TABLE 4. CONDUCTIVITIES (k) AND CONDUCTANCES (C) USED IN CALCULATING HEAT TRANSMISSION COEFFICIENTS (U) IN TABLES 5 TO 18

These constants are expressed in Btu per (hour) (square foot) (Fahrenheit degree temperature difference). Conductivities (k) are per inch thickness and conductances (C) are for thickness or construction stated, not per inch thickness.

MATERIAL	DESCRIPTION	Conductivity or Conductance (k)	Conductivity or Conductance (C)	Resistance: Per Inch Thickness $\left(\frac{1}{k}\right)$	Resistance: For Thickness Listed $\left(\frac{1}{C}\right)$
AIR SPACES					
Bounded by ordinary materials	Vertical[a], ¾ in. or more in width	—	1.10	—	0.91
Bounded by aluminum foil	Vertical[a], ¾ in. or more in width	—	0.46	—	2.17
EXTERIOR FINISHES (Frame Walls)					
Brick Veneer	4 in. thick (nominal)	—	2.27	—	0.44
Stucco (1 in.)		12.50	—	0.08	—
Wood Shingles		—	1.23	—	0.78
Yellow Pine Lap Siding		—	1.28	—	0.78
INSULATING MATERIALS					
Aluminum Foil	See Air Spaces	—	—	—	—
Bats and Blankets	Made from mineral or vegetable fiber or animal hair, enclosed or open	0.27	—	3.70	—
Corkboard	Pure, no added binder	0.30	—	3.33	—
Insulating Board	Vegetable fiber	0.33	—	3.03	—
Mineral Wool	Fiber made from rock, slag or glass	0.27	—	3.70	—
Vermiculite	Expanded	0.48	—	2.08	—
INTERIOR FINISHES					
Composition Wallboard	5/16 in. to ⅜ in. thick	0.50	—	2.00	—
Gypsum Plaster		3.30	—	0.30	—
Gypsum Board (⅜ in.)	Plain or decorated	—	3.70	—	0.27
Gypsum Lath (⅜ in.) and Plaster	Plaster thickness assumed ½ in.	—	2.4	—	0.42
Insulating Board (½ in.)	Plain or decorated	—	0.66	—	1.52
Insulating Board Lath (½ in.) and Plaster	Plaster thickness assumed ½ in.	—	0.60	—	1.67
Insulating Board Lath (1 in.) and Plaster	Plaster thickness assumed ½ in.	—	0.31	—	3.18
Metal Lath and Plaster	Plaster thickness assumed ¾ in.	—	4.40	—	0.23
Plywood (⅜ in.)	Plain or decorated	—	2.12	—	0.47
Wood Lath and Plaster		—	2.50	—	0.40
MASONRY MATERIALS					
Brick	Adobe, assumed 4 in. thick	—	0.89	—	1.12
Brick	Common, assumed 4 in. thick	—	1.25	—	0.80
Brick	Face, assumed 4 in. thick	—	2.30	—	0.43
Cement Mortar		12.00	—	0.08	—
3 in. Clay tile (hollow)		—	1.28	—	0.78
4 in. Clay tile (hollow)		—	1.00	—	1.00
6 in. Clay tile (hollow)		—	0.64	—	1.57
8 in. Clay tile (hollow)		—	0.60	—	1.67
10 in. Clay tile (hollow)		—	0.58	—	1.72
12 in. Clay tile (hollow)		—	0.40	—	2.50
16 in. Clay tile (hollow)		—	0.31	—	3.23
Concrete	Light weight aggregate[b]	2.50	—	0.40	—
Concrete	Sand and gravel aggregate	12.00	—	0.08	—
3 in. Concrete blocks	Hollow, cinder aggregate	—	1.28	—	0.78
4 in. Concrete blocks	Hollow, cinder aggregate	—	1.00	—	1.00
8 in. Concrete blocks	Hollow, gravel aggregate	—	1.00	—	1.00
12 in. Concrete blocks	Hollow, gravel aggregate	—	0.80	—	1.25
8 in. Concrete blocks	Hollow, cinder aggregate	—	0.60	—	1.66
12 in. Concrete blocks	Hollow, cinder aggregate	—	0.53	—	1.88
8 in. Concrete blocks	Hollow, light weight aggregate[b]	—	0.50	—	2.00
12 in. Concrete blocks	Hollow, light weight aggregate[b]	—	0.47	—	2.13
Gypsum fiber concrete	87½ per cent gypsum and 12½ per cent wood chips	1.66	—	0.60	—
3 in. Gypsum tile	Hollow	—	0.61	—	1.64
4 in. Gypsum tile	Hollow	—	0.46	—	2.18
Stucco		12.50	—	0.08	—
Tile and Terrazzo	For flooring	12.00	—	0.08	—
Stone		12.50	—	0.08	—

[a] Conductance values for horizontal air spaces depend on whether the heat flow is upward or downward, but in most cases it is sufficiently accurate to use the same values for horizontal as for vertical air spaces

[b] Expanded slag, burned clay or pumice.

TABLE 4. CONDUCTIVITIES (k) AND CONDUCTANCES (C) USED IN CALCULATING HEAT TRANSMISSION COEFFICIENTS (U) IN TABLES 5 TO 18—Concluded

These constants are expressed in Btu per (hour) (square foot) (Fahrenheit degree temperature difference). Conductivities (k) are per inch thickness and conductances (C) are for thickness or construction stated, not per inch thickness.

MATERIAL	DESCRIPTION	Conductivity or Conductance (k)	Conductivity or Conductance (C)	Resistance: Per Inch Thickness $\left(\frac{1}{k}\right)$	Resistance: For Thickness Listed $\left(\frac{1}{C}\right)$
ROOFING MATERIALS					
Asbestos Shingles		—	6.00	—	0.17
Asphalt Shingles		—	6.50	—	0.15
Built-up Roofing	Assumed thickness ⅜ in.	—	3.53	—	0.28
Heavy Roll Roofing		—	6.50	—	0.15
Slate	Assumed ½ in.	10.00	20.00	0.10	0.05
Wood Shingles		—	1.28	—	0.78
SHEATHING					
Gypsum (½ in.)		—	2.82	—	0.35
Insulating Board (25/32 in.)		—	0.42	—	2.37
Plywood (5/16 in.)		—	2.56	—	0.39
Fir or Yellow Pine (1 in.)	Actual thickness 25/32 in.	—	1.02	—	0.98
Fir, plus building paper	Actual thickness 25/32 in.	—	0.86	—	1.16
SURFACES					
Still air	Ordinary non-reflective materials, vertical	—	1.65	—	0.61
15 mph wind velocity	Ordinary non-reflective materials, vertical	—	6.00	—	0.17
WOODS					
Fir sheathing (1 in.) building paper and Yellow Pine lap siding		—	0.50	—	2.00
Maple or Oak		1.15	—	0.87	—
Yellow Pine or Fir		0.80	—	1.25	—

sion U_i of the insulated construction may be compared with the corresponding coefficient U without insulation. Attention is called to the necessity of applying the insulating material in accordance with the manufacturer's specification. The engineer must evaluate carefully the economic considerations involved in the selection of an insulating material as adapted to various building constructions. Lack of proper evaluation, or improper installation may lead to unsatisfactory results.

Computed Heat Transmission Coefficients

Computed overall heat transmission coefficients of many common types of building construction are given in Tables 5 to 18, inclusive, each coefficient being identified by a serial number, except in Table 18. For example, the coefficient U of a brick veneer, frame wall with wood sheathing and ½-inch of plaster on gypsum lath is 0.27 (Wall No. 28-C in Table 5) and with 2-inches of blanket or bat insulation, the coefficient would be 0.097 (No. 49-B in Table 6).

In the analysis of any wall construction for the purpose of calculating the overall coefficient of heat transmission U, it is first necessary to determine the paths of heat flow, that is, whether they are parallel or series, or a combination of both. This is in accordance with the basic laws of heat transfer which state that in parallel flow the conductances are additive, while in series flow the resistances are additive. Likewise, in order to determine the total resistance for the wall, the conductance must be known.

The importance of this analysis cannot be over-emphasized. This is especially true in wall constructions in which there are parallel paths of heat flow, and one path has a high heat transfer, while others have a low heat transfer.

The method of making this calculation can best be shown by the following example and Fig. 4. As this wall was tested by the hot box method