in factory buildings. Tests have shown that the heat emitted from a wall-type radiator may be reduced from 5 to 10 percent if the radiator is placed near the ceiling with the bars horizontal and in an air temperature exceeding 70 F. When radiators are placed near the ceiling, there is usually such a large difference in the temperature between the floor level and the ceiling that it becomes difficult to heat the living zone of the rooms satisfactorily. Dimensions and heat emission rates for wall radiators are given in Table 4.

Baseboard radiation consists of long, low units which are made to resemble conventional baseboards, and are installed along the outside walls of rooms in place of the usual wooden baseboard. Units are made either of hollow cast-iron panels (with, or without fins on the back) or of ferrous or nonferrous finned tubing installed behind a metal enclosure. They are primarily used in hot water systems, but may also be used in two-pipe steam systems.

There are various kinds of baseboard radiation available,[1] the *radiant* type and the *convector* type. Radiant baseboards have a substantial portion of the front face water backed, and do not depend upon an enclosure for their heat output. Cast-iron radiant baseboards may be either (1) a full radiant, called Type R, or (2) a radiant convector, called Type RC. The Type RC unit, in addition to the radiant front face, has extended convection heating surface on the rear face to increase its output. The convector type of baseboards includes finned tube units with which enclosures are used. The front of the enclosure supplies radiant heat.

TABLE 5. HEAT EMISSION OF PIPE COILS PLACED VERTICALLY ON A WALL (PIPES HORIZONTAL) CONTAINING STEAM AT 215 F AND SURROUNDED WITH AIR AT 70 F

Btu per linear foot of coil per hour (not linear feet of pipe)

SIZE OF PIPE	1 IN.	1¼ IN.	1½ IN.
Single row	132	162	185
Two	252	312	348
Four	440	545	616
Six	567	702	793
Eight	651	796	907
Ten	732	907	1020
Twelve	812	1005	1135

The basic advantage of the baseboard radiator or of the long low narrow radiator is that its normal placement is along the cold walls and under areas where the greatest heat loss occurs in a room. Other advantages claimed for the baseboard radiator are: it is inconspicuous; it is clean in operation; it offers a minimum of interference with furniture placement, and, it distributes the heat near the floor. This last characteristic reduces the floor to ceiling temperature gradient to about 2 to 4 F deg, and tends to produce uniform temperatures throughout the room. It also makes baseboard radiators especially adaptable to basementless homes, where cold floors are prevalent.[2]

Heat loss calculations for baseboard heating systems are the same as those used for other types of radiation. The procedure for designing baseboard heating systems is given in I = B = R Installation Guide No. 5.[1] Ratings for baseboard radiation are expressed in Btu per linear foot.

Pipe coils are assemblies of standard pipe or tubing (1 in. to 2 in.) which are used as radiators. In older practice these coils were commonly used in factory buildings, but are not often found in this service today. When coils are used, the miter type assembly is preferable, as it readily permits expansion in the pipe.

The heat emission of pipe coils placed vertically on a wall, with the pipes horizontal, is given in Table 5, which has been developed from available data and does not represent definite results of tests. For such coils the heat emission varies as the height of the coil. The heat emission of each pipe in *ceiling* coils, placed horizontally, is about 126 Btu, 156 Btu, and 175 Btu per linear foot of pipe, respectively, for 1-in., 1¼-in., and 1½-in. coils.

CONVECTORS

Convectors are space heating devices composed of a casing with outlet grille, and an extended surface heating element of fin-tube or cast-iron fin surface. The casing usually contains a damper. The air enters the enclosure near the floor line below the heating element, is heated in passing through the element, and delivered to the room through the outlet grille located near the top of the enclosure. The room air movement thus established accomplishes a reduction in floor to ceiling temperature differential, and tends to assure comfort in the living zone. A typical recessed convector is shown in Fig. 1. Factory-assembled units comprised of a heating element, casing and outlet grille with damper, are widely used. Grilles may be used over the air inlets.

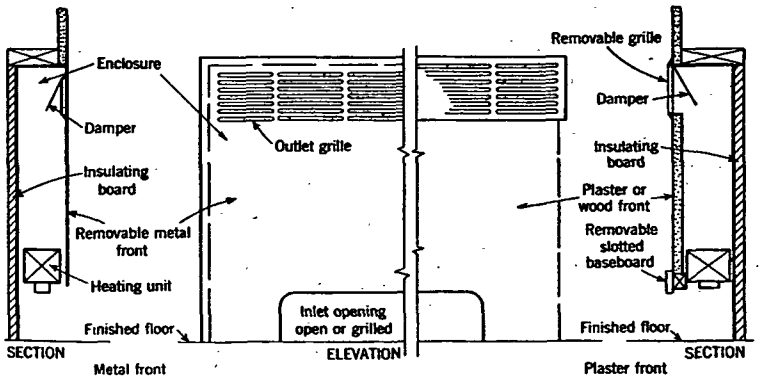


FIG. 1. TYPICAL RECESSED CONVECTOR

In cases where enclosures are to be used but are not furnished by the heater manufacturer, it is important that the proportions of the cabinet and the grilles be so designed that they will not impair the performance of the assembled convector. It is desirable that the enclosure or housing for the convector fit as snugly as possible so that the air to be heated cannot by-pass the heating element in passing through the enclosure.

Cast-iron heating units may be concealed in a cabinet or enclosure for appearance. In such cases a greater percentage of heat is conveyed to the room by convection thereby resulting in a form of gravity convector.

The output of a convector, for any given length and depth, is a function