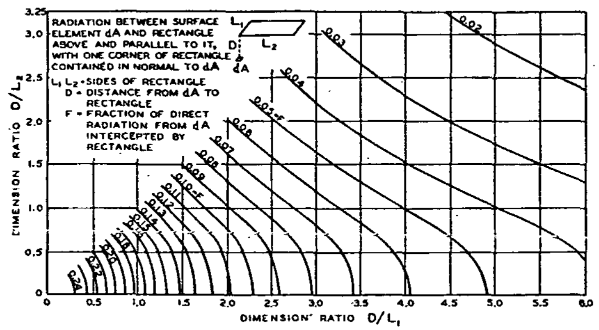

FIG. 4. GEOMETRICAL FACTOR F FOR DIRECT RADIATION BETWEEN AN ELEMENT dA AND A PARALLEL RECTANGLE*

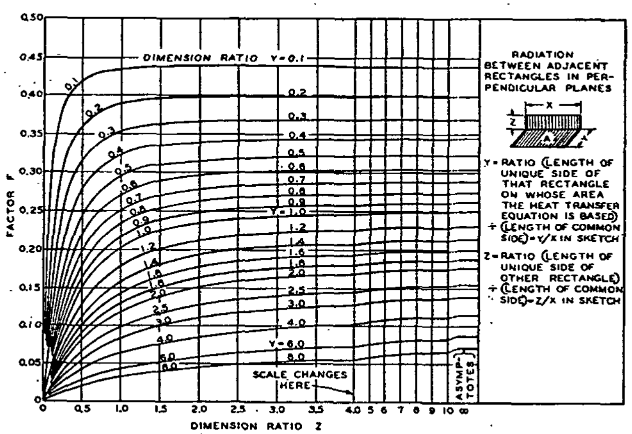

FIG. 5. GEOMETRICAL FACTOR F FOR DIRECT RADIATION BETWEEN ADJACENT RECTANGLES IN PERPENDICULAR PLANES*

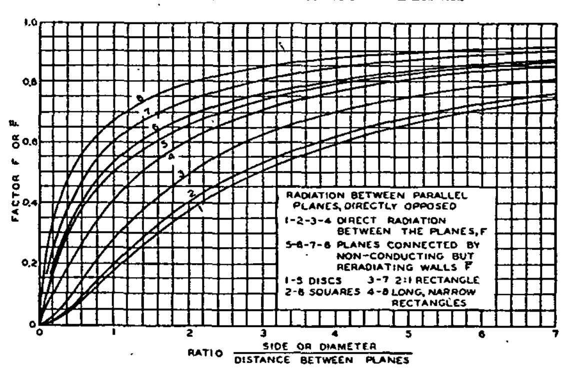

FIG. 6. GEOMETRICAL FACTOR F FOR DIRECT RADIATION BETWEEN OPPOSED PARALLEL RECTANGLE AND DISCS OF EQUAL SIZE*

The conductance h_r thus defined is a function of the shape-emissivity factor, as well as the temperatures of the radiator and receiver. Fig. 7 shows a plot of the equivalent conductance for two *black bodies* (*i.e.*, with emissivities equal to unity) which exchange energy only with one another.

Combined Convection and Radiation

It should be noted that the previous equations and tables give the heat transfer by convection and by radiation computed separately. In many practical cases it is desirable to treat convection and radiation as a single combined process, using a first-power equation:

$$q_{rc} = h_{rc} \, A \, (t_1 - t_2) \tag{5}$$

where q_{rc} is the total heat flow due to radiation and convection, in Btu per hour. Values of h_{rc}, the surface or film conductance for combined

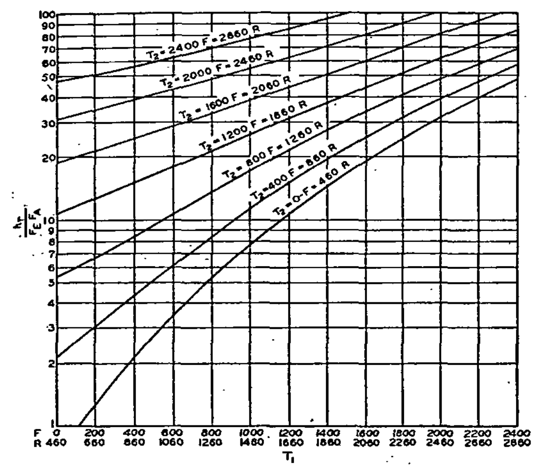

FIG. 7. EQUIVALENT CONDUCTANCE FOR RADIATION BETWEEN TWO BLACK BODIES EXCHANGING ENERGY ONLY WITH ONE ANOTHER

radiation and convection, are given in Chapter 9, (Table 1 and Fig. 4). Complete tables for the combined heat transfer of steam and hot water radiators, pipes, coverings, etc., will be found in the appropriate chapters.

HEAT-FLOW RESISTANCE

In most of the steady-state heat transfer problems encountered in air conditioning applications, more than one of the heat transfer mechanisms are effective, and the thermal current flows through several resistances in series or in parallel. In using the resistance concept, the calculations involved are analogous to the application of Ohm's Law in electricity, *viz.*, the heat flow or thermal current is directly proportional to the thermal potential or temperature difference, and inversley proportional to the thermal resistance:

$$q_{rc} = \frac{t_1 - t_2}{R} \tag{6}$$