ward side must leave through the cracks on the leeward side. Therefore, only one-half of the total crack will be used in computing infiltration for each side and each end of building.

(2) An exposure allowance of 15 per cent is also to be added to the wall and glass transmission losses and to the infiltration losses on the two adjacent sides of the building most nearly facing the prevailing wind as stated in the first paragraph on page 48.

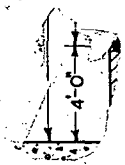
(3) It is also possible to compute the heat required to take care of infiltration on the basis of ½ of an air change per hour as given in Table 14 for a factory with minimum conditions. Volume = 50 × 120 × 20 (mean height) = 120,000 cu. ft. and heat required per hour is

$$120{,}000 \times \tfrac{1}{2} \times 0.075 \times 0.24 \times 59.6 = 64{,}200 \text{ B.t.u.}$$

Based on infiltration through one-half the total crackage in all walls, the heat to be supplied per hour is from preceding table,

$$6{,}850 + 27{,}300 + 5{,}950 + 23{,}750 = 63{,}850 \text{ B.t.u.}$$

This value based on crackage should be used, but if building is to be heated intermittently, not less than one air change per hour should be allowed.



CHAPTER II

RADIATORS AND HEATERS

Kinds of Heat Emitting Units, Heat Emission from Different Kinds of Radiators and Heaters, Effects of Humidity, Painting and Enclosures on Heat Emission, Specifications for Cast Iron Radiators.

THIS chapter is intended to apply to the salient data on the different kinds of heating elements pertaining to that field wherein heating is done by direct radiators, direct-indirect or concealed heaters (performing their function of emitting the necessary heat by radiation or conduction) or wherein the heating is done by concealed built-in heaters, cabinet heaters or indirect heaters, performing these same functions, mainly by the processes of convection.

It should be understood that any heater, whether it be a cast-iron "radiator" or one of the newer non-ferric, extended surface heaters specifically designed for enclosure within a wall or cabinet, heats the air which comes in contact with its surfaces almost wholly by *conduction*, the radiant effect being negligible.

Careless nomenclature has resulted in such confusion that the facts should be briefly reviewed.

An exposed cast-iron radiator emits from 10 per cent to, almost, 30 per cent of its heat emission, as radiant heat.[1] The balance or major position of its emission is, of course, by conduction to the air in contact with the heated surfaces. Thereupon the heated air, through convection, sets up a circulation which tends to distribute the heat, more or less uniformly, in accordance with the manner in which the convection currents are utilized.

When a cast-iron radiator, or one of the newer non-radiating heaters provided with extended conducting surfaces, is enclosed within a wall or cabinet, it emits practically no heat by radiation, functioning as a "conductor" rather than a "radiator." Hence the term "radiator" or "radiation" applied to such heaters, or such *heat-surface*, is distinctly a misnomer which should not be perpetuated. And it should be equally emphasized that air is heated by *conduction*, in contact with a heated surface, while *convection* is that phenomenon by which heat is distributed within a *fluid*, liquid or gas. With these facts kept in mind there should be no further confusion or faulty nomenclature.

Most of the former types of large column cast-iron radiators have recently been replaced by the small tube types, while many forms of concealed and cabinet heaters have recently been developed. These changes make it necessary to establish definite meanings for the terms

[1]Research Laboratory, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS.

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