The average value of the product of $C_o$ and $W$ is about 141,000 B.t.u. To obtain the fuel saving from formula (14) in terms of barrels of oil, divide the result by 42, the number of gallons of oil in a barrel.

If gas is the fuel burned, the annual saving in cubic feet of gas can be estimated by the following formula:

$$F_g = \frac{(U - U_i) \times N \times (t - t_a) \times A}{C_g \times E_g} \qquad (15)$$

*where*

$F_g$ = annual fuel saving in cubic feet of gas.
$C_g$ = calorific value of gas in B.t.u. per cubic foot (usually taken as 535 for manufactured gas and 1,000 for natural gas).
$E_g$ = overall efficiency of the heating system for a gas-fired furnace (usually taken as 80 per cent).

It should be understood that the heating efficiencies of 60, 70 and 80 per cent, which are frequently used for estimating fuel savings with coal, oil and gas are approximate values and apply more specifically where the heating plant is not located in the building heated, and consequently, where there is no regain of the sensible heat of the flue gases, and where the pipe transmission losses may be considerable. Where the heating plant is located within the building to be heated, the *house* or *building* efficiencies for coal, oil and gas may be substantially higher than those specified, although it is even possible that the efficiencies may be lower than these values under varying conditions of operation.

***Radiation Saving***

The installation of a given thickness of insulation in the walls and/or roof of a building will reduce the amount of direct radiation required to maintain the desired temperature, and in many cases this may be an item of considerable importance; in fact, in the case of certain uninsulated constructions having a high rate of heat transmission, the monetary value of the saving in radiation due to the application of the insulation, may be sufficient to offset the cost of the insulation. The amount of radiation that can be saved is of course determined from the difference in the radiation requirements of the uninsulated and insulated buildings. The radiation saving can also be estimated by means of the following formula, if a steam heating system is to be installed:

$$R_s = \frac{(U - U_i) \times (t - t_o) \times A}{240} \qquad (16)$$

*where*

$R_s$ = saving in square of equivalent radiation based on a steam heating system.

$t_o$ = the outside temperature on which the design of the system is based.

If in the example on page 42, the temperature $t_o$ is 0 deg. fahr., the saving in radiation for a steam heating system will be:

$$R_s = \frac{(0.30 - 0.15) \times (75 - 0) \times 10{,}000}{240}$$

= 468 sq. ft. of equivalent direct radiation.





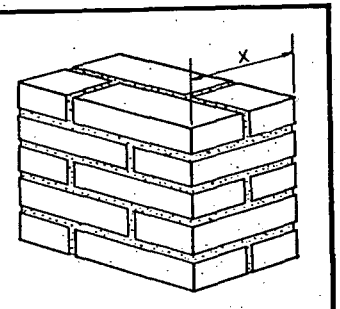
TABLE 9. COEFFICIENTS OF TRANSMISSION ($U$) OF SOLID BRICK WALLS[b]

*Note.*—THESE COEFFICIENTS ARE EXPRESSED IN B.T.U. PER HOUR PER SQUARE FOOT PER 1 DEG. FAHR. DIFFERENCE IN TEMPERATURE BETWEEN THE AIR ON THE TWO SIDES AND ARE BASED ON AN OUTSIDE WIND EXPOSURE OF 15 MILES PER HOUR.

The values of U in this Table are based on the following Internal Conductivities or Conductances which are expressed in B.t.u. per Hr. per Sq. Ft. per 1°F

| | |
|---|---|
| Brick | 5.00 per 1" |
| Cement Mortar | 8.00 per 1" |
| Plaster board | 3.73 per $\frac{3}{8}$" |
| Plaster (Gypsum) | 2.32 per 1" |
| Wood Lath & Plaster | 2.00 as applied |
| Cork board | 0.30 per 1" |
| Rigid Insulation (Board form) | 0.33 per 1" |
| Cellular Gypsum (18#) | 0.59 per 1" |
| Flaked Gypsum, Dry (24#) | 0.48 per 1" |
| Split Furring Tile | $1\frac{1}{2}$" = 1.40 2" = 1.25 |

Y = Thickness of Insulation where specified




| Number | Interior Construction | Y | Thickness of Brick - X | | |
|---|---|---|---|---|---|
| | | | 8" | 12" | 16" |
| | | | A | B | C |
| 1 | Plain Walls - No Interior Finish | | 0.385 | 0.295 | 0.238 |
| 2 | $\frac{1}{2}$" Plaster on Brick | | 0.356 | 0.277 | 0.227 |
| 3 | $\frac{3}{4}$" Plaster on Metal Lath - Furred | | 0.261 | 0.216 | 0.184 |
| 4 | $\frac{1}{2}$" Plaster on Wood Lath - Furred | | 0.250 | 0.208 | 0.178 |
| 5 | $\frac{1}{2}$" Plaster on $\frac{3}{8}$" Plaster board - Furred | | 0.251 | 0.209 | 0.179 |
| 6 | $\frac{1}{2}$" Plaster on Wood Lath on 2" Furring Strips - Cellular Gypsum Fill[c] | 1$\frac{5}{8}$"[a] | 0.171 | 0.151 | 0.135 |
| 7 | $\frac{1}{2}$" Plaster on Wood Lath on 2" Furring Strips - Flaked Gypsum Fill | 1$\frac{5}{8}$"[a] | 0.154 | 0.137 | 0.124 |
| 8 | $\frac{1}{2}$" Plaster on Rigid Insulation (Board form) Furred | $\frac{1}{2}$" | 0.191 | 0.166 | 0.146 |
| 9 | | 1" | 0.148 | 0.132 | 0.120 |
| 10 | $\frac{1}{2}$" Plaster on Cork board set in $\frac{1}{2}$" Cement Mortar | 1$\frac{1}{2}$" | 0.127 | 0.115 | 0.104 |
| 11 | | 2" | 0.105 | 0.097 | 0.090 |
| 12 | $\frac{1}{2}$" Plaster on 1$\frac{1}{2}$" Split Furring Tile set against Wall | | 0.284 | 0.231 | 0.195 |
| 13 | $\frac{1}{2}$" Plaster on 2" Split Furring Tile set against Wall | | 0.277 | 0.227 | 0.192 |

[a] Based on 1$\frac{5}{8}$ in., the actual thickness of 2 in. furring strips.
[b] The coefficients on this page can also be used with sufficient accuracy for the Ideal Rolok-Bak Wall.
[c] The coefficient used for cellular gypsum, 0.59 is for 18 lb. weight—weights as low as 12 lb. may be used.