



MANUFACTURERS OF INDUSTRIAL HEAT TREATING FURNACES & OVENS

GENERAL PREVENTATIVE MAINTENANCE

Lucifer Furnaces' products are individually tested and inspected before leaving the factory. The following general procedures can help you avoid unnecessary trouble in the operation of your furnace.

Preventative maintenance scheduling should vary depending upon intensity of your operating schedule and environmental conditions. Frequent preventive maintenance will prolong service life and go a long way in preventing time-consuming repairs/costly down time. The following procedures are offered as some steps requiring only a few minutes time and should be followed on a regular schedule.

1. General Electrical Safety

- A. Whenever service or maintenance requires opening of electrical enclosures be sure main power disconnect is turned off, locked and labeled.
- B. Do not over fuse main connection or change type or value of fuse for controls. Fuses were selected to protect against electrical hazards.
- C. Never operate furnace on any voltage, phase and cycles than what is specified on the furnace.
- D. Use only exact replacement parts listed in the installation; Substitutes may result in poor performance and/or create a hazard.
- E. Be sure all panels are replaced with covers and protect electrical components before returning furnace to service. If furnace must be energized while covers are removed, then observe proper precautions as required by your plant safety director. Serious shock hazard is present when operating with covers removed which could result in serious injury, disability or death.

2. General Operation

Idle furnace at an elevated temperature when not heating to reduce shocking the refractory and heating elements from hot and cold cycles. Limit the time period the door is open when the furnace is hot to minimize the cold shock or air entering the chamber. Clean the work load as much as possible to avoid chemical contamination on the heating elements. Avoid any contact or moving of heating elements because they become very brittle once heated.

3. Heating Elements

- A. Keep elements free from scale and slag
- B. Allow sufficient clearance between the work load and heating elements inside the chamber.
- C. Do not bang elements or slam furnace door. Elements become brittle after heating and may break.
- D. Do not change wiring of any bank of elements to increase or decrease heat up times.
- E. Check elements clips and supports. Loose or improperly positioned clips can cause failures.

4. Fans & blowers

- A. Do not operate when vibrating.
- B. Check V Belt and bearings periodically for fraying and proper tension.
- C. Lubricate bearings with grease, if equipped with grease fittings.
- D. Check fan shaft bearings for excessive operating temperatures and noise.

5. Contactors

- A. Periodically check contact points for pitting or dust build up. Contact points can be cleaned with compressed air. If they are pitted, they should be replaced.
- B. Dirty and dusty shops can be harder on contactors because airborne particles collect on the contact points and damage their potential for proper operation.
- C. Check wire connections for tightness.
- D. Replace contacts **BEFORE A FAILURE OCCURS**. Sticking contact points can cause furnace overheating and element failure. Failure of a contactor without a proper overtemperature system protection can cause permanent damage to the furnace and a complete melt down.
- E. Contactors seizing closed is the most common form of furnace failure.

6. Thermocouples

- A. Periodically check connections for tightness.
- B. If furnace is used regularly then thermocouples should be replaced every six months. This is inexpensive insurance for regular accuracy.
- C. Do not reverse thermocouple extension wire color code. Each color wire is of a given calibration. Red wire is the negative leg of both "R" and "K" thermocouples. "R" thermocouple extension wire has a green outer jacket with red & black wires inside. "K" thermocouple extension wire has a yellow outer jacket with red & yellow wires inside. Refer to Instruction Manual for proper terminals for thermocouples.

7. Check the wiring

DISCONNECT ALL POWER TO FURNACE BEFORE SERVICING. Periodically inspect wiring for loose connections, worn or damaged insulation or other conditions that could interfere with proper unit operation. Inspect connections to ensure they are clean and tight, structurally sound and electrically continuous. Repair or replace worn or damaged wiring immediately. Remove any foreign objects that may have become lodged among wiring or heating elements. Check insulation for brittleness, cracking, fraying and/or discoloration. These are conditions that could impair proper operation. Replace any bolts or screws that cannot maintain a tight joint.

8. Clean the unit

Periodically remove excess dirt, rust, and foreign material from the unit, (inside and out), especially any accumulations that could cause electrical shorting or interfere with required air circulation or proper control function. Remove these accumulations using either a heavy duty industrial vacuum unit or medium compressed air. **Observe all SAFETY PRACTICES** when using compressed air to blow away particle accumulations.

9. Instrumentation

- A. All **HONEYWELL** controls carry a 2-year warranty after date of shipment. If you have a question on the instrument operation or should the instrument malfunction within the warranty period the nearest instrument manufacturer's representative should be notified. Call the technical assistance number located in the front of the HONEYWELL instrument manual.
- B. Have your control instrumentation checked regularly for measurement accuracy and control function.

NOTE: The Lucifer manual has a setup guide that should first be reviewed with the instrument. This could solve the problem before further assistance is needed.

10. Lubrication

The fan motor, fan bearings, vertical lift door chain, pillow blocks, crank or air cylinders and quench tank wheels, or any moving mechanical parts will require periodic lubrication. (NOTE: Some furnaces are equipped with options that require no lubrication).

11. Atmosphere-Non Flammable

On all atmosphere systems (non-flammable) check flowmeters, valves, all joints and solenoids periodically for leakage and cleanliness. Periodically remove the needle valve of the flowmeter and clean with acetone or industrial de-greaser. Inspect exhaust port and piping for rust, bending and blockage.

12. Atmosphere-Flammable

On all atmosphere systems (flammable) check all components listed in step (10). Check flammable solenoid and valve for close off leakage before each use. If leakage is suspected **DO NOT USE** until repaired or replaced. Check regularly at least twice as frequently for leaks in the flammable gas pipe. Check each time the furnace is used for dirt, dust, or debris on the flame curtain and burn off. Serious damage may result from failure of the flame curtain while opening the door. Periodically check the shell (in gas tight models) or muffle (in AM models) for leakage or warping. Check all couplings, joints and components for leaks using soapy water or a leak solution. Check calibration of the 1400°F temperature function switch for 1400°F accuracy and check electrical operation of the instrument and solenoids.

13. Atmosphere Generators

Check for all items mentioned in (11) and (12), and check the retort for leaks, and all safety equipment for proper operation. If a compressor is supplied check the diaphragm for cracking, drying out, dirt, dust, and holes.

14. General Safety Notes

A Lucifer Furnace does not contain asbestos. This product contains refractories composed of alumina, silica and mineral fibers. For service and repair, Lucifer Furnaces recommends wearing a NIOSH approved N95 respirator or higher. MSDS are available at www.luciferfurnaces.com.