air up to the temperature of the room. In-leakage takes place on the windward side, and out-leakage on the leeward side of the building. Heat loss by infiltration should, therefore, be figured only for windows and doors on the windward side of the room to be heated. Since the wind will, at different times, come from all directions, radiation must, in practice, be based upon the windows and doors on the side having the greatest window and door area.

Example: What will be the heat loss by infiltration from a room 20 x 12 x 9 ft. high with west, north and east exposure, having one 3 x 6 ft. double hung frame window on each the east and west exposures, and two on the north. Also one 3 x 7 ft. door on the north. Assume a 15 mile wind velocity, 0 deg. outside, and 70 deg. inside temperature. Also assume that the cracks between the frame and the wall are well caulked.

Infiltration must be based on the greatest number of windows and doors in any exposure, or, in this instance, two windows and one door. Each window has 21 ft. of crack, or together 42 ft., and the door 20 ft. of crack making a total of 62 ft. of crack.

Answer: A—If windows and doors are fairly tight (1/16 in. crack), but without weather-stripping the leakage will be 2.5 ft. per min. per ft. of crack. (See Table 1).

$$H = 1.2 \times 2.5 \times 62\ (70 - 0) = 13{,}020 \text{ B.t.u. per hr.}$$

$\frac{13{,}020}{240}$ or 52 sq. ft. of radiation will be required to supply this loss.

Answer: B—If windows and doors are tight and well weather-stripped, the leakage will be 0.38 cu..ft. per min. per ft. of crack.

$$H = 1.2 \times 0.38 \times 62\ (70 - 0) = 1{,}979 \text{ B.t.u. per hr.}$$

$\frac{1979}{240}$ or 8.2 sq. ft. of radiation will be required to supply this loss.

COMPARISON OF FUEL QUANTITIES AND COSTS, TO HEAT AIR ENTERING VARIOUS SLIDING SASH WINDOWS, AS AIR INFILTRATION OR IN-LEAKAGE, ASSUMING 65 PER CENT OVER ALL EFFICIENCY OF HEATING PLANT

Window, 3 x 7 ft. Crack, 23 lin. ft.
Wind, 15 miles per hr.

B.t.u. to raise 1 cu. ft. air from zero to 70 deg.,	1.439
B.t.u. per lb. best coal,	13,080
Duration heating season,	130 days
Cost coal,	$6.00 per ton
Overall efficiency of heating plant,	65 per cent (high)

B.t.u. available per lb. of coal = 13,080 × 0.65 = 8500 B.t.u.

A.	Unstripped window,	2.53 cu. ft. per min. or 132 cu. ft. per hr. per ft. crack
B.	Plain Rib Strip,	0.6 cu. ft. per min. or 36.0 cu. ft. per hr. per ft. crack
C.	Interlocking weather-strip,	0.46 cu. ft. per min. or 27.6 cu. ft. per hr. per ft. crack

A. $\frac{23 \times 132 \times 1.439}{8500} = 0.513$ lb. coal per hr.

$\frac{0.513 \times 24 \times 130}{2000} = 0.800$ tons per season

$6.00 × 0.800 = $4.80 per season

B. $\frac{23 \times 36.0 \times 1.439}{8500} = 0.140$ lb. coal per hr.

$\frac{0.140 \times 24 \times 130}{2000} = 0.22$ tons per season

$6.00 × 0.22 = $1.31 per season

C. $\frac{23 \times 27.6 \times 1.439}{8500} = 0.107$ lb. coal per hr.

$\frac{0.107 \times 24 \times 130}{2000} = 0.167$ tons per season

$6.00 × 0.167 = $1.00 per season

Saving per window per year by using rib strip

$4.80 − $1.31 = $3.49

Saving per window per year by using interlocking weather-strip

$4.80 − $1.00 = $3.80

TRANSMISSION LOSSES

Heat flows from a higher to a lower temperature at a definite rate, depending upon the difference in temperature and the character and thickness of the material through which it passes.

The accompanying heat transmission tables are for average conditions of construction and the rate of transmission for any material is given in

TABLE 4. HEAT TRANSMISSION FROM ROOFS

CONSTRUCTION	B.t.u.
1″ Wood, 5-Ply Paper, Tar and Gravel	0.30
1″ Wood, Felt Roofing	0.36
1½″ Wood, 5-Ply Paper, Tar and Gravel	0.26
2″ Wood, 5-Ply Paper, Tar and Gravel	0.21
2½″ Wood, 5-Ply Paper, Tar and Gravel	0.18
Tin on Wood Strips	1.60
Tin on Sheathing	0.60
Tin on Sheathing, with Paper	0.43
Shingles on Wood Strips	0.87
Shingles on Sheathing	0.43
Shingles, Paper, Sheathing, Strips	0.21
4″ Hollow Tile, Paper, Tar and Gravel	0.30
6″ Hollow Tile, Paper, Tar and Gravel	0.27
2″ Concrete, Paper, Tar and Gravel	0.71
3″ Concrete, Paper, Tar and Gravel	0.64
4″ Concrete, Paper, Tar and Gravel	0.57
Flat Tile on Wood Strips	1.07
Flat Tile on Sheathing	0.64
Slate on Wood Strips	1.10
Slate on Paper and Sheathing	0.50
Corrugated Iron on Strips	1.50
Corrugated Iron, Sheathing	0.64