



Hartford Compressors Inc.
179 South Street
West Hartford, CT 06110 USA
Phone: 860-249-8671 * Fax: 860-548-1705
E-mail: webmaster@hartfordcompressors.com

SERVICE BULLETIN :

MSC Clean-up Procedure For Motor Burn-outs

This bulletin will serve to assist in the clean-up operation and detection in the event of a motor failure on a medium screw compressor. It is in accord with good industry practices and with steps as outlined in the ASHRAE handbooks.

- This procedure applies specifically to the Medium Screw Compressor product.
- Experience has shown that after a motor burnout has occurred the complete system must be cleaned thoroughly to remove contaminants created by the motor failure. Failure to follow these minimum cleanup recommendations will result in excessive risk of a repeat burnout and jeopardize warranty consideration of the replacement compressor.

BURNOUT CAUSE AND AVOIDANCE

Before starting any system after a burnout it is imperative that any potential causes for the burnout that are not associated with the compressor are thoroughly checked out to avoid a repeat burnout. This includes any components that may have been affected by the motor burnout itself.

- There are several devices designed to protect the compressor motors from electrical malfunctions. They include circuit breakers, starter overload relays, undervoltage relays, motor over-temperature protectors, etc.
- **Restarting of any of these safety devices and repeated starting could turn a minor motor problem into a costly major motor burnout.**
- Once a burnout has occurred it is very important to assure that the controls are still operable and such things as contact pitting, pull-in capability and any signs of overheating/arcing should be investigated immediately. Any controls that are questionable in any way should be replaced before start-up of the replacement compressor.

MOTOR FAILURE CONFIRMATION

If the you suspect the motor to have failed, complete the MSC Motor Troubleshooting Guide located at the end of this service bulletin and submit to HCI Application Engineering. Before completing the form, request the motor winding resistances from HCI A/E Dept.

Do not attempt to restart the compressor until completing all tests on this form and receiving verification from HCI A/E Dept.

Check for short to ground :

- Check compressor motor with a 500-volt megger (meg-ohmmeter).
- If the reading for each post is in the 100's of megohms then the motor is not grounded and you can proceed to the next test.
- If the reading is 0 or in the very low digits then the compressor may have refrigerant trapped and the sump heater should be energized an additional 24 hours and a new reading should then be taken. If at this point the new reading is still 0 or very low, the motor may have a short to ground and you should contact Hartford Compressors application engineering department for further assistance.

Electrical System Check:

- Before starting a replacement compressor after a motor failure, the starters and associated control circuit must be checked for proper operation.
- Check to see that all terminals and connections are right and not damaged.
- Check for burns on all wiring and terminals in both the power and control circuits and replace any damaged parts.
- With the power off remove the starter covers to check mechanical operation of starter to assure proper alignment and good contactor mesh. Energize control circuit and operate starter electrically. Check performance of starter auxiliary contacts and cycle several times. Replace any damaged or burned parts.
- Check electrical operation of control circuit, including all timers and relays.

Assess extent of burnout:

When motor protection devices are properly used it is possible that the compressor motor damage will be minimal, thereby creating a very minimal amount of contamination to the system. It is helpful to determine the severity of the burnout before proceeding with the cleanup as it serves to establish the extent to which the cleanup process must go. The severity can be determined as follows:

- If possible, obtain a small oil sample from the burned-out compressor and analyze it using an acid test kit. Excessive acidity (over 0.05 acid number) in the oil indicates a severe burnout.
- Discoloration and/or odor of the oil are also good indicators of a severe burnout. The darker the oil, the more severe the burnout. The stronger the burnt oil smell, the more severe the burnout.
- Inspect the discharge line at the compressor and the liquid line drier. Any carbon deposits present indicate a severe burnout.
- If none of the above indications of severe contamination are found, the burnout can be classified as mild.

Cleanup after burnout:

Whether the burnout is mild or severe, the entire system must be cleaned as indicated in the following procedure:

- If possible, save the refrigerant by isolating it in the high side. If not possible, recover the refrigerant in approved cylinders and label cylinder with the refrigerant type and that it was from a burnout.
- Remove the burned out compressor.
- If sludge or carbon has deposited in the discharge line, it should be swabbed out or the section of the line replaced. All of the sludge and products of the burnout need to be removed from the system.
- If the burnout is found to be extreme, a system flushing treatment may be used to assure that the system is cleaned properly. This chemical when flushed through the system will remove soot, gum, moisture, sludge, grease, tar, particulate, debris, acids and carbon deposits. (An example is Highside Chemicals "Super Flush")
- Remove all filter-driers and replace with high capacity acid core driers (burnout driers).
- Check the moisture indicators downstream of the filter-driers to make sure that the system is dry. Check the moisture indicator to see if acid may have damaged the indicator. (Replace as necessary)
- Install the replacement compressor.
- Evacuate the compressor and all segments of the stem that have been exposed to the atmosphere during compressor removal to 1000 microns.

Cleanup after burnout: (Cont.)

- After an electrical check has been performed as mentioned on page 2 and the replacement compressor has been properly installed and inspected according to Hartford Compressors start-up procedures, the service valves can be opened and the system operated.
- Monitor the pressure drop across the system cleanup acid core burnout driers during the first hour of operation. Change the cores as needed. The number of times the driers will need to be changed depends on the severity of the burnout and how well the system was flushed out.
- In some cases non-condensable gases are produced during the burnout. This would cause the head pressure to rise higher than its' equivalent condensing temperature. If this is the case then the system should be purged by pumping down into the condenser and then bleeding gas from the condenser during shutdown with cool air/water moving through the condenser.
- After the unit has reached stabilized operating conditions and run for 4 hours, take an oil sample from all compressors piped into the system. Observe the oil color and test with an acid test kit to measure the degree of acidity. If the oil is either dirty or acidic, change the cores. If the oil is clean and free of acid (less than 0.05 acid number or acceptable color reading from test kit), the system cleanup acid burnout cores may be removed and replaced with original standard type filter-driers. The oil sample taken should be sent in for analysis using the Hartford Compressors Oil Kare kit #053498A1.
- After the compressor has been running for at least 4 hours, the pressure drop across the suction filter should be checked. A differential pressure gauge should be used. Using the pad mounted unloader the downstream pressure can be obtained. The upstream pressure can be read from the schraeder valve located on the suction boss. The nominal drop across the filter is 2 PSID. The filter should be changed if the pressure drop exceeds 5 PSID. Contaminants and foreign matter may have clogged the filter and could cause problems if not replaced. Please consult the Hartford Compressors parts list for proper suction filter kit number.
- After two weeks of operation and again after four weeks of operation, recheck the suction filter pressure drop and take an oil sample to check the color and acid level. If the acid or color is still unacceptable then the filter-driers will need to be changed again. If the pressure drop across the filter, acid level or dirty oil does not normalize after the changeout of the filters, a complete changeout of the oil may be necessary or the system may need to be recleaned.

Additional method to clean oil:

The following is a method for speeding up the cleaning of oil in the system after the burned out compressor has been replaced and the cleanup procedure as just outlined has been followed.

- Install a 5 ton 3/8" flare (Acid Removal) filter drier from the oil drain valve on the bottom of the replacement compressor to the pressure tap on the back seat of the suction service valve.
- Open the oil drain valve on the bottom of the compressor by one turn and front seat the suction service valve by one turn.
- With the compressor running, circulate the oil until it is clean and free of acid.
- Close the valves and remove the filter drier.
- After cleanup is complete an oil sample must be taken and sent to the HCl oil Kare lab. (Oil Kare kit #053498A1 should be used to properly accomplish this)

Note* The MSC has an oil sight glass built into the side of the compressor to monitor oil level at all times. HCl requires that when charging the compressor with oil that the proper oil charge be used on each compressor. Initially, fill the compressor until the oil level is at the bottom of the sight glass.

It is very important that an overcharge of oil is not added to the compressor.

If, after running the compressor, the level goes above the sight glass, oil must be removed until it is in the sight glass. If the oil level falls below the sight glass, do not be concerned. This is normal. There is an oil sensor that will stop the compressor should the oil level drop too low.

Caution: Combustible gases may have been produced by the burnout. Care should be taken when using electrical instruments while performing these tests



Hartford Compressors Inc.
179 South Street
West Hartford, CT 06110 USA
Phone 860-249-8671 *Fax 860-548-1705
E-mail:webmaster@hartfordcompressors.com

MSC MOTOR TROUBLESHOOTING GUIDE

******Complete & fax to HCI for analysis******

FAX TO: 860-548-1705, ATTENTION: Application Engineering

Compressor Model No.: _____ Serial No.: _____
Compressor Run Hours: _____

If you suspect a motor failure, **DO NOT** attempt to restart the compressor without first conducting the following check. Restarting the compressor can turn a minor motor problem into a major motor burnout requiring extensive cleanup.

CAUTION: Do not run any tests while the compressor is in a vacuum. This can destroy a good motor.

Compressor motor winding resistance: _____ to _____ ohms.
(Call HCI Application Engineering for this information.)

1. Measure the resistances to ground and record:

T1 to Ground _____, T2 to Ground _____ T3 to Ground _____
T7 to Ground _____, T8 to Ground _____ T9 to Ground _____

2. Measure resistances of the following windings and record:
(These readings should all be approximately the same)

T1 to T2 _____, T2 to T3 _____ T1 to T3 _____
T7 to T8 _____, T8 to T9 _____ T7 to T9 _____

3. Measure resistances the following windings and record:
(These measurements should be 1.124 times the measurements in step 2.)

T1 to T7 _____, T2 to T8 _____ T3 to T9 _____

4. Measure resistances the following windings and record:
(These readings should be .635 times the resistances in 2.)

T1 to T8 _____, T1 to T9 _____ T2 to T7 _____
T2 to T9 _____, T3 to T7 _____ T3 to T8 _____