

Rapid condensation of steam, especially during heating-up periods, is characteristic of this type of equipment. The piping must be planned to accommodate this rapid condensation, must keep the surfaces free of water; while on the supply side the piping must be ample to carry a full supply of steam to the surfaces to take the place of that condensed.

Adequate size of pipe is thus essential to all heating surfaces over which there is a forced flow of air. Especially is this true where the fan is operated under start-and-stop control and where the air handled may be made up either wholly or partly of cold air from outside the building. In such installations the condensation rate may vary rapidly and the necessity for ample pipe capacity is especially acute.

A method of connecting a unit heater to a one-pipe gravity system is illustrated in Fig. 4. In those cases where the unit heater is to be con-

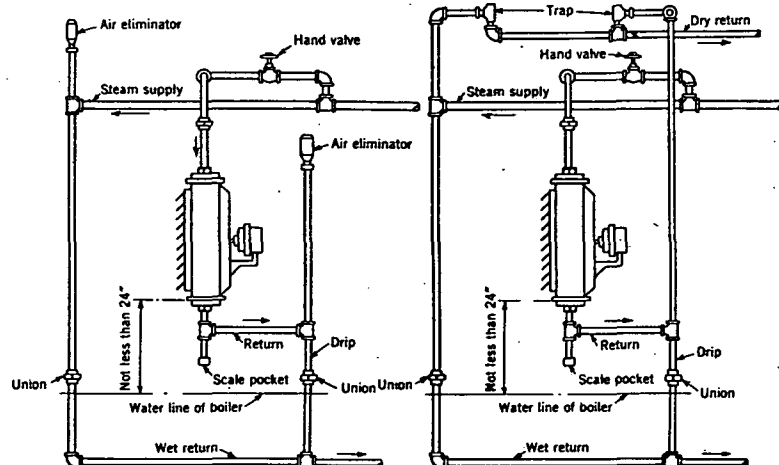


FIG. 4. UNIT HEATER CONNECTION TO ONE-PIPE GRAVITY STEAM SYSTEM

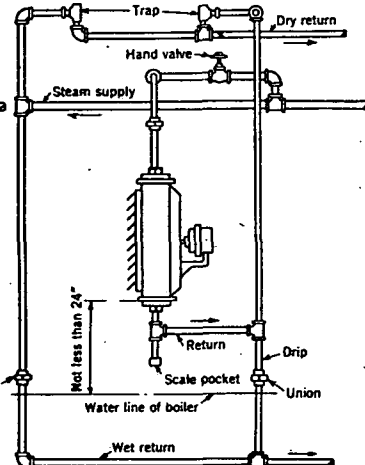


FIG. 5. UNIT HEATER CONNECTION TO GRAVITY SYSTEM WITH WET AND DRY RETURNS

nected to a dry return instead of a wet return it is necessary to provide a water pocket or loop about 5 ft in depth to prevent steam passing into the return and thus into other equipment.

A method of connection is shown in Fig. 5, where there is a wet return and a dry return. In this case the condensate from the heater and the drip from the supply main drop to the wet return by gravity, while the air passes upward through the traps to the dry return and is vented from the system at any suitable location.

A sketch of an arrangement where there is a dry return line through which both air and condensate pass to be handled by some suitable means, such as a condensate pump and receiver is given in Fig. 6. The return line is not subjected to vacuum, and consequently all arrangements must facilitate gravity flow of the condensate toward the receiver. Traps must pass air and condensate rapidly to keep the return piping only partially full of water.

Since unit heaters are often constructed with sufficient strength to resist high pressures, use of high pressure steam in them is a common practice. In Fig. 7 the condensate and air reach the return overhead through traps, and check valves are located in the return piping.

For two-pipe closed gravity return systems, the return from each unit should be fitted with a heavy duty or blast trap, and an automatic 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.

In pump and receiver systems the air may be eliminated by individual air valves on the heaters, or it may be carried into the returns the same as for vacuum systems and the entire return system be free-vented to the atmosphere, provided all units, drip points, and radiation are properly trapped to prevent steam entering the returns.

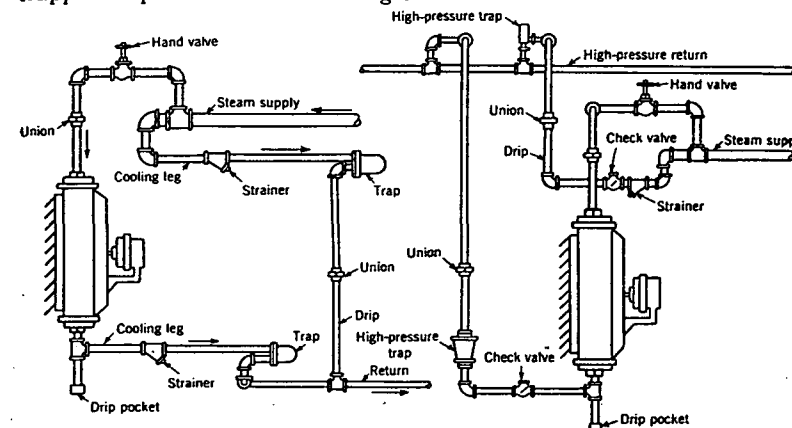


FIG. 6. UNIT HEATER CONNECTION FOR VACUUM OR VAPOR SYSTEM DISCHARGING CONDENSATION INTO DRY RETURN

FIG. 7. METHOD OF CONNECTING UNIT HEATER TO HIGH PRESSURE RETURN

On vacuum or open vented 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.

For 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 high pressure air valve can be used; otherwise the air may be passed with the condensate through the high-pressure return trap, with some danger of return pipe corrosion and the problem of its elimination at some other point in the system.

Application

Unit heaters are used principally for commercial and industrial applications such as display rooms, garages, factories, factory offices and to