

CHECKLIST FOR SYSTEM STARTUP ASSISTANCE

The following items should be completed before the Field Engineer's arrival on site for startup. This will minimize the time and associated costs for startup. Please review the following questions, sign off on each and then e-mail, mail or fax (770-425-9559) this form to Thermal Fluid Systems, Inc. Please contact us at any time for clarification or with questions. When returning this form, please also include a map or directions to the job site. Upon receipt of this form, we will coordinate with you the best schedule for startup dates and times.

1. Mechanical

- a. Has all of the equipment been installed and has the piping been completed in accordance with the drawings, good engineering practice and any applicable codes?
- b. Has the associated process piping been cleaned, pressure tested and /or leak tested? Note water should NOT be used for testing as the system should be as dry as possible before filling?
- c. Does the system have sufficient vent and drain valves installed for filling, venting and draining the system?
- d. What type of thermal oil will be used?
- e. Has the system volume been determined and is there a sufficient amount of the selected thermal oil available on site?
- f. Are required utilities such as nitrogen, carbon dioxide, water, steam, or atomizing air available for use during startup & operation?

Note: We recommend that process piping NOT be insulated until after the initial system heat up has been completed so that any leaks may easily be identified.

2. Electrical

- a. Has the field wiring been completed in accordance with the drawings, good engineering practice and any applicable codes?
- b. Has the electrical power has been connected to the control panel with sufficient capacity and protection per good engineering practice and any applicable codes?

c. Do the flame scanner wires run in a separate conduit and are they wired directly to the flame safeguard wiring base?

3. Burner

a. Is the gas pressure at the inlet of the gas train according to the design requirements? (Note actual pressure reading_____)

b. Has the gas train been installed and properly vented according to manufacturers recommendations, good engineering practice and any applicable codes?

c. If fuel oil is being used, does the fuel oil tank have an adequate supply available for startup?

d. If the pilot fuel is supplied from a separate source, is there sufficient fuel available for startup & operation?

4. General

a. Are there any components that have been damaged in shipment or during installation? (List below)

b. Are there any components that are missing? (List below)

c. Are all the heat users ready to be commissioned and accept fluid flow & heat?

d. Are there any temperature restrictions associated with any of the users that would limit the commissioning temperature of the heating equipment? (If so list below)

e. Will a process load be available, preferably at 100% capacity, to properly tune and/or adjust the controls and burner?

f. Are operation and maintenance personnel available to assist with startup and receive training in operation, maintenance and troubleshooting?

5. Additional Checks and Information:

- a. Ensure the exhaust stack area is not any smaller than the breech opening to ensure a backpressure is not built up on the heater and that the stack is designed and installed to meet good engineering practice and any applicable codes.
- b. Check the RTD's are operational. The resistance should be 100 ohms at 0 C, at ambient temperature the resistance should be approximately 110 ohms.
- c. Remove and check the flow meter sensing tubes are clear of any blockages. Blowing air through them is an adequate check. If needed, replace the tubes with 5/16" O.D. x .035 wall steel tubing. **DO NOT USE COPPER TUBING AS A REPLACEMENT** as copper reacts with thermal fluid and should never be used in these systems. If needed, you can obtain replacement ferrules through TFS.
- d. Have the expansion tank, blocking vessel and gas/dirt separator been cleaned out prior to the installation into the system?
- e. Check the pump strainers are clean prior to filling the system.
- f. Ensure there is access to the top of the expansion tank. You must be able to get to the top to remove the blind flange during the thermal oil-conditioning phase to allow water vapor and entrapped gases to leave the system.

Approved as noted: Date:

Company:

By: _____ Title: