

One-pipe gravity and vapor systems are not recommended for unit heater work.

On two-pipe gravity, or on pump and receiver systems the return from each unit should be fitted with a heavy duty or blast trap and an air valve should be connected into the return header of each unit. Pressure-drop must be compensated for by elevation of the heater above the water line of the boiler or of the receiver.

On vacuum systems the return from each unit should be fitted with a large capacity trap to discharge the water of condensation and with a thermostatic air valve for eliminating the air, or with a heavy duty trap for handling both the condensation and the air, provided the air finally can be eliminated at some other point in the return system.

On high pressure systems the same kind of traps may be used as with vacuum systems, except that they must be constructed for the pressure used. If the air is to be eliminated at the return header of the unit, a

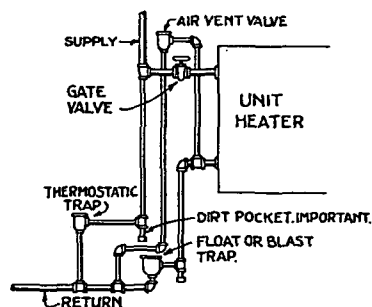


FIG. 3. UNIT HEATER CONNECTIONS WHERE CONDENSATION IS RETURNED TO CONDENSATION PUMP OR HOT WELL

high pressure air valve can be used; otherwise the air may be passed with the condensate through the high-pressure return trap.

The connections for steam and return piping to unit heaters must always be calculated on the basis of the high heat emission or condensation rate of such devices, usually by reducing the heat to be supplied to square feet of equivalent radiation by dividing by 240, and then using the pipe-size tables given in Chapter 9.

ELECTRIC HEATING UNITS

The foregoing discussion relates generally to units in which steam, vapor, or hot water are used as the heating medium. On rare occasions electrical resistances are used as the heating element. These are applied only where electric power is abundant and cheap and where other forms of fuel are scarce and expensive.

DIRECT FIRED UNITS

Where steam or hot water are not available the direct-fired type of heater is sometimes used. The heating element is a warm-air furnace in

which coal, coke, oil or gas is burned directly. This heating element is enclosed in a casing through which a fan maintains a rapid air current by pressure. This type of heater is often used for temporary heat during building construction or where the installation of a steam or hot water plant is for some reason not justified.

TURBINE DRIVEN UNIT HEATERS

Where high pressure steam is available it is sometimes used to drive a steam turbine direct-connected to the unit heater. The exhaust from this turbine, reduced in pressure, is then passed into the heating coil where it is condensed and returned to the boiler.

AUTOMATIC CONTROL

Where automatic temperature control is to be used, there are two classes of units to be considered. One is the standard unit, which has been on the market for many years, and the other is the bypass-type unit, which is a more recent development.

Control of Units Not Having Bypass

There are two general methods of automatic control that may be applied to the unit without bypass. One is to stop and start the unit heater motors individually or in a group by means of a room thermostat. The other is to control the steam supply either to individual units or to a group of units by means of a gradual-acting valve operated from a room thermostat. Where a steam valve control is used, the return system must be equipped with a vacuum pump, as an appreciable pressure difference between supply and return connections necessarily exists when the steam is throttled.

A combination of these two methods is sometimes used wherein the steam supply to the units is cut off completely before the unit heater motor is stopped and is turned on just before the motor is started again. The purpose of this control is to cool off the heater casing and to prevent possible discomfort to persons close to the unit from the radiant heat if steam is left on the coils when the motor is stopped. This is accomplished by two thermostats, one for controlling the motor and the other for controlling the steam valve. With this combination control, there is some possibility of draft complaint, for at times the fans may deliver cool air.

Gradual-acting control of the steam valve should not be applied to heaters with outside air connections unless some protection against freezing is also used. This protection can be accomplished by separating the heater coil into two parts, one of which acts as a tempering coil and is controlled from an outside air thermostat which will keep steam at full pressure on the coil whenever the entering air is below freezing, and which will cut off the steam when the entering air goes above freezing. The main coil is controlled from the room thermostat and is depended upon for temperature regulation. Another method of protection is to immerse in the return condensate a thermostat which controls a positive-acting bypass valve and which will admit additional steam if the temperature of the condensate falls to the freezing point. This is purely a safety device