Tank Farm Maintenance Procedure

MAINTENANCE

Inspect Replacement Cross Site Transfer System Air Compressors and Air Dryers

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### Inspect Replacement Cross Site Transfer System Air Compressors and Air Dryers

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for performing maintenance inspections for the Replacement Cross Site Transfer System Compressed Air Packages including air compressors, air dryers, and other associated skid mounted accessories.

1.2 Scope

This procedure provides directions for the maintenance inspection of the Replacement Cross Site Transfer System Compressed Air Packages manufactured by Rogers Machinery Company, Inc., including Air Compressors SA-CMP-3101A and SA-CMP-3101B, the respective air dryers, and the associated skid mounted equipment which are installed in Compressor Room 104 of the respective support buildings for Diversion Box 6241-A and Vent Station 6241-V.

This procedure will be performed prior to performing cross site transfer.

Calibration of compressor skid pressure relief valves is not included in this procedure.

2.0 INFORMATION

NONE
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

WARNING - Operations of the compressor can cause eye injury or hearing loss to personnel.

3.1.1 Working on instrument air system prior to isolating and depressurizing the affected portion of system may result in personnel injury.

3.1.2 The following Personal Protective Equipment (PPE) is required when equipment is running:
- Leather Gloves
- Safety Glasses with Side Shields
- Hearing Protection (e.g. foam ear plugs or ear muffs).

3.1.3 Lockout and Tagouts will be performed in accordance with DOE-0336, Hanford Site Lockout/Tagout Procedure, during maintenance activities where there exists a potential for personnel injury or equipment damage.

3.1.4 Compliance with DOE–0359, Hanford Site Electrical Safety Program is required when working with this procedure.

3.1.5 To protect against contact with hot surfaces and solvents, the proper Personnel Protective Equipment required will be leather gloves and safety glasses with side shields. Hearing protection will be required when equipment is running.

3.2 Equipment Safety

CAUTION - Overfilling crankcase can cause oil foaming, oil pump cavitations, and subsequent machine damage.

CAUTION - Over tightening adjusting screw lock nut can strip threads.

CAUTION - Use of solvents to flush compressor crankcase may cause damage.

CAUTION - Over tightening compressor crankcase oil plug may strip threads.

3.3 Radiation and Contamination Control

Work in radiological areas will be performed using a Radiological Work Permit following review by Radiological Control per the ALARA Work Planning procedure TFC-ESHQ-RP_RWP-C-03.
3.4 Environmental Compliance

3.4.1 Review Material Data Safety Sheets for any oils or solvent being used.

3.4.2 Waste generated during the performance of this procedure such as oil, oil filters, and pre-filter elements shall be disposed of in accordance with specific instructions provided by the Facility/Plant/Area Hazardous Waste Coordinator to ensure compliance with applicable Hanford Site and DOE environmental standards.

3.4.3 If any spills to the environment occur during the performance of this procedure, notification must be made to the on call Environmental Representative and any contaminated media must be sent for proper disposal.
4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform portions of this procedure:

- Soap bubble solution or an ultrasonic leak detector (only for major inspections)
- Oil, Mobil Rarus 427
- Oil filter(s) (Rogers Machinery Part # MT001), or (Quincy, part # 110814)
- V belt(s) (Part # B-68) (When 2 are used they must be a matched set.)
- Muffler
- Gasket(s) for compressor unloader valve assemblies (Part # Be110-037-2)
- Desiccant (Part # BM-4)
- Air Dryer Pre-filter (Finite Part # 3PU10-025X8) and After filter (Finite Part # 6C10-025X8) element(s)
- Orifice(s) (Hycomp Part # PA-001)
- Filter felt(s)
- Air filter(s) (Hycomp Part # 0A208)
- 2 Each Diaphragms for Unloader (Hycomp Part # GO002-1)
- 2 Each O-Rings for Unloader Piston (Hycomp Part # BK115-2)
- 2 Each Gaskets for Unloader Body (Hycomp Part # BE110-037-2)
- 4 Each Gaskets for Valve Seat (Hycomp Part # BE200-050-1)
- 4 Each Gaskets for Inlet and Discharge Valves (Hycomp Part # BF101)
- 4 Each O-Rings for Filter Felt Canister (Parker Finite Filter Part # 76143V).

The following Personal Protective Equipment (PPE) is required when equipment is running:

- Leather Gloves
- Safety Glasses with Side Shields
- Hearing Protection (e.g. foam ear plugs or ear muffs).
4.2 Performance Documents

The following documents may be needed to perform this procedure:
- Activated Alumina AA-4 (\(\frac{1}{8}\)^") GHS-SDS and/or MSDS # 013978B
- Mobil Rarus 427, GHS-SDS and/or MSDS 019984
- Performance of extended air compressor maintenance activities not described in this procedure, is referred to in the Aeroflow "Service Manual for Model 2AN17," CVI-22798, Sup. 17, Sheet 793 – 856 including the following:
  - Torque settings
  - Clearances and tolerances
  - Oil pump removal and replacement
  - Compression piston removal and installation
  - Guide piston removal and installation
  - Setting compression piston clearance.

The following procedure may be needed to perform this procedure:
- DOE-0336, Hanford Site Lockout/Tagout Procedure.

4.3 Field Preparation

4.3.1 **OBTAIN** Shift Manager's permission prior to performing this procedure

AND

**DOCUMENT** results on Comments Section of the Data Sheet.
**5.0 PROCEDURE**

NOTE - If trouble shooting is required, the chart provided in referenced certified vendor information CVI-22798, Sup. 17 will identify possible causes and prescribed fixes.

**5.1 Perform Inspections**

**Check Compressor**

5.1.1 **CHECK** compressor crankcase oil level.

**CAUTION**

Overfilling crankcase can cause oil foaming, oil pump cavitations, and subsequent machine damage.

NOTE - Oil Level shall be maintained between the low and high marks on the dipstick.

**WARNING**

Operations of the compressor can cause eye injury or hearing loss to personnel.

5.1.2 **DON** the following PPE:

- Leather Gloves
- Safety Glasses with Side Shields
- Hearing Protection (e.g. foam ear plugs or ear muffs).

NOTE - Oil will be replaced in Section 5.2.

5.1.3 **IF** the oil level is low, **ADD** oil to obtain proper level.

5.1.4 **START** air compressor being serviced; SA-CMP-3101A or SA-CMP-3101B.

5.1.5 **RECORD** observations, readings, and replacements on comments section of PM Data Sheet.

5.1.6 **CHECK** crankcase oil pressure indicator PI-3110A (SA-CMP-3101A) or PI-3110B (SA-CMP-3101B) for compressor being serviced **AND**

**RECORD** the pressure reading on the As-Found column of PM Data Sheet.
5.1 Perform Inspections (Cont.)

NOTE - Oil pressure is controlled by a regulator adjusting screw and locknut. Adjustments must be made while compressor is running. An increase in pressure is accomplished by a clockwise rotation of adjusting screw.

5.1.7 IF As-Found oil pressure reading is not within tolerance per PM Data Sheet, ADJUST oil pressure as follows:

5.1.7.1 LOOSEN locknut on oil pressure regulator adjusting screw.

5.1.7.2 SET oil pressure reading to value given on PM Data Sheet.

CAUTION
Over tightening adjusting screw lock nut can strip threads.

5.1.7.3 TIGHTEN locknut, snug tight.

5.1.7.4 RECORD set pressure on As-Left column of PM Data Sheet.

NOTE - Steps 5.1.8 through 5.1.14 can be performed in any logical order.

5.1.8 CHECK (manually) drain build-up collection for Compressor air receiver automatic drain traps for compressor being serviced; SA-CMP-3101A or SA-CMP-3101B.

5.1.9 CHECK compressor system for the following:

5.1.9.1 LISTEN for Air leaks in the piping system AND RECORD on PM Data Sheet.

5.1.9.2 LISTEN for Irregular sounds and unusual vibrations AND RECORD on PM Data Sheet.

5.1.10 CHECK V-belts for belt slap, slippage, and/or squealing AND RECORD results on PM Data Sheet.

5.1.10.1 IF belt(s) need tensioned or replaced; tensioning and/or replacement will be performed at step 5.2.5.
5.1 Perform Inspections (Cont.)

Check Start and Stop Pressures Using Tank Drain Valve.

5.1.11 REMOVE excess condensate from receiver.

5.1.12 USING Tank drain valve, CHECK Compressor “Cut-In” and “Cut-Out” pressures per PM Data Sheet as follows:

5.1.12.1 BLEED air from Receiver Tank Drain Valve until compressor loads (Cut-In) AND RECORD As-Found pressure value on the PM Data Sheet.

5.1.12.2 OBSERVE compressor unload (Cut-Out) AND RECORD As-Found pressure value on the PM Data Sheet.

5.1.12.3 IF “Cut-In” and “Cut-Out” pressures are in tolerance per Data Sheet, RECORD values in As-Left column on PM Data Sheet.

5.1.12.4 IF “Cut-In” (load) pressure is not in tolerance, ADJUST per Data Sheet AND RECORD in As-Left column of PM Data Sheet.

5.1.12.5 IF “Cut-Out” (Unload) pressure is not in tolerance, ADJUST per PM Data Sheet AND RECORD in As-Left column of PM Data Sheet.

5.1.12.6 IF the compressor fails to unload (Cut-Out) properly, repair and/or replacement will be performed at Step 5.2.14.
5.1 Perform Inspections (Cont.)

Check Air Dryer

5.1.13 CONFIRM Air Dryer, drying chambers are cycling at approximately 5 minute intervals AND

RECORD on PM Data Sheet.

NOTE - Excessive DP across PRE-FILTER and AFTER FILTER is indicated by spring loaded indicator within the top of clear plastic housing.

5.1.14 CHECK compressor air dryer PRE-FILTER and AFTER FILTER differential pressure indicators at the top of filter housing(s) AND

RECORD if DP indication is acceptable on PM Data Sheet.

5.1.14.1 IF high DP is indicated, filter element will be replaced in Step 5.2.19.

NOTE - Pressure is indicated on air dryer pressure indicators PI-3111A and PI-3112A for compressor SA-CMP-3101A, or PI-3111B and PI-3112B for compressor SA-CMP-3101B.

- Each air dryer chamber pressure gauge will indicate normal line pressure during drying cycle and 0 psig to 3 psig during reactivation cycle.

5.1.15 CONFIRM regenerative desiccant air dryer is operating 0 to 3 psig during its reactivation cycle AND

RECORD results on PM Data Sheet.

5.1.16 CHECK re-activation back pressure is ≤ 5 psig AND

RECORD results on PM Data Sheet.

5.1.16.1 IF re-activation back pressure is ≥ 5 psig, exhaust muffler will be replaced at Step 5.2.20.
5.1 Perform Inspections (Cont.)

NOTE - Total air dryer cycle time is set for approximately five minutes.

5.1.17 CHECK drying cycle time for each chamber is per PM Data Sheet.

5.1.17.1 IF drying cycle time is not per PM Data Sheet, NOTIFY FWS for resolution.

5.1.18 ENSURE the following valves OPEN and CLOSE freely without subsequent leakage:
  • Intercooler pressure relief valve
  • Aftercooler pressure relief valve
  • Receiver tank safety relief valve PRV3100A if being serviced
    OR
  • Receiver tank safety relief valve PRV3100B if being serviced.

5.1.18.1 RECORD results on PM Data Sheet.

5.1.19 SURVEY compressed air piping/tubing on skid for leaks with "either" soapy solution or ultrasonic leak detectors AND

REPAIR any leaks.
5.2 Perform Major Inspections

5.2.1 IF performing inspections on Compressor SA-CMP-3101A, ISOLATE at Switchboard SB-1, Circuit Breaker 2-5 in accordance with DOE-0336, Hanford Site Lockout/Tagout Procedure.

5.2.2 IF performing inspections on Compressor SA-CMP-3101B, ISOLATE at Distribution Panel board DP-1, Circuit Breaker 3 in accordance with DOE-0336, Hanford Site Lockout/Tagout Procedure.

5.2.3 DEPRESSURIZE compressor system.

NOTE - Steps 5.2.4 through 5.2.22 may be worked in any logical order.

5.2.4 CLEAN cooling surfaces of compressor cylinders, intercooler and aftercooler.

REPLACE "V" Belt

5.2.5 IF belts are worn, or not tensioned to manufactures specifications, REMOVE belt guard AND PERFORM the following:

5.2.5.1 IF belt(s) are worn, REPLACE V belt(s)

5.2.5.2 IF belt(s) are loose, TENSION belt(s) to manufacturer’s specifications (Reference CVI 22798, Supp. 17).

5.2.5.3 RE-INSTALL “V” belt guard.
Inspection/Parts Replacement of Unloader Valve

5.2.14 IF unloader valve fails to function properly, DISASSEMBLE compressor unloader valve assemblies AND

PERFORM the following:

5.2.14.1 INSPECT valve parts for wear.

NOTE - Crankcase capacity is 2 quarts.

5.2.11 REPLACE crankcase oil with Mobil Rarus 427.

5.2.12 ENSURE compressor crankcase oil level is at full mark.

5.2.13 INSPECT AND REPLACE air inlet filter as needed.
5.2 Perform Major Inspections (Cont.)

5.2.14.2 INSPECT compressor unloader diaphragms for wear AND IF damaged, REPLACE diaphragm(s).

5.2.14.3 REPLACE gaskets during valve reassembly.

5.2.14.4 RE-INSTALL compressor unloader valve assemblies.

5.2.15 INSPECT filter felts on compressor unloader controls AND REPLACE any damaged filter felts.

5.2.16 INSPECT pressure switch diaphragms for wear.

5.2.17 PERFORM the following Electrical Control Panel Inspections:

5.2.17.1 ENSURE all electrical connections in compressor control panel are tight.

5.2.17.2 INSPECT pressure switch contacts in compressor control panel.

5.2.17.3 INSPECT motor starter contacts for pitting.

5.2.17.4 IF the above inspections reveal degradation of components NOTIFY FWS for directions AND RECORD those directions on Comments Section of Data Sheet.

5.2.18 LUBRICATE motor bearings.

Air Dryer

5.2.19 IF high DP was indicated in Step 5.1.14, REPLACE filter element.

5.2.20 IF re-activation back pressure checked in Step 5.1.16.1 was ≥ 5 psig, REPLACE exhaust muffler.

5.2.21 REMOVE piping from drying towers AND CHECK desiccant condition.

5.2.21.1 IF desiccant is contaminated with oil or crumbling into particles smaller than 1/8 inch diameter, DON dust respirator AND REPLACE desiccant with AA-4, 1/8” diameter (per the GHS-SDS and/or MSDS # 013978B).
5.2 Perform Major Inspections (Cont.)

5.2.21.2 REPLACE piping on drying towers AND ATTACH towers to support structure.

NOTE - Air dryer bypass orifice passes approximately 14% of the normal compressor air flow during air dryer operation. If plugged or restricted, air dryer will not perform adequately. If worn, too much air may be bypassed.

5.2.22 REMOVE AND INSPECT air dryer bypass orifice for foreign particles trapped inside.

5.2.22.1 IF foreign particles are found in air dryer bypass orifice, CLEAN orifice.

5.2.22.2 IF orifice cannot be cleaned, REPLACE orifice.

5.2.22.3 INSTALL orifice into bypass line of air dryer.
5.3 Restoration

5.3.1 IF any problems were encountered INFORM FWS.

5.3.2 ENSURE equipment is restored to normal operating configuration.

5.3.3 IF system has been locked and tagged out, CLEAR lock and tag in accordance with DOE-0336, Hanford Site Lockout/Tagout Procedure.

5.3.4 ENSURE PPE per Step 3.1.2 is donned prior to starting Compressor(s).

5.3.5 RESTART compressor(s) AND

ENSURE Crankcase Oil Pressure Indicator, (for compressor being serviced) PI-3110A (SA-CMP-3101A) OR PI-3110B (SA-CMP-3101B) indicates 25 \( \pm 5 \) psig.

5.3.6 IF indicated oil pressure does not rise to acceptable range within 20 seconds, SHUTDOWN air compressor AND CONTACT Field Work Supervisor.

5.3.7 CONFIRM compressor discharge pressure returns to normal operating set pressure.

5.3.8 RECORD discrepancies, adjustments, and part replacements in comments/remarks section of PM data sheet(s).

5.3.9 INFORM Operations and Field Work Supervisor of completion of procedure.

5.3.10 RETURN PM data sheet(s) and foreign material found in oil and oil filter to Field Work Supervisor.

5.4 Acceptance Criteria

Acceptance Criteria has been met when Steps in this procedure have been satisfactorily performed per the Data Sheet.
5.5 Review

5.5.1 INFORM FWS test is complete.

5.5.2 FWS REVIEW AND ENSURE the following:
- Completed Data Sheets meet the acceptance criteria.
- Comments sections are filled out appropriately.
- Work requests needed as a result of this procedure are identified and generated.
- Work request number(s) of any work documents generated as a result of this procedure, are recorded in the Comments/Remarks section of the Data Sheet, as applicable.

5.6 Records

This procedure is performed within a work package, as such, the procedure in its entirety will be maintained as a record per the Work Control process.

The record custodian identified in the Company Level Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.