

D-ZERO MAX-AIR 90 HIGH PRESSURE COMPRESSOR

OPERATING and LOTO PROCEDURES

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Section I: Operating Procedure

INITIAL CONDITIONS: This procedure assumes the equipment to be in safe operating condition, and correctly connected to the system per control room drawing 3740.510-ME-273995 (sheet 1 of 2). The emergency backup air trailer is assumed to be on line with its valves open. Instrument air compressor is assumed to be functioning normally with an output pressure exceeding 88 psig.

MV-1406-I, MV-1728-I, MV-1719-I are **closed**.

MV-1720-I, MV-1716-I, and MV-1729-I are **open**.

1. Check dewpoint of instrument air system in room 510. It should be better than -55 C (preferably -65 C).
2. Check the compressor hour meter and oil change sticker to see if the oil needs to be changed before starting operation.

(See the LOCKOUT / TAGOUT procedure section following the operating procedure, before changing the oil.)

Oil changes are required every 50 hours of operation. Use only MaxLube 501 synthetic oil. The compressor crankcase requires 1.7 liters of oil to fill to proper level in the sight glass. Do not exceed the maximum oil level, as it can result in coking the valves. Fill line is a groove in the crankcase behind the sight glass.

3. If Oil level is correct and within hour meter window for operation, go to step 4.
4. Open the handle of MV-1719-I until the end is about level with the horizontal run of tube from it. This supplies feed to the Max-Air compressor. Excessive opening of this valve may pull down instrument air pressures below acceptable levels.
5. Unlock and ease open MV-1406-I.

CAUTION: In performing the next step, keep clear of the valve exhaust opening, since the high pressure air , condensate, and any particulate matter which might accompany it, can cause serious injury.

6. This is also a good time to crack open MV-1728-I to vent accumulated water in the main line low leg. Close MV-1728-I when it blows clear.
7. Unlock the contactor switch, pull out the emergency stop button and start the compressor by turning the SYSTEM switch to AUTO position.
8. When the pressure level in the skid exceeds 1800 psig, the minimum pressure check valve will open and the compressor will begin pressurizing the line.
9. Run the compressor until the trailer pressure reaches 2100 psig in warm weather(the output pressure limit switch should trip the compressor at this pressure); in cold weather, stop at 2000 psig to allow for expansion if weather warms. System relief blows at 2200 psig: it is preferred not to blow it, lest it not reseal tightly.
10. **To shut down the compressor:** Turn SYSTEM switch to OFF, Depress the EMERGENCY OFF button, and Close MV-1719-I.
11. Close MV-1406-I and apply the lock.
12. Vent MV-1728-I one last time to clear any accumulated water and depressurize the line.
13. Close MV-1728-I.
14. Shut down the contactor switch and apply the lock.

Section II: Lockout / Tagout Procedure

(CAUTION: The skid is equipped with a minimum pressure check valve set for 1800 psig. Venting pressure at MV-1728-I will not depressurize the skid! Open the three manual condensate drain valves marked on the skid, to be sure pressure is absent.)

1. **IDENTIFICATION & LOCATION OF EQUIPMENT:** The Max-Air 90 High Pressure Air Compressor is located in the D-Zero Gas shed northwest corner. The lockable electrical disconnect for it, is mounted directly on the skid. Redundant isolation may be achieved by unplugging at the welding outlet.
2. **SCOPE OF WORK:** Work covered by this lockout is limited to work on the Max-Air 90 skid and piping between, but not including, MV-1719-I and MV-1406-I. Electrical work is limited to the skid side of the disconnect box (not including the disconnect box unless the plug is removed from the weld outlet and enclosed in a locking cover.)
3. **AUTHORIZED EMPLOYEES:** D-Zero operators and supervisory personnel trained in this procedure, and having current Fermilab LOTO II training.
4. **NOTIFICATIONS:** This equipment is offline during normal operations, and taking it out of service will not affect operations. The D-Zero cryo-operations shifter should be notified that it will be unavailable for the duration of maintenance.
5. **SOURCES OF HAZARDOUS ENERGY:** High pressure compressed air up to 2200 psig may be present in the compressor and/or attached piping. 480 VAC power may be present,

in addition to 120 VAC control power. Rotating parts and belts may present a pinch hazard when guards are removed.

6. **SHUTDOWN PROCEDURE: To shut down the compressor:**

turn system knob to OFF, Depress the EMERGENCY OFF button, Close MV-1719-I, Close MV-1406-I and apply the lock.

CAUTION: In performing the next step, keep clear of the valve exhaust opening, since the high pressure air , condensate, and any particulate matter which might accompany it, can cause serious injury.

Vent MV-1728-I one last time, to clear any accumulated water and depressurize the line.

Close MV-1728-I.

Shut down the power disconnect switch.

7. **LOCKOUT OF ENERGY ISOLATION DEVICES:** Apply locks & tags to power disconnect, MV-1406-I and secure and lockout MV-1719-I (this configuration may require a chain to lockout in closed position). If electrical work is planned, remove plug from weld outlet and lock in a plug lockout sleeve.

8. **RELEASE OF STORED ENERGY:** Open drain vent valves on all three stages on the compressor skid.

Open MV-1728-I

Leave these valves open for the duration of work.

9. **VERIFICATION OF LOCKOUT:** Lift Emergency Stop button and attempt to start. Rollup line cord from skid to verify correct plug is disconnected, if electrical work is planned.

10. RETURN TO SERVICE:

Verify all components are reassembled and tight.

Verify all tools, old parts, and debris are removed from the skid.

Verify all drains and vents are closed, filters and fill caps tightened correctly.

Verify fluid levels are correct.

Notify operations shifter of intent to return equipment to operational status.

Place local controls in the OFF configuration, including the EMERGENCY STOP button.

Remove locks and tags.

Replace plug into weld outlet.

Leave disconnect on OFF position unless immediate use is planned.

Place operations combination configuration locks on disconnect, and MV-1406-I

Close MV-1728-I

Log work performed and parts used in operations log.