INSTRUCTIONS FOR THE LEADER AROCLOR UNIT

MONS 092397

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I. SAFETY

1. Aroclor is not flammable. Indeed it will not burn. However, because of the possibility of foreign gases being present, an air or nitrogen sweep should be used in an Aroclor line when welding on it.
2. Aroclor vapors are very unpleasant and the health hazard is slight. However, the vapors are somewhat irritating to the nose and throat and should be avoided.
3. The chief hazard of Aroclor is the high temperatures that are likely to be employed.
4. It is possible for the main burner to belch flame back out bottom of the heater, particularly on start-up. For this reason, make visual observation for pilot flame from Freon Building steps and for main burner through the observation window on East side (a lever on side of window opens it for viewing).

II. EQUIPMENT NUMBERS OF THE PRIME UNITS

Reservoir C.T. 4644

800 gal. steel tank rated at 50 lbs. allowable pressure. It contains a hair pin steam coil.

Heater Misc. 790

A radiant-convection, three million BTU/hr. heater. Radiant coils are 4" vertical hair pins and the convection coils are 4" horizontal.

Pump 3298

A Dean Brothers type SMR-10, water cooled mechanical seal, 300 gpm. at 160 ft. head. 30 H.P. Motor at 1770 R.P.M.

Cooler H.E. 242

A 229 sq. ft. steel heat exchanger using U tubes. It is 12" x 12 ft.

III. AROCLOR

1. Aroclor comes in several grades. The grade used in this system is No. ~~1248~~ 1242.
2. The pour point is -7°C. (19.4°F.). Tracers, therefore, will have to be used on the vent system and the circulating lines in cold weather.
3. Aroclor 1248 begins to decompose, or coke, at temperatures above 320°C. The over temperature control must be set to limit the temperature to 320°C. maximum.
4. Water in Aroclor generates hydrochloric acid which attacks the iron. Therefore, water must be kept out of the system by blanking at service headers, blowing (when necessary to blow out Aroclor lines) with nitrogen and not air, and by venting the system thru a heated vent on the surge tank.
5. Analysis of fresh Aroclor:

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   Water - less than 100 PPM, or .01%

   Acidity - less than .05%

   Viscosity - 75 to 80 Saybolts per seconds at 130°F.

   (Krummrich labs will run these.)

6. Any Aroclor drained from the system (job change-overs, repairs or alterations) must be clearly labeled "Aroclor for Incineration" and placed in storage on Plant walk. It will

be incinerated at W.G.K. This is the only way to completely breakdown and test by Aroclor.

IV. AROCLOR DISTRIBUTION SYSTEM

The Leader Unit is originally and primarily for the high vacuum still and the multitube still, however, by removing blanks it can be connected to the yard unit distribution system.

V. GENERAL NOTES

1. With the Aroclor circulating, the reservoir should be 1/4 to 1/2 full.
2. When Aroclor temperature is below 200°C., operate burner by manual control (starting at lowest heat) until 200°C. is reached, then go to full and automatic heat.
3. When shutting down, leave Aroclor circulate for 1/2 hour after shutting off flame in order to dissipate heat in the combustion chamber. Also turn toggle switch on panel to off and close manual valves in both gas lines.
4. Following an interruption of Aroclor circulation for any reason (such as a power failure) when temperature is above 200°C. circulate for a few minutes to get rid of any vapor pockets that may have formed in the heater tubes before turning on main burner.

VI. COMPONENT UNITS

1. Vent

A 1-1/2" vent to the raw atmosphere is provided atop the reservoir. This vent is steam traced so as to heat and dry the breathing air.

2. Rupture Disc

A 4" x 20 lb. Karbate rupture disc is provided on the reservoir. The 4" discharge line is against the building and 18" off of the ground.

3. Pop Valve

A 1" pop valve is provided on the outlet from the heater. It is set at 85 lbs. and discharges to the reservoir.

4. Masoneilan Automatic By-pass Valve

To insure an adequate flow (about 300 gpm) thru the heater coils at all times and yet maintain a satisfactory flow to the user, a Masoneilan valve is provided as a by-pass. It is controlled by the Flow Recorder. Pressure at pump discharge should be about 80 lbs. and on the line leading to user, about 55 lbs.

5. Low Flow Gas Shut-Off

The Aroclor must be circulating in order for either the pilot flame or the main gas flame to burn. When the Aroclor is circulating at at least 170 gpm, a differential across the orifice reacts on a transmitter which in turn reacts on a Mercoid switch. When the pressure drops off, the Mercoid switch ~~actuates~~ and closes the solenoid valves in both gas lines. A low flow shutdown is indicated by a red light on the right of the panel board. After the low flow situation has been remedied, the low flow reset button will douse the signal light.

6. Pump Motor Failure Gas Shut-Off

To serve as a back-up for the "No Flow Gas Shut-Off" and to act as a double guard against having a flame on when there is no Aroclor circulation, an auxiliary contact point is provided on the pump motor.

7. Flow Recorder-Controller

The Flow Recorder controls the Masoneilan by-pass valve. The flow recorder-controller gets its signal from the flow transmitter which detects pressure drop across an orifice in the Aroclor line. It has three operating positions; Manual, Seal and Automatic. Normally it will be set on automatic. Seal can be used in start-ups to avoid a surge of Aroclor in the lines. Manual may be used at times when some of the automatic controls fail. The black pointer indicates the ratio of by-pass (the % the Masoneilan is open). The top red pointer is the set point and the bottom red pointer indicates the flow through the heater on all of the three positions.

8. Over Temperature Gas Shut-Off

A Protect-O-Vane located at West side of heater shuts off both flames when the temperature of Aroclor gets up to set point on the Protect-O-Vane. This must never be set higher than 320°C. A red light on the Protect-O-Vane case comes on when it has shut off the flames. A reset button near the light has to be pressed and held in for about 30 seconds before flames can be re-established.

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9. Purge Blower and Timer

A blower mounted half way up on North side of heater purges the combustion chamber for 2-1/2 minutes before start-up. The blower is controlled by a timer inside the panel case.

10. High-Low Gas Pressure Shut-Off

Mounted on both sides of the Fisher gas pressure regulators are Mercoid pressure switches. The high pressure on down stream side of regulator is set at 15 lbs. and the low pressure on up side of regulator is set at 10 lbs. If the regulated gas pressure gets above 15 lbs or if the main gas pressure gets below 10 lbs, both flames are shut off.

11. Maxon Safety Shut-Off Valve

The Maxon valve has to be manually opened. It is in the main burner gas line and closes when either flame goes out.

12. Auxiliary Safety Shut-Off Solenoid Valve

Down stream of the Maxon valve is a Solenoid valve which closes at the same time as the Maxon. Its purpose is to insure no gas leak through. Between the Maxon and the Solenoid valves is a branch line with a small Solenoid valve which is opened at the same time the other two valves close. This serves as a bleed-off of any gas between the two safety shut-off valves.

13. Main Burner Control Valve

Down stream of the two safety shut-off valves is the air actuated modulating valve for the main burner gas feed. It is controlled by the Brown recorder-controller.

14. Protectoglo Relay

The Maxon valve, the auxiliary Solenoid valve, the bleed-off Solenoid valve (see paragraphs 11 and 12) and a safety shut-off Solenoid valve in the pilot gas line receive their signal from a Honeywell Protectoglo relay (the large box inside the panel case). The Protectoglo relay receives its signals from any of the following:

Low flow switch.

High-low air pressure switches.

High-low gas pressure switches.

Over temperature switch.

Toggle switch on panel board.

Flue damper switch.

Pump Motor contact

The horns at both the panel and the annunciator will sound and both flames shut off when the Protectoglo actuates. Failure of the Protectoglo relay (as well as the Purple Peeper) will also shut off the flames and sound the horn.

15. Purple Peeper and Marion Meter

The Purple Peeper monitors both the main burner flame and the pilot flame. Mounted in the wiring line between the Peeper and the Protectoglo Relay is a Minneapolis-Honeywell ammeter. Output of the Peeper is about 4 microampers. If above two microampers the Peeper is getting a good look at the flame. If below two, something is obstructing the Peeper's view of the flame.

16. Flue Damper

The Flue Damper is set for the proper draft and should not be changed. However, there is a safety switch connected to the damper and this shuts off the flames if the damper is closed.

17. Air Supply

The air supply is off of the H.P. air system. It is fed in thru a Fulflo filter, a pressure regulator (set at 35 lbs) and a Deltech filter (cartridge turns red when it needs changing). The air is used to activate the main burner control valve, the Masoneilan by-pass valve, the Brown temperature recorder-controller and the flow transmitter and flow recorder-controller. Inside the panel case are two air pressure switches; low pressure set at 5 lbs and high pressure at 25 lbs. On either side of these pressure settings, the flames are shut off.

18. Secondary Damper

The secondary air damper on the furnace is located at the bottom of the combustion chamber. The damper is positioned by a pneumatic operator, which receives the same air signal as received by the main burner gas control valve. As the temperature controller opens the gas valve, it also opens the air damper, allowing more air flow for combustion.

The secondary damper was set on 9-10-65 to provide the following excess air levels for combustion:

Fuel Gas Valve	Approximate Excess Air
100% Open	25%
80%	50%
60%	100%
40%	Greater than 100%

The high excess air figures at low fuel gas flows is caused by air leakage around the moveable parts of the damper.

VII. TO START-UP WHEN UNIT HAS COOLED (BELOW 200°C.)

1. Have valves in Aroclor lines set to pump thru the heater and to the user.
2. Have pilot gas manual valve and the main burner gas cock both open.
3. Have cooling water on Aroclor pump seal and bearing. The water to the lantern ring should be regulated to 5 psig.
4. Have Aroclor pump on with Aroclor circulating through the heater at 200 gpm, as indicated on the flow recorder.
5. Turn temperature control selector switch to "Manual" and set "Manual Control" air pressure gauge to 10 lbs.
6. Throw toggle switch on panel to "On". The horn will then sound, push "Silence Horn" button, then push "Low Flow" reset button to turn off the low flow signal light (if on). Then push "Purge Start" button.
7. When the "Safe Start" light comes on after a 2-1/2 min. purge delay, push "Flame Start" and HOLD IN for about 5 seconds, repeating until "Pilot On" light comes on. (Several pushes on the "Flame Start" button may be necessary before ignition is achieved.)

8. If pilot light does not come on, wait 2-1/2 min. and try again. Check for pilot flame by looking thru aperture where pilot gas line goes thru burner (squatting on Freon Building steps). Do not go in under heater.
9. Throw lever of Maxon safety shut-off valve in main gas line to open. The main flame should come on right away but will automatically stay on low flame for 1 minute.
10. When temperature reaches 200°C.,
    a) set Aroclor flow up to 300 gpm or normal
    b) switch temperature controller to "Automatic" and set the Brown recorder-controller pointer at the desired temperature.

VIII. TO RE-START THE UNIT WHEN IT IS HOT (ABOVE 200°C.)

When there has been a temporary interruption of flame and the Aroclor is still above 200°C., it is not necessary to re-start on "Manual Control". Set the pointer on the Brown recorder-controller to the desired temperature of the Aroclor before pressing "Purge Start" button. After "Safe Start" light comes on (after 2-1/2 minutes), push "Flame Start" button and hold in until "Pilot On" light comes on.

IX. TO COOL THE AROCLOR

First turn water on full to the cooler. Next open the high valve in cooler outlet, then close the valve (above pump) in inlet to the heater and open the adjacent one which leads to the cooler. The Aroclor flow will include the user if valves at the user are open. If they are not open, the circulation will be at the Aroclor unit only, circulating thru the Masoneilan by-pass valve.

NOTE: Do not let Aroclor flow exceed 320 gpm, or the pump motor will overload. When Aroclor temperature is below 200°C., do not allow flow to exceed 250 gpm.

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