.2 Lubricate bearings with grease conforming to DOD-G-24508 in accordance with Paragraphs 244-1.7.7.2 and 244-1.7.7.3 of 2.7, for equipment not using double seal bearings.

3.18 Assemble the equipment using 2.2 and 2.4 through 2.8 for guidance. Do not use materials containing silicone in the repair and assembly of equipment with commutator or collector rings. Install new gaskets on covers, inspection plates, and between the external connection box and the frame. Gaskets must conform to MIL-PRF-1149 unless otherwise

specified in 2.2. Set brush holders not less than 1/16-inch or more than 1/8-inch from commutator or collector rings unless otherwise specified in 2.2; set in electrical neutral plane and stagger brushes for maximum coverage of the commutator, in accordance with Paragraph 300-4.7.7.1.10 of 2.4; center over the collector rings; ensure the brushes do not extend beyond the edge of the collector rings; install new brushes in accordance with 2.2; sand new brushes to fit curvature of the commutator or collector rings in accordance with Paragraph 6-3.5 through 6-3.5.4 of 2.10; ensure brushes have a surface contact of 100 percent and are not chipped, cracked, or broken; remove sand, carbon, and other foreign matter resulting from fitting new brushes; adjust spring tension of brushes in accordance with 2.2. Adjust air gap as specified in 2.2, plus or minus 10 percent. Rotate shaft by hand a minimum of 3 revolutions. Rubbing or binding of rotating assembly must not be allowed. Record data ***in Attachment C or equivalent form that contains the requirements of Attachment C.***

3.18.1 Install label plates conforming to MIL-DTL-15024 for those identified to be missing or damaged.

3.18.2 Inspect equipment for applicable electromagnetic interference (EMI) fixes using Shipboard Electromagnetic Compatibility Improvement Program (SEMCIP) Technical Assistance Network (STAN) in accordance with 2.12. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.19 Accomplish a no-load shop test of the equipment for a minimum of one-half hour. Verify proper direction of rotation. After one-half hour, measure current and voltage in each phase, speed and bearing temperature rise measured on the equipment's exterior near each bearing. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.20 Accomplish an operational test, of the ***assembled*** vaneaxial/tubeaxial fan, for one hour after bearing and stator temperatures stabilize within one degree Celsius for 3 consecutive 15-minute intervals. Verify proper direction of rotation. Measure current, voltage, frame and bearing temperature rise and speed at 15-minute intervals. Bearing temperatures must not exceed 180 degrees Fahrenheit, unless otherwise specified in the invoking Work Item or equipment technical manual. Measure hot insulation resistances of winding to ground immediately upon completion of the operational shop test, using a 500-volt megger. Record data ***in Attachment B-1 or equivalent form that contains the requirements of Attachment B-1.***

3.21 Submit one legible copy, in approved transferrable media, of a report listing results of the requirements of 3.1.1, 3.1.2, 3.2, 3.3.1 through 3.3.2.1, 3.3.5 through 3.3.7, 3.5.1, 3.5.3 through 3.5.5, 3.6.1 through 3.6.4, 3.9, 3.10, 3.11, 3.17.1.5, 3.18, 3.19, and 3.20 to the SUPERVISOR.

3.22 Install equipment. Install new gaskets conforming to MIL-PRF-900 on disturbed ventilation. Align in accordance with 2.2. Measure facial and peripheral coupling data. Install chocks, shims, shock mounts, sound damping pads, and other accessories. Connect electrical cables/wiring. Bond and ground equipment in accordance with 2.11, using new ground

straps. Rotate shaft by hand a minimum of 3 revolutions. Rubbing or binding of rotating assembly must not be allowed. Measure the air gap and bearing clearance (sleeve bearing equipment only), insulation resistance (at 500 volts DC), and thrust. Record data ***in Attachment B-2 and C or equivalent form that contains the requirements of Attachment B-2 and C.***

3.22.1 Accomplishment of pump and driver shaft alignment must be in accordance with NAVSEA Standard Items. (See 4.8)

(V)(G) "OPERATIONAL TEST"

3.23 Accomplish an operational test of the assembled equipment at full system capacity for one hour after bearing and stator temperatures stabilize within one degree Celsius for 3 consecutive 15-minute intervals, unless otherwise specified in the invoking Work Item. When temperatures do not stabilize in four hours, stop test and contact the SUPERVISOR. Verify proper direction of rotation. Verify/establish oxide film coating of the commutator/collector rings, using 2.10 for guidance. Measure current, voltage, frame and bearing temperature rise, and speed at 15-minute intervals. Frame and bearing temperature rise and speed is not required for vaneaxial and tubeaxial fan assemblies. Bearing temperatures must not exceed 180 degrees Fahrenheit, unless otherwise specified in the invoking Work Item or equipment technical manual. Record data ***in Attachment B-2 or equivalent form that contains the requirements of Attachment B-2.***

3.23.1 Accomplish the requirements of 3.23 twice for two speed motors, once while operating at low speed, and once while operating at high speed. Record data ***in Attachment B-2 or equivalent form that contains the requirements of Attachment B-2.***

3.23.2 Accomplish the requirements of 3.23 for limited duty motors, for a period of time equal to the duty cycle of the motor. For motors with a duty cycle equal to or less than 30 minutes, measure data every 10 minutes. Record data ***in Attachment B-2 or equivalent form that contains the requirements of Attachment B-2.***

3.23.3 Measure hot insulation resistances of windings to ground immediately upon completion of test, using a 500-volt megger. Record data ***in Attachment B-2 or equivalent form that contains the requirements of Attachment B-2.***

3.24 Submit one legible copy, in hard copy or approved transferrable media, of a report listing data recorded in ***3.1.1, 3.1.2, 3.2***, 3.22 and 3.23 through 3.23.3 to the SUPERVISOR.

4. NOTES:

4.1 Equipment technical manual, Allowance Parts List (APL) (if applicable) and drawings will be listed in the invoking Work Item.

4.2 Shop test of generator will be addressed in the invoking Work Item.

4.3 Utilize Attachment A for determination if the Navy's motor bearing conversion program for Extended Life Double Seal (ELDS) ball bearings is permissible.

4.4 Data received in 3.17.1.5 must be forwarded to the SUPERVISOR for the purpose of initiating action ensuring shipboard databases such as the Equipment Guidance List (EGL) are updated to reflect the change in maintenance requirements for converted motors. Additionally, where APL changes are initiated to convert to ELDS bearings, a COSAL feedback report will be submitted, providing the NSN and part number for the ELDS bearing. The following website to initiate changes to Technical Manuals, APLs, etc.: http://www.navy311.navy.mil.

4.5 MIL-B-17931 (Bearings, Ball, Annular, For Quiet Operation) bearings are considered to be Long Lead Time (LLT) material. It is recommended these bearings be provided as Government Furnished Material (GFM).

4.6 If balancing of rotating equipment of 3.12 is required; the use of Category II Standard Item 009-15 "Rotating Machinery; balance" of 2.1 will be specified in the Work Item.

4.7 If cleaning and painting of 3.2.1, 3.3.4, or 3.16.1 is required; the use of Category II Standard Item 009-32 "Cleaning and Painting Requirements; accomplish" of 2.1 will be specified in the Work Item.

4.8 If pump and driver shaft alignment of 3.22.1 is required; the use of Category II Standard Item 009-58 "Pump and Driver Shaft Alignment; accomplish" of 2.1 will be specified in the Work Item.

4.9 Shipboard Electromagnetic Compatibility Improvement Program (SEMCIP) Technical Assistance Network (STAN) referred to in 3.18.2 is available at https://semcip.nswc.navy.mil/stan/modules/stan/default.asp .

ATTACHMENT A

1. To reduce motor maintenance and repair costs, the NAVY has implemented a program that allows for the use of Extended Life Double Seal (ELDS) bearings.

2. LIMITATIONS: The ELDS program does NOT apply to motors that are under the cognizance of NAVSEA 08.

3. APLs for motors meeting the conversion criteria requirements have been modified to identify ELDS bearings. In these cases, the APL bearing criteria will override any specifications delineated in the equipment technical manual or the motor "Original Equipment Manufacturer (OEM)" drawings. If ELDS bearings are not indicated in an APL, the following motor criteria must meet the applicability specifications for motors to undergo conversion to ELDS bearings:

3.a Motor must be installed on a surface ship and must NOT be under the cognizance of NAVSEA 08.

3.b Commercial motors are not eligible. Motors must have been furnished to the NAVY in accordance with MIL-DTL-17060 (Motors, Alternating Current, Integral Horsepower, Shipboard use), MIL-M-17413 (Motors, Direct Current, Integral H.P., Naval Shipboard [NAVY]) or MIL-M-17059 (Motors, 60 Cycle, Alternating Current Fractional H.P. [Shipboard Use]).

3.c Motors using one or more noise-quiet bearings per MIL-B-17931 (Bearings, Ball, Annular, For Quiet Operation) are NOT eligible for ELDS conversion.

3.d Bearings originally furnished with the motor must be type 111 bearings per FF-B-171. Motors are NOT to be considered as candidates for ELDS conversion in situations where the equipment technical manual and/or the OEM motor drawings originally specified FF-B-171 bearings but have notes indicating that replacement bearings are to be in accordance with MIL-B-17931 (Bearings, Ball, Annular, For Quiet Operation).

3.e The use of ELDS bearings is limited to motors where the full load speed and the size of both bearings are as follows:

1. Maximum bearing size 306 or 206 and full load rpm between 1,801 and 3,600 rpm.
2. Maximum bearing size 313 or 213 and full load rpm between 1,201 and 1,800 rpm.
3. Maximum bearing size 318 or 218 and full load rpm less than 1200 rpm.

4. The repair process using ELDS bearings includes the following requirements:

4.a Only ELDS bearings, in accordance with the following table (Attachment A / Table 1), can be used. Other double seal bearings will not provide an acceptable bearing life.

Attachment A / Table 1
ELDS Bearings NSNs and Part Numbers

SIZE	P/N	NSN
201	6201-2RS1C3/GHY	3110-01-492-0221
202	6202-2RS1C3/GHY	3110-01-491-0233
203	6203-2RS1C3/GHY	3110-01-491-0234
204	6204-2RS1C3/GHY	3110-01-491-6636
205	6205-2RS1C3/GHY	3110-01-451-9166
206	6206-2RS1C3/GHY	3110-01-451-9165
207	6207-2RS1C3/GHY	3110-01-451-9164
208	6208-2RS1C3/GHY	3110-01-451-9170
209	6209-2RS1C3/GHY	3110-01-451-9252
210	6210-2RS1C3/GHY	3110-01-492-1831
211	6211-2RS1C3/GHY	3110-01-518-0937
303	6303-2RS1C3/GHY	3110-01-493-3750
304	6304-2RS1C3/GHY	3110-01-451-9153
305	6305-2RS1C3/GHY	3110-01-451-9158
306	6306-2RS1C3/GHY	3110-01-451-9159
607	6307-2RS1C3/GHY	3110-01-451-9161
308	6308-2RS1C3/GHY	3110-01-451-9167
309	6309-2RS1C3/GHY	3110-01-451-9168
310	6310-2RS1C3/GHY	3110-01-490-6683
311	6311-2RS1C3/GHY	3110-01-492-0223
312	6312-2RS1C3/GHY	3110-01-490-6848
313	6313-2RS1C3/GHY	3110-01-492-0191
314	6314-2RS1C3GHY	3110-01-492-0226
315	6315-2RS1C3/GHY	3110-01-494-0993
316	6316-2RS1C3/GHY	3110-01-492-0188
317	6317-2RS1C3/GHY	3110-01-492-0219
318	6318-2RS1C3/GHY	3110-01-493-3749

4.b Both bearings of each converted motor must be ELDS bearings.

4.c A label plate must be permanently attached to the motor indicating "Do Not Lubricate".

4.d Grease fills and drains, if present, must be fitted with a pipe plug, securely fastened. Fittings to accommodate grease guns must be replaced with pipe plugs."

ATTACHMENT B-1

Ship name:

Hull number:

Work item number:

Date:

Motor nameplate data.

Manufacture:

Amperage (AMP):

Model number:

Horsepower (HP):

NSN:

Revolutions per minute (RPM):

S/N:

Winding (WDG):

Frame:

Maximum ambient temperature (AMB):

Volt:

Insulation class:

Phase:

Duty:

Hertz (HZ):

Drawing number (DWG):

Field changes:

Additional nameplate data:

3.3.1 Core Loss test.

SAT		UNSAT	
Test equipment:			
Findings:			

3.3.1.1 Loop test.

SAT		UNSAT	
Test Equipment:			
Findings:			

3.3.2 Core temperature limitations and winding data.

Core temperature limitations:	°F
As found winding data:	
Manufacture winding data:	

3.3.2.1 Post winding removal core loss and loop test.

- Core Loss test.

SAT		UNSAT	
Test equipment:			
Findings:			

- Loop test.

SAT		UNSAT	
Test Equipment:			
Findings:			

3.3.5 Rotor inspection.

- Non-wound rotor inspection.

SAT		UNSAT	
Findings:			

- Wound rotor inspection.

SAT		UNSAT	
Findings:			

3.3.7 Commutator pre-installation and post-installation test.

Pre-installation	Acceptance Criteria	Measured	SAT	UNSAT
	MΩ	MΩ		
	MΩ	MΩ		
Post-installation				
	MΩ	MΩ		
	MΩ	MΩ		
Findings:				

3.5.1 500-volt megger insulation resistance test.

Lead	Acceptance Criteria	Measured	SAT	UNSAT
	MΩ	MΩ		
	MΩ	MΩ		
	MΩ	MΩ		
Findings:				

3.5.3 Phase resistance balance test.

Phase	Acceptance Criteria	Measured	SAT	UNSAT
	Ω	Ω		
	Ω	Ω		
	Ω	Ω		
Findings:				

3.5.4 Voltage surge test.

Circuit Tested	Test Voltage	Error Ratio	SAT	UNSAT
	V	%		
	V	%		
	V	%		
Findings:				

3.5.5 DC HI POT test.

Circuit Tested	Test Voltage	Leakage Current	SAT	UNSAT
	V	uA		
	V	uA		
	V	uA		
Findings:				

3.6.1 Post winding permanent connection.

- 500-volt megger insulation resistance test.

Lead	Acceptance Criteria	Measured	SAT	UNSAT
	MΩ	MΩ		
	MΩ	MΩ		
	MΩ	MΩ		
Findings:				

- Phase resistance balance test.

Phase	Acceptance Criteria	Measured	SAT	UNSAT
	Ω	Ω		
	Ω	Ω		
	Ω	Ω		
Findings:				

- Voltage surge test.

Circuit Tested	Test Voltage	Error Ratio	SAT	UNSAT
	V	%		
	V	%		
	V	%		
Findings:				

- DC HI POT test.

Circuit Tested	Test Voltage	Leakage Current	SAT	UNSAT
	V	uA		
	V	uA		
	V	uA		
Findings:				

3.6.2 DC bar-to-bar test.

Circuit Tested	Acceptance Criteria	Measured	SAT	UNSAT
	Ω	Ω		
	Ω	Ω		
Findings:				

3.6.3 Polarization index test.

Circuit Tested	One Minute	10 Minute	PI Ratio	SAT	UNSAT
	MΩ	MΩ			
	MΩ	MΩ			
	MΩ	MΩ			
Findings:					

3.9 Post Varnish and bake

- 500-volt megger insulation resistance test.

Lead	Acceptance Criteria	Measured	SAT	UNSAT
	MΩ	MΩ		
	MΩ	MΩ		
	MΩ	MΩ		
Findings:				

- Phase resistance balance test.

Phase	Acceptance Criteria	Measured	SAT	UNSAT
	Ω	Ω		
	Ω	Ω		
	Ω	Ω		
Findings:				

- Voltage surge test.

Circuit Tested	Test Voltage	Error Ratio	SAT	UNSAT
	V	%		
	V	%		
	V	%		
Findings:				

- DC HI POT test.

Circuit Tested	Test Voltage	Leakage Current	SAT	UNSAT
	V	uA		
	V	uA		
	V	uA		
Findings:				

3.10 AC HI POT test.

Circuit Tested	Test Voltage	Leakage Current	SAT	UNSAT
	V	mA		
	V	mA		
	V	mA		
Findings:				

3.11 Commutator or collector ring eccentricity.

SAT		UNSAT	
Findings:			

3.17.1.5 Maintenance requirement change for double seal bearing conversion.

Findings:	

3.18.2 Inspection for EMI fixes.

Findings:	

3.19 No-load shop test.

Direction of Rotation	CW		CCW	
Speed				RPM
Current		Volts		
T1	A	T1		V
T2	A	T2		V
T3	A	T3		V
Bearing Temperature				
Coupled End				°F
Free End				°F

3.20 Operational shop test of assembled vaneaxial/tubeaxial fan.

Direction of Rotation	CW		CCW	
Speed				RPM
Current		Volts		
T1	A	T1		V
T2	A	T2		V
T3	A	T3		V
Bearing Temperature				
Coupled End				°F
Free End				°F

500-volt megger insulation resistance test				
Lead	Acceptance Criteria	Measured	SAT	UNSAT
	MΩ	MΩ		
	MΩ	MΩ		
	MΩ	MΩ		

ATTACHMENT B-2

Ship name:

Hull number:

Work item number:

Date:

Motor nameplate data.

Manufacture:

Amperage (AMP):

Model number:

Horsepower (HP):

NSN:

Revolutions per minute (RPM):

S/N:

Winding (WDG):

Frame:

Maximum ambient temperature (AMB):

Volt:

Insulation class:

Phase:

Duty:

Hertz (HZ):

Drawing number (DWG):

Field changes:

Additional nameplate data:

3.1.1 Preliminary inspection.

SAT		UNSAT	
Findings:			

3.1.2 List of accessories.

Findings:	

3.2 Foundation structural inspection.

SAT		UNSAT	
Findings:			

3.22 Post installation 500-volt megger insulation resistance test.

Lead	Acceptance Criteria	Measured	SAT	UNSAT
	MΩ	MΩ		
	MΩ	MΩ		
	MΩ	MΩ		
Findings:				

3.23 Operational test of the assembled equipment at full system capacity.

Direction of Rotation	CW		CCW	
Speed				RPM
15 Minutes				
Current		Volts		
T1	A	T1		V
T2	A	T2		V
T3	A	T3		V
Bearing Temperature				
Coupled End				°F
Free End				°F
30 Minutes				
Current		Volts		
T1	A	T1		V
T2	A	T2		V
T3	A	T3		V
Bearing Temperature				
Coupled End				°F
Free End				°F
45 Minutes				
Current		Volts		
T1	A	T1		V
T2	A	T2		V
T3	A	T3		V
Bearing Temperature				
Coupled End				°F
Free End				°F
One Hour				
Current		Volts		
T1	A	T1		V
T2	A	T2		V
T3	A	T3		V
Bearing Temperature				
Coupled End				°F
Free End				°F

3.23.1 Operational test of the assembled equipment at full system capacity, two speed motor.

Direction of Rotation	CW		CCW	
Speed				RPM
15 Minutes				
Current			Volts	
T4	A		T4	V
T5	A		T5	V
T6	A		T6	V
Bearing Temperature				
Coupled End				°F
Free End				°F
30 Minutes				
Current			Volts	
T4	A		T4	V
T5	A		T5	V
T9	A		T6	V
Bearing Temperature				
Coupled End				°F
Free End				°F
45 Minutes				
Current			Volts	
T4	A		T4	V
T5	A		T5	V
T6	A		T6	V
Bearing Temperature				
Coupled End				°F
Free End				°F
One Hour				
Current			Volts	
T4	A		T4	V
T5	A		T5	V
T6	A		T6	V
Bearing Temperature				
Coupled End				°F
Free End				°F

3.23.2 Operational test of the assembled equipment at full system capacity, limited duty motor.

Direction of Rotation	CW		CCW	
Speed	RPM			
Duty Cycle or 10 Minutes as applicable.				
Current		Volts		
T1	A	T1	V	
T2	A	T2	V	
T3	A	T3	V	
Bearing Temperature				
Coupled End	°F			
Free End	°F			
20 Minutes as applicable.				
Current		Volts		
T1	A	T1	V	
T2	A	T2	V	
T3	A	T3	V	
Bearing Temperature				
Coupled End	°F			
Free End	°F			
30 Minutes as applicable.				
Current		Volts		
T1	A	T1	V	
T2	A	T2	V	
T3	A	T3	V	
Bearing Temperature				
Coupled End	°F			
Free End	°F			

3.23.3 Post installation 500-volt megger hot insulation resistance test.

Lead	Acceptance Criteria	Measured	SAT	UNSAT
	MΩ	MΩ		
	MΩ	MΩ		
	MΩ	MΩ		
Findings:				

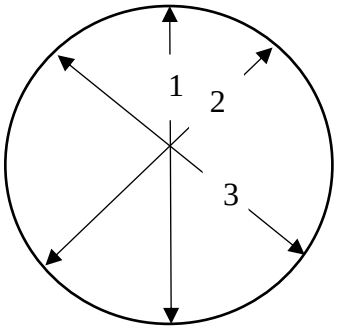
ATTACHMENT C

SHIP NAME & HULL NUMBER / / MONTH/DAY/YEAR

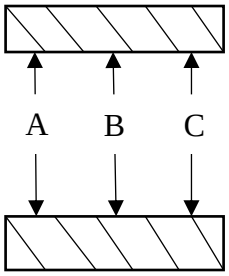
MOTOR LOCATION (i.e., NO.2 MAIN FEED PUMP, etc.)

HOUSING DIAMETERS

DRIVE END			
	A	B	C
1			
2			
3			



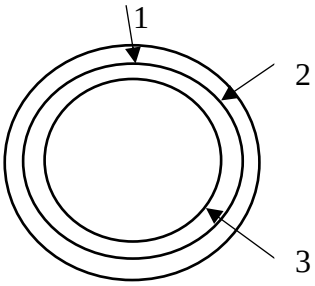
OUTER INNER

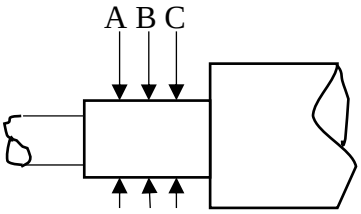


OUTER END			
	A	B	C
1			
2			
3			

SHAFT DIAMETERS

DRIVE END				OUTER END		
	A	B	C	A	B	C
1						
2						
3						





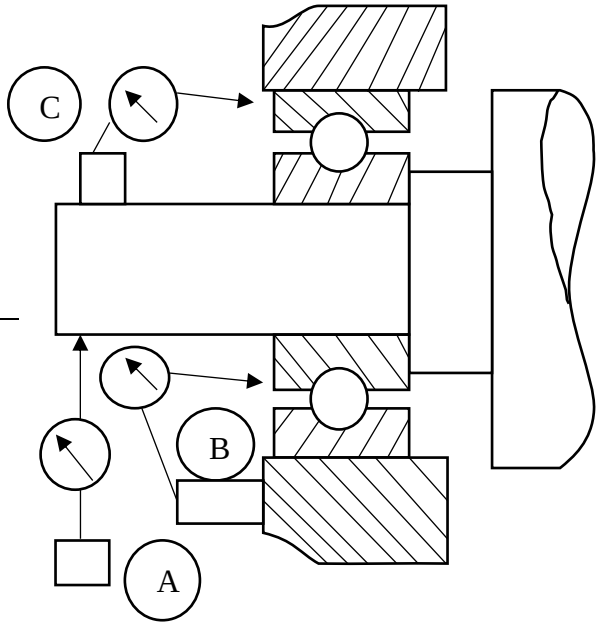
A. SHAFT RADIAL RUNOUT _____

B. FACE RUNOUT, BEARING INNER RING
DRIVE END _____
OUTER END_____

C. FACE RUNOUT, BEARING OUTER RING _____
DRIVE END _____
OUTER END_____

MECHANICAL CONDITION
(LOSS OF LUBE, BURNED ETC.)

_____
_____



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