will be noted that they vary in accordance with the service for which they are intended. It is obvious that a Turkish bath room requires a higher temperature than a gymnasium or machine shop. In providing these temperatures the engineer must necessarily know the conditions and solve the problem accordingly.

TABLE 16. INSIDE TEMPERATURES USUALLY SPECIFIED

	Deg. Temp.		Deg. Temp.
Warm Air Baths	120	Factories	65
Steam Baths	110	Stores	65
Hospital Operating Room	85	Gymnasium	55 to 60
Bath Rooms	85	Machine Shops	60 to 65
Paint Shops	80	Foundries, Boiler Shops, etc.	50 to 60
Hospitals	72 to 75		
Public Buildings	68 to 72	Unheated spaces such as cellars, vestibules, attics, etc., are usually taken at 35 deg. fahr.	
Residences	70		
Schools	70		

The inside air temperature which must be maintained within a building, is the temperature at the breathing line 5 ft. above the floor and not less than 3 ft. from the outside walls. Inside air temperatures usually specified vary in accordance with the use to which the building is to be put, and in making the actual heat loss computations for the various rooms in a building it is often necessary to modify the temperatures given in Table 16 so that the air temperature at the proper level will be used. By "air temperature at the proper level" is meant, in the case of walls, the air temperature at the mean height between floor and ceiling; in the case of glass, the air temperature at the mean height of the glass, in the case of roof or ceiling, the air temperature at the mean height of the roof or ceiling above the floor of the heated room, and in the case of floors, the air temperature at the floor level. In the case of heated spaces adjacent to unheated (no heat of any kind) spaces, it will usually be sufficient to assume the temperature in such spaces as the mean between the temperature of the inside heated space and the outside air temperature.

The air temperature at the mean height between floor and ceiling is the "breathing line" temperature, Table 16, for rooms not over 10 ft. in height. For rooms above this height, add 2 per cent per foot of height to the breathing-line temperature for each foot or fraction of a foot difference between the mean height of the vertical wall glass roof or ceiling surface, and the height of the breathing line.

In determining mean air temperatures just above floors which are next to ground or unheated spaces, a temperature 5 deg. lower than breathing-line temperature may be used, provided breathing-line temperature is not less than 55 deg. fahr.

CHAPTER II

HEATING BY RADIATION

CALCULATING RADIATION

RADIATION can be classified as direct, semi-direct, and indirect, and is usually made of pipe or cast iron; when it is made of pipe it is termed *pipe coil*, and when made of cast iron it is termed column, wall, semi-indirect, or indirect radiation.

The unit of measure in figuring radiation is the square foot of heating surface, which is the external surface.

The amount of heat a square foot of heating surface (radiation) will give off depends upon the temperature of the heating medium (steam, or hot water), the temperature of the surrounding air, and the velocity at which the air passes over same.

Tables 17 to 23 on succeeding pages indicate the number of B.t.u. a given size column or wall radiator will transmit in 1 hr. with steam as the heating medium. The ordinary practice in calculating the amount of radiation of various kinds to meet a variety of conditions will be briefly stated.

To determine the amount of direct radiation to heat a room, figure all of the heat losses, adding the proper amount for exposure, and refer to Table 24 to find the proper size radiator.

To determine the amount of semi-indirect (sometimes termed direct-indirect), radiation to heat a room, figure all the heat losses, adding the proper amount for exposure and add 40 per cent then divide by 240.

Example.—The heat losses including allowance for exposure for a given size room is 17,200 B.t.u. + 40 per cent or 24,080 B.t.u. ÷ by 240 = 100 sq. ft. of semi-indirect radiation to heat the room.

To determine the amount of indirect radiation required to heat a room, figure all the heat losses, making allowance for exposure, and add 80 per cent, then divide by 240.

Example.—The heat losses including allowance for exposure for a given size room is 17,200 B.t.u. + 80 per cent for 30,860 B.t.u. ÷ by 240 = 129 sq. ft. of indirect radiation to heat the room.

For rooms over 12 ft. in height and not over 20 ft. in height figure as above and add 2 per cent of each additional foot of height over 12 ft. and up to 20 ft. Should the room be over 20 ft. in height add 25 per cent to the total height. If rooms are to be heated in the day time only, figure as above and make proper allowance for heat of rooms and add the number of B.t.u. required to heat the amount of air in the room