OAK GROVE PLANT

MAINTENANCE SECTION-MECHANICAL

PRIMARY AIR FAN
MAJOR INSPECTION

PROCEDURE NO. OG-MSM-3002

REVISION NO. 0

EFFECTIVE DATE: _____

PREPARED BY (Print): TOM PERSON 6/10/2010 EXT: 6395

TECHNICAL REVIEW BY (Print): _____ EXT: _____

APPROVED BY: _____ DATE: _____

1.0 PURPOSE AND SCOPE

The purpose of this procedure is to perform a major inspection of the Primary Air Fan, Howden-Buffalo, Model L5N 2636.00.98.

2.0 ACCEPTANCE CRITERIA

- The rotating element will be inspected for evidence of excessive wear, erosion, corrosion, cracking, and effects of cavitation.
- Internal casings will be inspected for evidence of erosion, corrosion, debris buildup, and cracking.
- All bearings will be inspected for evidence distress.
- Seal and shaft journals will be inspected for evidence of excessive wear, misalignment, and journal scoring.
- Visual observations indicating cracking or distress of any component will be further evaluated.`

3.0 DEFINITIONS/ACRONYMS

- AR Action Request
- LOTO Lock Out Tag Out
- PPE Personnel Protective Equipment
- MSDS Material Safety Data Sheet
- DE Drive End
- NDE Non-Drive End

4.0 REFERENCES

- MSDS for chemicals, cleaners, oil, grease, etc.
- Safety Handbook
- Buffalo-Howden Primary Air Fan Manual

5.0 PRECAUTIONS, LIMITATIONS AND NOTES

- Hold tailgate meeting prior to performing procedure.
- Follow LOTO and permit procedures including Confined Space Permits and Welding Permit.
- Wear proper PPE.
- Block all open lines.
- Provide fall protection as required.
- Use precautions around rotating equipment.
- Beware of slippery surfaces.
- Secure ladder as required.
- Watch for pinch points when climbing ladders or scaffolding.
- Keep area clean and organized.
- Be aware of other workers in the area.
- Inspect tools for proper condition.
- Use two-way radios.
- Provide proper lighting.

6.0 PREREQUISITES

6.1 Planning Group

6.1.1 ENTER the following information:

Work Order No. _____

Component Tag No. _____

Unit No. _____

Serial No. _____

6.1.2 A Howden-Buffalo Service Representative will be required on-site to provide technical assistance for this inspection.

6.1.3 An NDE Contractor will be required on-site to perform testing on the fan rotating assembly.

6.1.4 It is recommended to use Laser Alignment Equipment when checking the fan shaft to motor alignment. A qualified Laser Alignment Specialist will be required to perform this function.

6.1.5 Plan to remove and clean the ITT standard lube oil heat exchangers. Exchanger end cover gaskets should be set up in the Oak Grove Warehouse.

6.2 Mechanical Group

6.2.1 Personnel performing this procedure shall review all instructions, precautions, notes, and safety requirements prior to performing this procedure.

6.2.2 Any visual observations indicating cracking or distress of any component should be documented with photographs and be further evaluated.

7.0 TOOLS AND MATERIALS

- Ladder and scaffolding as required
- Hand tools as required
- Rags, trash bags, Absorball
- Lube oil filter, 4 each, TSN 483313
- Lube oil pump suction strainer, Flow-EZ #P-20-1 1/4” NPT, 100 mesh
- Heat exchanger inlet end cover gasket, 2 each, part # 3-299-8-04-210-10
- Heat exchanger outlet end cover gasket, 2 each, part # 3-299-8-04-210-08
- Mechanical cleaners and pressurized water source for cleaning heat exchanger tube bundles
- Curil-T gasket sealant
- DE bearing sleeve, Bowden-Buffalo part # EZLA 22-200
- NDE bearing sleeve, Bowden-Buffalo part # EZLQ 22-200
- Bearing seals, type 20, TSN 483314
- Bearing thermocouple, TSN 483311
- Fan shaft seal, Howden-Buffalo part # C2-90325
- Coupling disc seal assembly, Howden-Buffalo part # 1060G20SGA
- Coupling disc fastener set, Howden-Buffalo part # 1060G20FS
- Laser alignment device for coupling alignment
- Rigging for bearing inspections
- 15 ton mobile crane and Operator
- Flexible coupling, Lovejoy L095
- Sandblasting equipment
- Lubrication:
  - MOBIL OIL HEAVY, 120 gallons, for lube oil reservoir
  - MOBIL 1 5W50, for REXA actuator on fan inlet dampers

8.0 INSTRUCTIONS

CONTENTS

8.1 General

8.1.1 Posted housekeeping zones shall be observed.

8.1.2 Drawings provided in this procedure are for reference only.

8.1.3 OBTAIN LOTO and any other necessary permits before proceeding. Be sure the LOTO boundaries include all auxiliary equipment, including fan discharge dampers, REXA fan inlet and damper control systems, lube oil skid, and electrical and instrumentation connections.

VERIFY

_____/_____ VERIFY that the housekeeping zone and cleanliness class are satisfactorily established as specified in the Work Order.

_____/_____ VERIFY that LOTO and necessary permits have been obtained.

8.2 Inspection

☐ 8.2.1 REMOVE 18 nuts and 18 washers from studs in fan access door THEN OPEN fan access door. PLACE nuts and washers in zip-lock bag AND LABEL bag.

NOTE: Loss of material from erosion or corrosion is excessive when loss reaches any of the following:

- Structural components: 25% of original thickness.
- Liners: 90% of original thickness in any area.
- Fasteners: 50% of original size.

☐ 8.2.2 INSPECT fan access door for erosion, corrosion, leakage, looseness, and proper seal.

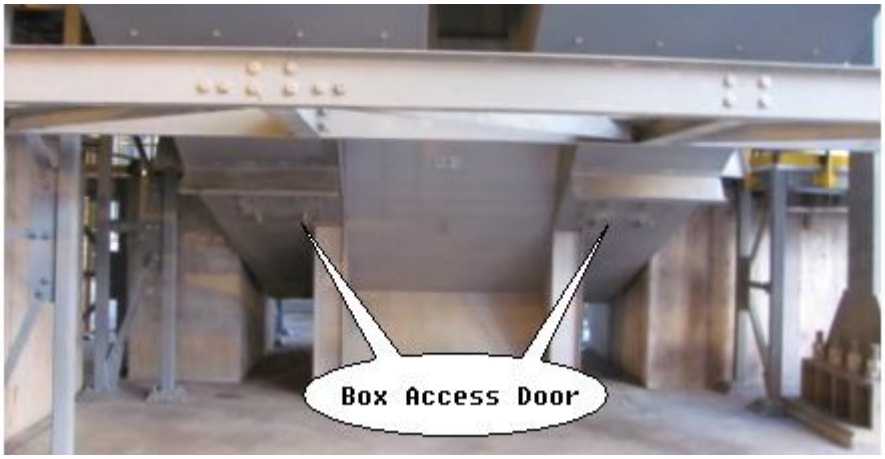
Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.2.3 REMOVE 14 nuts and 14 washers from studs in each box access door THEN OPEN two box access doors. PLACE nuts and washers in zip-lock bag AND LABEL bag.



☐ 8.2.4 INSPECT box access doors for erosion, corrosion, leakage, looseness, and proper seal.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.2.5 INSPECT box recesses and shelves for erosion, corrosion, cracks, and looseness.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.2.6 INSPECT internal casings for evidence of excessive wear, erosion, corrosion, cracks and effects of cavitation.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.2.7 INSPECT internal bracing for erosion, corrosion, and cracks.

Satisfactory _____

If unsatisfactory, describe condition below.

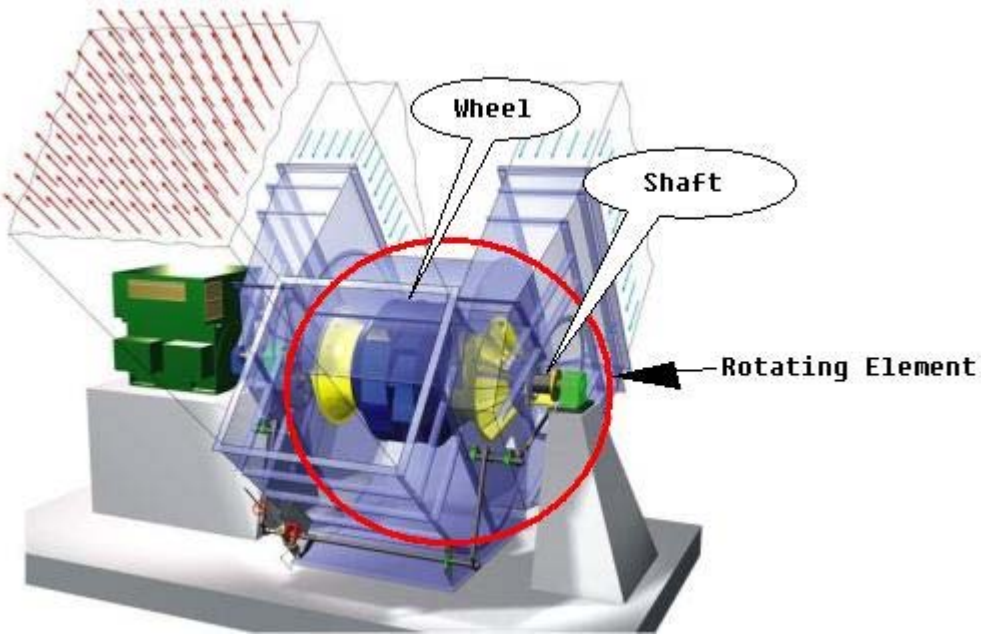
COMMENTS: _____

_____

☐ 8.2.8 NOTIFY NDE Contractor to perform testing on fan rotor assembly.

☐ 8.2.9 CLOSE dampers AND temporarily SEAL any openings in fan to prepare for sandblasting.

☐ 8.2.10 SANDBLAST wheel to prepare for inspection.



☐ 8.2.11 INSPECT rotating element for evidence of excessive wear, erosion, corrosion, cracking, and effects of cavitation.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.2.12 INSPECT wheel for evidence of erosion, corrosion, cracks, and fastener wear or looseness.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.2.13 INSPECT shaft for erosion, corrosion, cracks, excessive wear in journal and seal areas, and damaged surface finish of shaft journal area.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

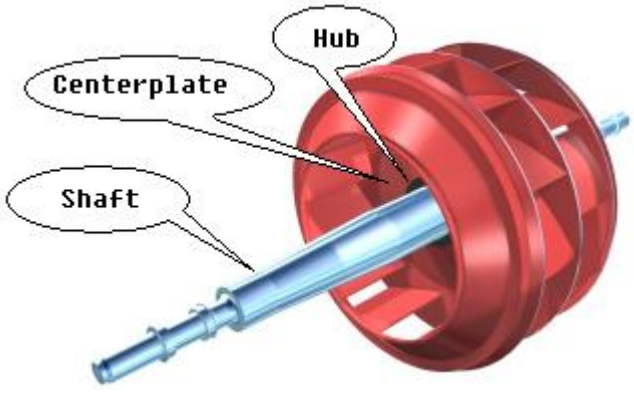
☐ 8.2.14 INSPECT wheel for hub to centerplate fit and hub to shaft fit.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____



☐ 8.2.15 INSPECT inlet clearances in a 360 degree sweep.

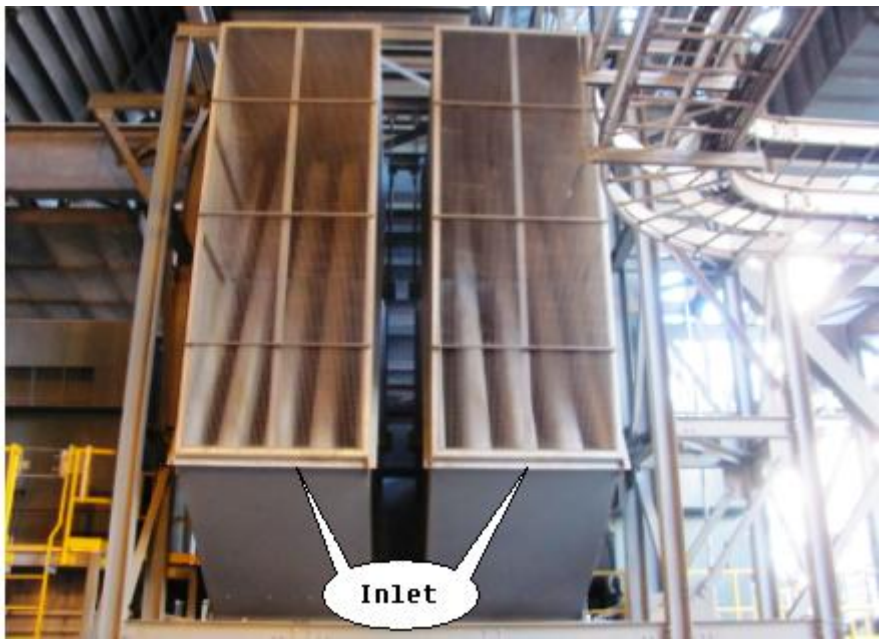
Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.2.16 NOTIFY Laser Alignment Specialist to check coupling alignment.



☐ 8.2.17 INSPECT drive side variable inlet vane assembly for 360 degree clearance and for damaged vanes and loose or missing hardware.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.2.18 INSPECT external bracing for cracks.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.2.19 INSPECT fan housing and inlet boxes for erosion, corrosion, and cracks.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

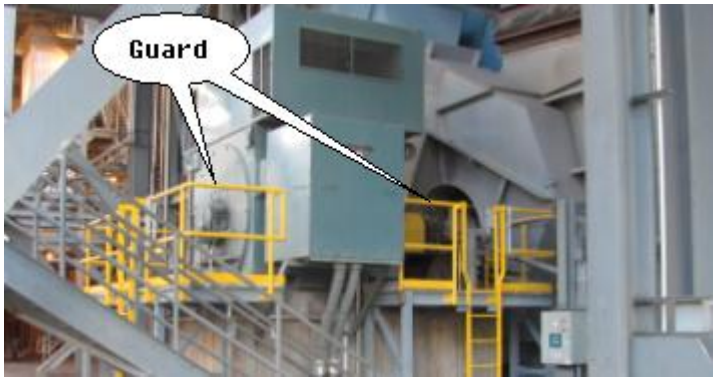
☐ 8.2.20 INSPECT guards for cracks and looseness.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____



☐ 8.2.21 INSPECT fan base for cracks and loose fasteners.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.2.22 INSPECT expansion joint for tears, deterioration, and loose or missing hardware.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.2.23 CLOSE one box access door AND INSTALL 14 washers and 14 nuts on studs. REPEAT for second box access door.

☐ 8.2.24 CLOSE fan access door AND INSTALL 18 washers and 18 nuts on studs.

☐ 8.2.25 INSTALL fan access door,

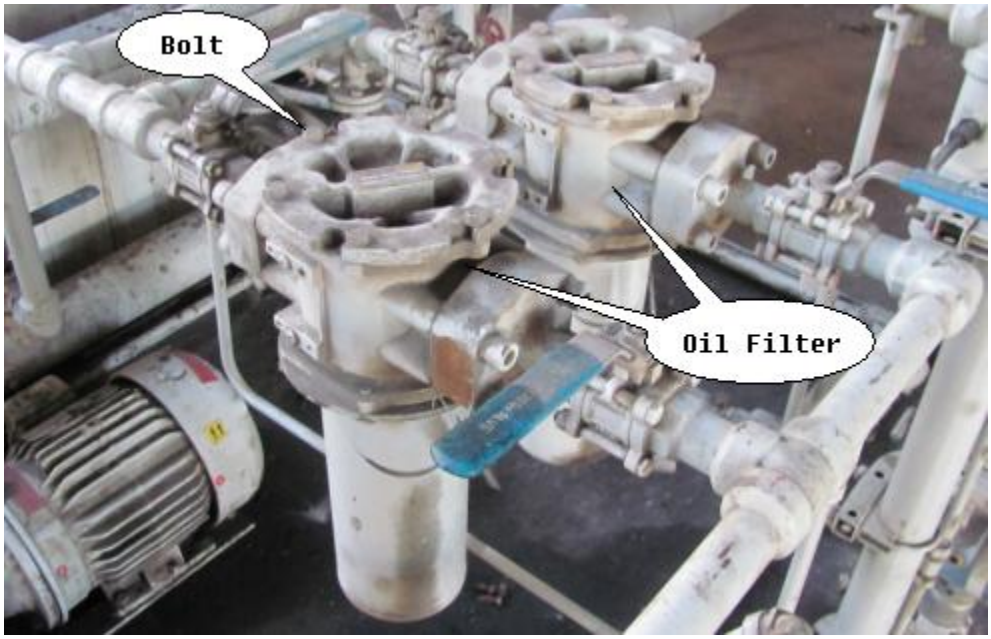
_____/_____ 8.2.26 Inspection is complete.

8.3 Lubrication

☐ 8.3.1 OPEN drain cock on lube oil reservoir AND DRAIN oil into suitable containers (capacity of reservoir is 120 gallons).

☐ 8.3.2 CLOSE drain cock on lube oil reservoir.

☐ 8.3.3 LOOSEN six bolts on one oil filter AND REMOVE cover from oil filter.



☐ 8.3.4 REMOVE filter element from oil filter body.

☐ 8.3.5 Using clean rags, CLEAN mating surfaces of cover and oil filter body.

☐ 8.3.6 INSERT new filter element into oil filter body.

☐ 8.3.7 INSTALL cover on oil filter body AND TIGHTEN six bolts.

☐ 8.3.8 LOOSEN six bolts on second oil filter AND REMOVE cover from oil filter.

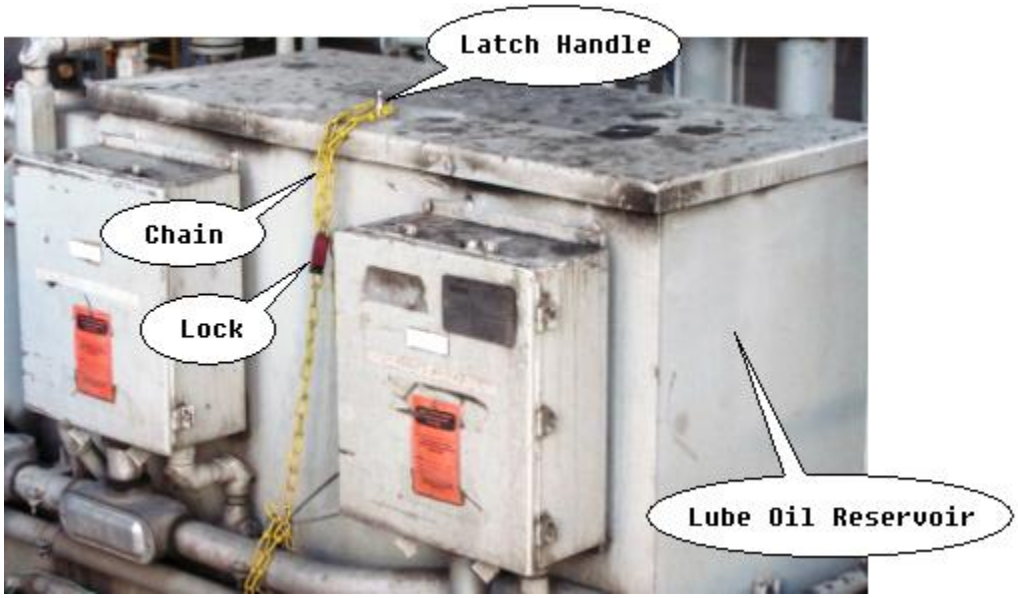
☐ 8.3.9 REMOVE filter element from oil filter body.

☐ 8.3.10 Using clean rags, CLEAN mating surfaces of cover and oil filter body.

☐ 8.3.11 INSERT new filter element into oil filter body.

☐ 8.3.12 INSTALL cover on oil filter body AND TIGHTEN six bolts.

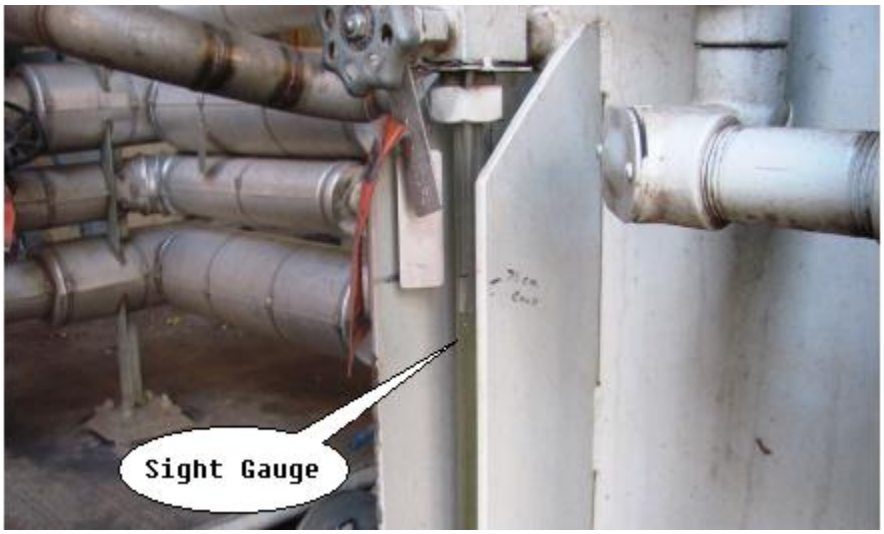
☐ 8.3.13 REMOVE lock and chain from latch handle on lube oil reservoir.



☐ 8.3.14 OPEN cover of lube oil reservoir.

☐ 8.3.15 REMOVE cap from oil fill tube.

☐ 8.3.16 ADD oil (MOBIL OIL HEAVY, approximately 120 gallons) at oil fill tube until oil level reaches mark on sight gauge.



☐ 8.3.17 INSTALL cap on oil fill tube.

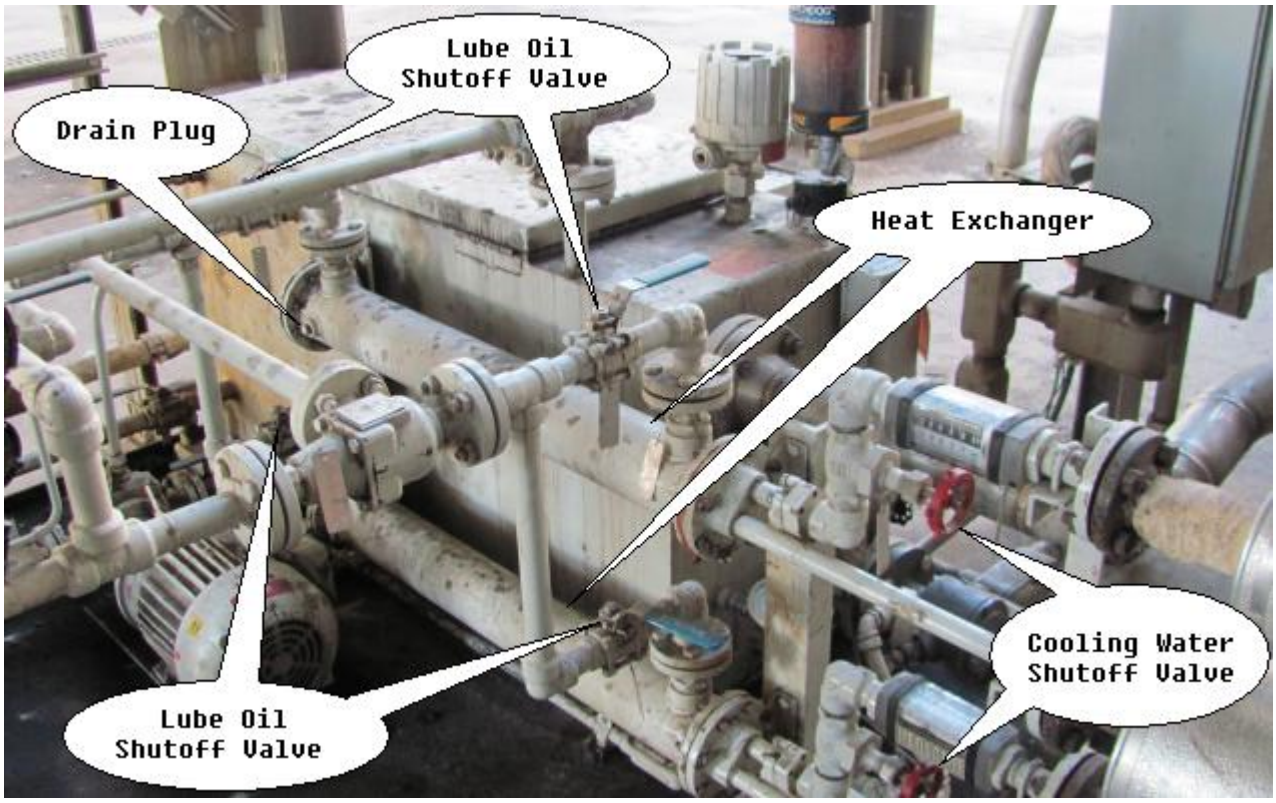
☐ 8.3.18 CLOSE cover of oil lube reservoir AND SECURE latch handle.

☐ 8.3.19 INSTALL chain and lock around latch handle.

_____/_____ 8.3.20 Lubrication is complete.

8.4 Clean Lube Oil Reservoir Heat Exchangers

☐ 8.4.1 CLOSE four lube oil shutoff valves and two cooling water shutoff valves to isolate heat exchangers.



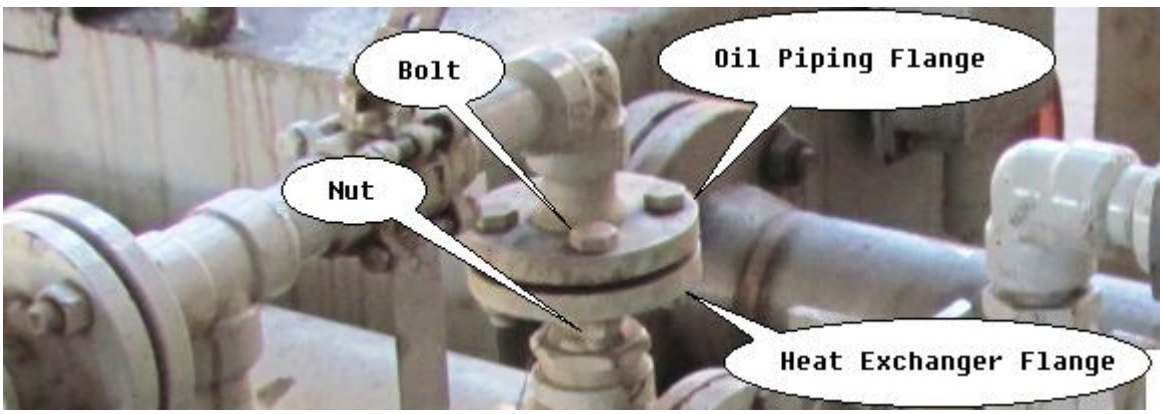
☐ 8.4.2 REMOVE drain plug from top heat exchanger AND DRAIN oil into suitable container.

☐ 8.4.3 Using clean rag, CLEAN drain plug THEN WRAP drain plug threads with Teflon tape.

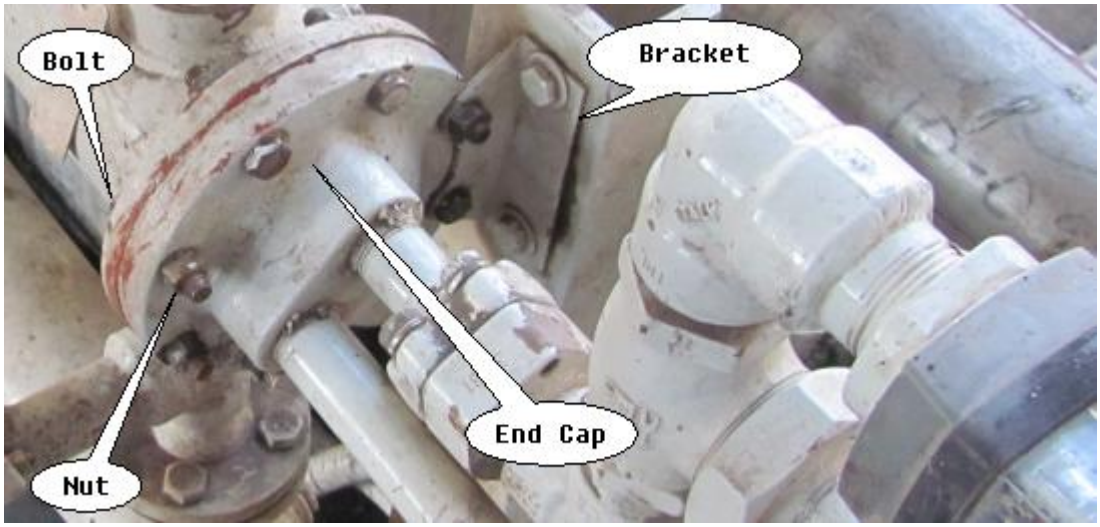
☐ 8.4.4 INSTALL drain plug in heat exchanger.

☐ 8.4.5 ATTACH rigging and strap to crane or chain fall and around top heat exchanger.

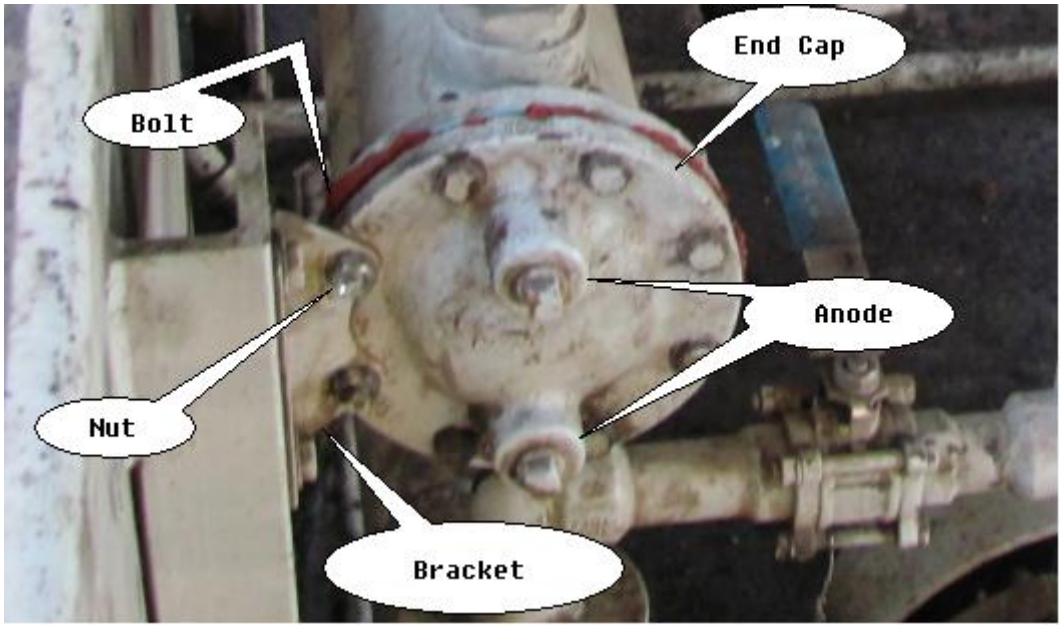
☐ 8.4.6 REMOVE four nuts and four bolts securing heat exchanger flange to oil piping flange at each end of heat exchanger. PLACE nuts and bolts in zip-lock bag AND LABEL bag.



☐ 8.4.7 With heat exchanger is supported by sling, REMOVE eight nuts and eight bolts securing end cap with cooling water piping to heat exchanger and bracket. PLACE nuts and bolts in zip-lock bag AND LABEL bag.



☐ 8.4.8 With heat exchanger is supported by sling, REMOVE two nuts and two bolts securing heat exchanger end cap to bracket. PLACE nuts and bolts in zip-lock bag AND LABEL bag.



☐ 8.4.9 Using crane or chain fall, REMOVE top heat exchanger from lube oil skid AND PLACE heat exchanger on blocks. REMOVE sling from heat exchanger.

☐ 8.4.10 REMOVE remaining six nuts, six bolts, and enc cap from heat exchanger. PLACE nuts and bolts in zip-lock bag AND LABEL bag.

☐ 8.4.11 REMOVE gaskets from both end caps and both flanges. DISCARD gaskets.

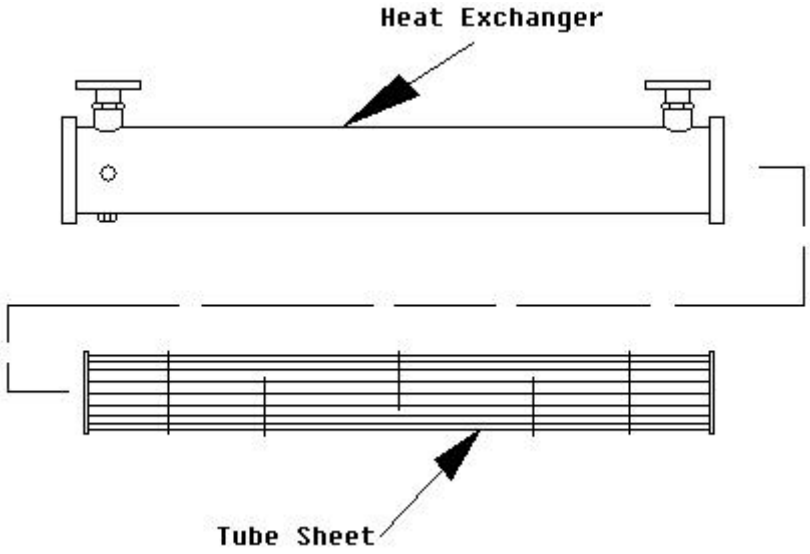
☐ 8.4.12 SCRAPE two anodes mounted inside end cap to brighten surfaces AND INSPECT anodes for deterioration. An anode is considered unsatisfactory if it is more than half corroded away.

CAUTION: When removing tube bundles from heat exchangers for inspection or cleaning, exercise care to ensure they are not damaged by improper handling.

The weight of the tube bundle should not be supported on individual tubes but should be carried by the tube sheets, support or baffle plates, or on blocks contoured to the shape of the tube bundles.

Do not handle tube bundles with hooks or other tools which might damage tubes. Move tube bundles on cradles or skids.

☐ 8.4.13 Carefully REMOVE tube sheet from heat exchanger.



☐ 8.4.14 Using mechanical cleaners and pressurized water, CLEAN tube bundle.

☐ 8.4.15 Visually INSPECT tube sheet for blockage, damage, and corrosion. If necessary, repeat cleaning.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.4.16 SLIDE tube sheet into heat exchanger.

☐ 8.4.17 Using clean rags and solvent, CLEAN six bolts and six nuts THEN APPLY anti-seize to threads of bolts.

☐ 8.4.18 INSTALL new gasket, end cap with anodes, six bolts, and six nuts on heat exchanger, leaving two holes to attach heat exchanger to bracket. Do not install this heat exchanger at this time.

☐ 8.4.19 REMOVE drain plug from bottom heat exchanger AND DRAIN oil into suitable container.

☐ 8.4.20 Using clean rag, CLEAN drain plug THEN WRAP drain plug threads with Teflon tape.

☐ 8.4.21 INSTALL drain plug in heat exchanger.

☐ 8.4.22 ATTACH rigging and strap to crane or chain fall and around bottom heat exchanger.

☐ 8.4.23 REMOVE four nuts and four bolts securing heat exchanger flange to oil piping flange at each end of heat exchanger. PLACE nuts and bolts in zip-lock bag AND LABEL bag.

☐ 8.4.24 With heat exchanger is supported by sling, REMOVE eight nuts and eight bolts securing end cap with cooling water piping to heat exchanger and bracket. PLACE nuts and bolts in zip-lock bag AND LABEL bag.

☐ 8.4.25 With heat exchanger is supported by sling, REMOVE two nuts and two bolts securing heat exchanger end cap to bracket. PLACE nuts and bolts in zip-lock bag AND LABEL bag.

☐ 8.4.26 Using crane or chain fall, REMOVE bottom heat exchanger from lube oil skid AND PLACE heat exchanger on blocks.

☐ 8.4.27 REMOVE remaining six nuts, six bolts, and enc cap from heat exchanger. PLACE nuts and bolts in zip-lock bag AND LABEL bag.

☐ 8.4.28 REMOVE gaskets from both end caps and both flanges. DISCARD gaskets.

☐ 8.4.29 SCRAPE two anodes mounted inside end cap to brighten surfaces AND INSPECT anodes for deterioration. An anode is considered unsatisfactory if it is more than half corroded away.

☐ 8.4.30 Carefully REMOVE tube sheet from heat exchanger.

☐ 8.4.31 Using mechanical cleaners and pressurized water, CLEAN tube bundle.

☐ 8.4.32 Visually INSPECT tube sheet for blockage, damage, and corrosion. If necessary, repeat cleaning.

Satisfactory _____

If unsatisfactory, describe condition below.

COMMENTS: _____

_____

☐ 8.4.33 SLIDE tube sheet into heat exchanger.

☐ 8.4.34 Using clean rags and solvent, CLEAN six bolts and six nuts THEN APPLY anti-seize to threads of bolts.

☐ 8.4.35 INSTALL new gasket, end cap with anodes, six bolts, and six nuts on heat exchanger, leaving two holes to attach heat exchanger to bracket.

☐ 8.4.36 Using crane or chain fall, POSITION bottom heat exchanger on brackets in lube oil skid with new gaskets inserted between heat exchanger flanges and oil piping flanges.

☐ 8.4.37 Using clean rags and solvent, CLEAN two bolts and two nuts THEN APPLY anti-seize to threads of bolts.

☐ 8.4.38 SECURE end cap with anodes to bracket using remaining two bolts and two nuts.

☐ 8.4.39 Using clean rags and solvent, CLEAN eight bolts and eight nuts THEN APPLY anti-seize to threads of bolts.

☐ 8.4.40 SECURE heat exchanger to end cap with cooling water piping and bracket using new gasket, eight bolts, and eight nuts.

☐ 8.4.41 Using clean rags and solvent, CLEAN eight bolts and eight nuts THEN APPLY anti-seize to threads of bolts.

☐ 8.4.42 SECURE heat exchanger flange to oil piping flange at each end of heat exchanger using four bolts and four nuts. REMOVE sling from heat exchanger.

☐ 8.4.43 Using crane or chain fall, POSITION bottom heat exchanger on brackets in lube oil skid with new gaskets inserted between heat exchanger flanges and oil piping flanges.

☐ 8.4.44 Using clean rags and solvent, CLEAN two bolts and two nuts THEN APPLY anti-seize to threads of bolts.

☐ 8.4.45 SECURE end cap with anodes to bracket using remaining two bolts and two nuts.

☐ 8.4.46 Using clean rags and solvent, CLEAN eight bolts and eight nuts THEN APPLY anti-seize to threads of bolts.

☐ 8.4.47 SECURE heat exchanger to end cap with cooling water piping and bracket using new gasket, eight bolts, and eight nuts.

☐ 8.4.48 Using clean rags and solvent, CLEAN eight bolts and eight nuts THEN APPLY anti-seize to threads of bolts.

☐ 8.4.49 SECURE heat exchanger flange to oil piping flange at each end of heat exchanger using four bolts and four nuts. REMOVE sling from heat exchanger.

☐ 8.4.50 OPEN two cooling water shutoff valves and four lube oil shutoff valves.

_____/_____ 8.4.51 Heat exchanger cleaning is complete.

VERIFY

_____/_____ VERIFY the satisfactory completion of steps 8.2 through 8.4.51.

9.0 TESTING

Not applicable.

10.0 CLOSEOUT

☐ 10.1 NOTIFY supervisor of unsatisfactory conditions documented during inspection.

☐ 10.2 CLEAN UP all spills and trash in the area.

☐ 10.3 RELEASE LOTO and any other permits.

☐ 10.4 RETURN all tools and ladders to proper locations.

☐ 10.6 RECORD job information and man hours on Work Order for historical and accounting purposes.

☐ 10.7 ENTER an AR for any problems not corrected.

☐ 10.8 RETURN all unused clean oil to proper location.

☐ 10.9 DISPOSE of all waste oil, oily rags, trash properly.

☐ 10.10 RETURN rebuildable parts to the Luminant Oak Grove Warehouse.

Data Reviewed & Approved: _____ Date _____
Mechanical Maintenance Supervisor

11.0 ATTACHMENTS/FORMS

None