

HEATEC TEC-NOTE

Publication No. 12-04-152

INSTALLATION

HFP & HFP-E SERIES HEAVY FUEL PREHEATERS

Scope

This document provides step-by-step instructions for installation of HFP (Fig. 1) and HFP-E (Fig. 2) preheaters. HFP models are heated by thermal fluid. HFP-E models are heated electrically. Preheaters are available as stand-alone units or as skid-mounted systems.



Figure 1. Heatec HFP preheater is heated by thermal fluid.



Figure 2. Skid-mounted system with electrically heated HFP-E preheater.

Intended users

Instructions in this document are intended for use by qualified installers. Qualified installers include licensed electricians and contractors who can make installations that conform with all local codes.

Use proper lifting lugs

When moving a stand-alone preheater, use its two lifting lugs (A and B, Fig. 3). One is mounted on the coil bundle flange, and the other is on the preheater shell. Do not lift preheater with straps around the shell. Doing so will damage the aluminum skin and the insulation.

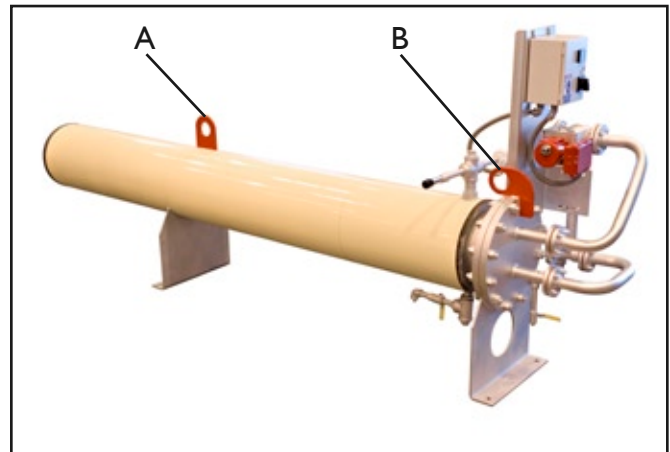


Figure 3. Lifting lugs for stand-alone preheater.

When moving a skid-mounted system, use the special lifting lugs designed specifically for lifting the entire skid (A and B, Fig. 4). These special lugs are positioned for even weight distribution when lifting the entire skid. **Do not attempt to lift the entire skid by the preheater's standard lugs (Fig. 3),** because the skid would not be evenly balanced and would be difficult to control.

Note: Some skids may have lugs mounted in different locations. Some skids may be fitted with forklift pockets for moving the skid by forklift.

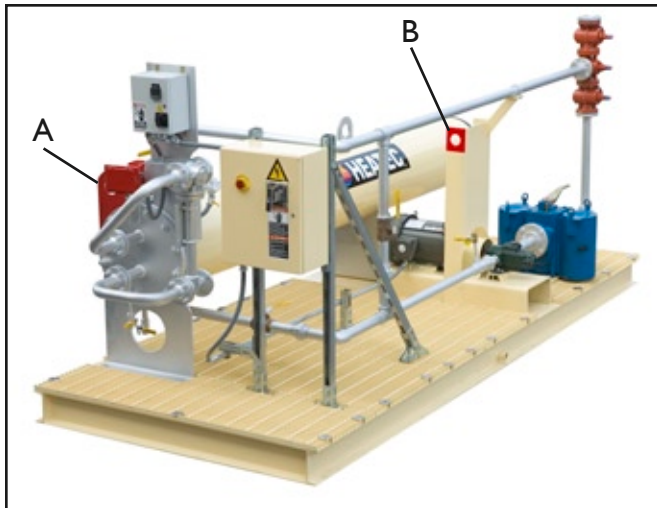


Figure 4. Lifting lugs for skid-mounted system.

Selecting a location for installation

The preheater should be installed as close as possible to the outlet of the thermal fluid heater. Doing so is particularly important for a heater with a single thermal fluid circuit (Fig. 5). For a heater with a manifold for multiple circuits, location of the preheater is less critical (Fig. 6).

Location is important because HFP preheaters may use up to 450,000 Btu/hour during the first hour of operation. As soon as heated fuel is circulated back to the inlet side of the fuel pump, the preheater will use less energy.

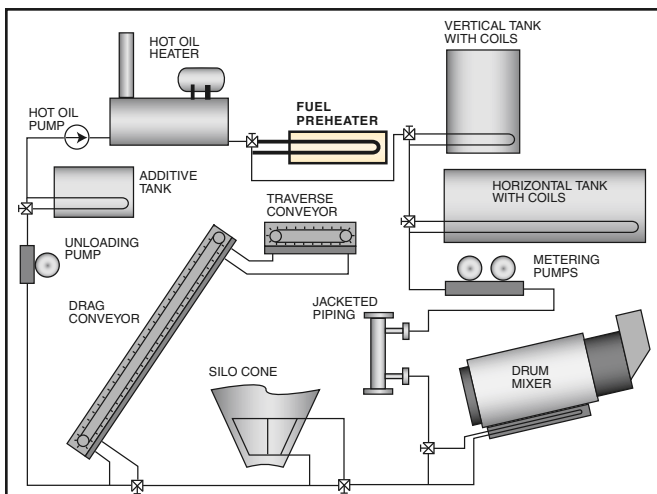


Figure 5. HMA plant with single thermal fluid circuit. Preheater is in thermal fluid circuit immediately after the hot oil heater. Alternatively, it can be placed after the AC tanks.

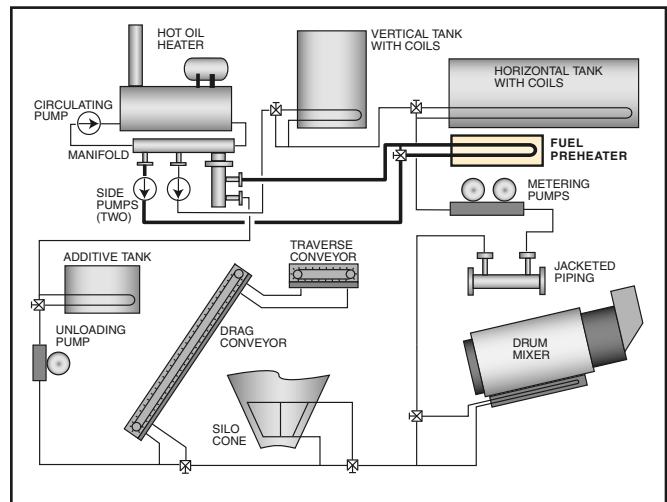


Figure 6. HMA plant with multiple thermal fluid circuits. Preheater is in a separate, dedicated thermal fluid circuit.

HFP preheaters are designed for a flow rate of 90 gpm of thermal fluid. We strongly recommend installing an independent thermal fluid circuit with its own pump and using it solely for the preheater.

Important Notice

Depending on plant operation and configuration, thermal fluid heaters with outputs less than 1 million Btu/hour may not provide enough heat for operating preheater while heating other plant components.

Because HFP-E models are electrically heated, they do not have to be installed close to the thermal fluid heater. HFP-E models may be installed as close as possible to the burner that consumes the heavy fuel. This is to minimize heat loss in the fuel piping from the preheater to the burner.

Foundation

Preparing a suitable foundation for the preheater is the responsibility of its owner. The owner is also responsible for properly bolting a stand-alone preheater to the foundation and for complying with all local codes and regulations.

Heatec provides the footprint drawing for the foundation. This drawing is on the preheater dimension sheet we provide. We recommend a concrete foundation and self-tapping anchor bolts (Fig. 7) to bolt the preheater to the foundation.

The height of the preheater saddles is normally enough to connect the fuel oil supply to the inlet at the preheater. If you require more height, use elevated concrete pads underneath the preheater legs.



Figure 7. Self-tapping anchor bolt.

Piping

Make sure that you include a bypass circuit in your thermal fluid piping to the preheater. This will allow you to shut off thermal fluid to the preheater for maintenance without shutting off thermal fluid to asphalt tanks or other plant components.

A bypass circuit can be created by installing two three-way valves: one at the thermal fluid inlet valve (B, Fig. 8) and one at the thermal fluid outlet (H, Fig. 8) and connecting them with a bypass line. In any case, be sure to include a valve to prevent thermal fluid from flowing backward into the preheater thermal fluid outlet (H, Fig. 8). Otherwise, thermal fluid will spill when the preheater inlet and outlet connections (A and I, Fig. 8) are removed for maintenance. Valves should be as close as possible to the preheater inlet (B, Fig. 8) and outlet (H, Fig. 8) to minimize the amount of thermal fluid to be drained for preheater maintenance.

Install a fuel pump in the fuel *inlet* piping to the preheater. If the fuel pump is installed in the outlet piping, the pump may cavitate and fail. Make sure you install shutoff valves in the piping for the fuel inlet and outlet to minimize fuel spillage when the heating coil assembly is removed for cleaning.

For thermal fluid pipe connections use only piping with welded flanges. Do not use threaded connections. Supply and return lines should be at least 1-1/2 inch in diameter. You may need flex hoses to compensate for thermal expansion and alignment of pipe flanges.

Piping with welded flanges is also preferred for fuel lines, but threaded fittings are acceptable.

Bypass relief valves and pressure relief valves require different piping, so note which type of valve is provided on your preheater.

The difference between *bypass relief valves* and *pressure relief valves*:

Early model preheaters were fitted with bypass relief valves (Fig. 9). Current models are fitted with pressure relief valves (Fig. 10). Preheaters with code stamp (optional) are fitted with pressure relief valves that meet code ASME VIII.

Bypass relief valves are designed with an opening at the valve seat that allows continuous flow of fuel, even at pressures less than the set pressure of the valve.

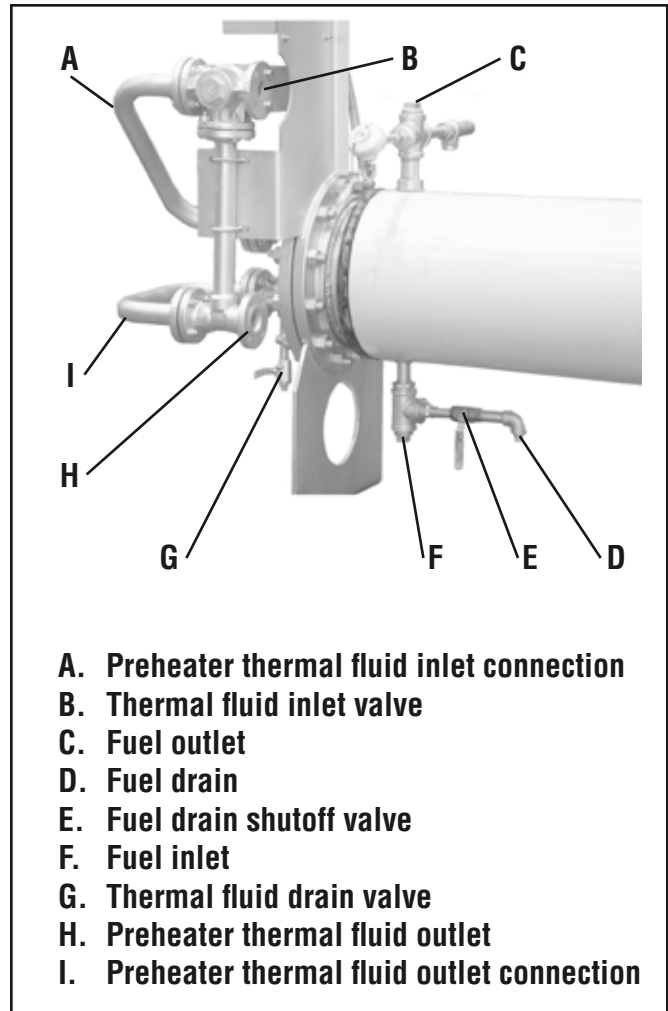


Figure 8. HFP preheater inlets and outlets.



Figure 9. Bypass relief valve used on early model preheaters.

Pressure relief valves are sealed. They only open when internal pressure rises above the set pressure of the valve. When open, the valve releases a small quantity (a few ounces) of fuel until pressure is released.



Figure 10. Pressure relief valve used on current preheaters.

For preheaters with bypass relief valves: Install a fuel line from the bypass relief valve on the preheater back to the fuel tank. Failure to do so will result in continuous fuel leakage from the bypass relief valve.

For preheaters with pressure relief valves: Install a pipe from the outlet of the pressure relief valve to a point about 10 inches above the ground. Leave enough space to place a bucket under its end to catch any fuel that escapes.

Note: Skid-mounted preheaters already have a fuel overflow pipe attached to the pressure relief valve (*Fig. 11*) and require no additional drain pipes.



Figure 11. Fuel overflow pipe attached to the pressure relief valve on a skid-mounted preheater.

Important Notice

By design, overpressure can only occur if the fuel valves at the inlet and outlet (*C and F, Fig. 8*) are closed and heating is activated. Therefore, ALWAYS make sure fuel valves are open when starting up preheater.

Electrical connection

Wiring diagrams of the preheater controls are provided separately, either in the control panel or in a separate binder. The electrical power source for all preheaters should be a branch-circuit breaker that is dedicated to the preheater.

For stand-alone HFP preheater:

Provide an earth-ground to the ground lug provided in the preheater control panel. Provide 120 volt / 1 phase / 60Hz power to the power supply located inside the panel.

Install a set of auxiliary contacts on the motor starter for the fuel pump. Typically, the motor starter is located in the plant's control house. Connect the auxiliary contacts to the proper terminals in the preheater control panel.

For skid-mounted HFP preheater:

Provide earth-grounds to the ground lugs provided in the preheater control panel and the power panel for the fuel pump motor starter. Provide 480 volt / 3 phase / 60Hz power to the power supply located inside the power panel for the fuel pump motor starter.

For stand-alone HFP-E preheater:

Provide an earth-ground to the ground lug provided in the preheater control panel. Provide 480 volt / 3 phase / 60Hz power to the power supply located inside the preheater control panel.

Install a set of auxiliary contacts on the motor starter for the fuel pump. Typically, the motor starter is located in the plant's control house. Connect the auxiliary contacts to the proper terminals in the preheater control panel.

For skid-mounted HFP-E preheater:

Provide an earth-ground to the ground lug provided in the preheater control panel. Provide 480 volt / 3 phase / 60Hz power to the power supply located inside the preheater control panel.

Final

Make sure to set the main power disconnect switches on all preheater panels to **OFF** before activating power to the preheater.

This completes installation, and the preheater is ready for operation.