



a. Both ferrous and non-ferrous pipe and tube are used in floor slabs which rest on grade. The coils are constructed as either sinuous-continuous pipe coils, or arranged as header coils with the pipes spaced from 6 to 18 in. on centers. The coils are generally installed with $1\frac{3}{4}$ to 4 in. of cover above



Air-Heated Ceilings, Walls, and Floors

Several different forms of electric resistance units are available for heating the interior room surfaces. These include: (1) resistance cables that may be embedded in a manner similar to hot water piping in concrete or plaster; (2) prefabricated electric heating panels to be attached to room surfaces; and (3) electrically heated fabrics or other materials for application to, or incorporation into, finished room surfaces. Figs. 7 and 8 indicate two methods of installation. The constructions of electric panels for ceilings, walls, and floors are described in greater detail in Chapter 11. Electric Heating.

HEAT OUTPUT FROM PANEL SURFACES

$$q_r = 0.173 F_s F_s \left[\left(\frac{T_p}{100} \right)^4 - \left(\frac{T_r}{100} \right)^4 \right] \quad (1)$$

T_p = temperature of panel heated surface, Fahrenheit, absolute.



Fig. 9 . . . Heat Output by Radiation

$$F_i = F_0 F_i = \frac{1}{\frac{1}{F_{i-1}} + \left(\frac{1}{\epsilon_1} - 1\right) + \frac{A_1}{A_2} \left(\frac{1}{\epsilon_2} - 1\right)} \quad (2)$$

F_{1-2} = combined configuration and emissivity factor.
 F_{1-2} = view factor = 1.0.
 ϵ_1 and ϵ_2 = emissivities of the surfaces.
 A_1 and A_2 = areas of the surfaces.

$$q_r = 0.15 \left[\left(\frac{L_s + 460}{100} \right)^4 - \left(\frac{AUST + 460}{100} \right)^4 \right] \quad (3)$$

t_s = temperature of panel surface, Fahrenheit.
AUST = area-weighted average temperature of unheated surfaces in room, Fahrenheit.

The actual radiation transfer in a room may be somewhat different from that given by Equation 3 because of non-uniform temperatures, irregular room surfaces, variations in