

Unit heaters are very popular since they will provide large quantities of heat at a reasonable cost. They are usually mounted between the lower trusses and the roof, where space is easily available. Large units with coils and blowers or indirect fired furnaces are also used extensively and may likewise be mounted in the upper section of the plant. These units can be controlled automatically and, if properly sized and located, can also be used to bring in all or part outside air in winter and summer.

One of the difficulties with units located between the trusses is that when recirculation is used the warm air at the ceiling is drawn through the units.



Figure 5. An application of radiant heat in a partially-opened, uninsulated building. No other heat source is used.

heated to a greater temperature, and discharged with a high velocity in an attempt to force it to the floor. This results in a hot blast over anyone in the immediate area while persons a few feet away may be cold. If operations in the plant generate any smoke and fumes that normally rise to the upper section of the building, these are also forced down toward the occupied area.

Units used to supply heated outside air to replace that discharged by exhaust fans are usually installed in the same way and cause the same complaints from the occupants. In winter, it may be desirable to introduce air at least than room temperature to control the heat generated by the operation (see the discussion of make-up air on page 225).

3. Controls

Any method of supplying heat requires some form of automatic controls as part of the system. One method is to use an outdoor thermostat to control the valve that regulates the input to the heater. Such a system should include a thermostat within the building to maintain proper building temperatures when heat-producing operations are not running. Air-supply units that provide tempered air to the area should have both a room thermostat and a thermostat in the duct to assure proper temperature at all times. Otherwise the room control might be misled because of process heat and allow untempered air to be delivered.

The control for a steam system should have some method of assuring that sufficient steam will be supplied to the coil whenever the temperature of the outside air is below freezing, to heat the air supply to at least 40° F. Some systems are arranged so that the full steam capacity is provided whenever the outside temperature falls below 40° F., which prevents freezing but may cause overheating on mild days. This can be prevented if the valves on both the preheat and main coils and/or the face and bypass dampers are modulated by the control system. There are also special controls to place on the discharge side of the coil to shut off the unit if the air temperature drops below the control setting.

Many coils have been frozen because the condensate did not drain away properly. Contrary to the belief of many persons, there is no such thing as a freeze-proof coil. A better name is a steam distributing coil, which will freeze if not properly protected.

B. REMOVING HEAT FROM A SPACE

This chapter concerns itself only with the problem of removing heat from a space (cooling) to provide suitable environment for employees, not for process cooling. It must be remembered that cooling is accomplished by removing heat from the room and that it is more difficult to remove than to add B.t.u.'s.⁶

The first approach to any cooling problem is to try to eliminate heat at its point of generation. Often this can be done by changing the operation; for example, by using induction heating rather than direct-fired furnaces for certain forging operations. The next step might well be that of isolation—the operation is removed to a separate building or a given section of the main building where it can be walled off and treated as a separate problem. On extremely large, hot operations it is often more practical to supply small confined areas with cool air for the comfort of the operators than to try to cool the entire area.

Most of the above-mentioned approaches are fairly well understood. The biggest problem concerns large areas where some heat is generated throughout, such as large machine shops. When large numbers of people are employed, even

⁶ Chapter on cooling load, *Heating, Ventilating, Air Conditioning Guide*, 1955. American Society of Heating and Air-Conditioning Engineers, New York, 1955.