TABLE 2. CONDUCTIVITIES (k), CONDUCTANCES (C) AND RESISTANCES (R) OF BUILDING AND INSULATING MATERIALS (*Continued*)

(Design Values)[a]

MATERIAL	DESCRIPTION	DENSITY (LB, PER CU FT)	CONDUCTIVITY OR CONDUCTANCE		RESISTANCE (R)	
			(k)	(C)	Per Inch Thickness $\left(\frac{1}{k}\right)$	For Thickness Listed $\left(\frac{1}{C}\right)$
INSULATING MATERIALS BOARD AND SLABS	Cellular glass	9.0	0.40	—	2.50	—
	Corkboard (without added binder)	6.5–8.0	0.27	—	3.70	—
	Hog hair (with asphalt binder)	8.5	0.33	—	3.00	—
	Plastic (foamed)	1.62	0.29	—	3.45	—
	Wood shredded (cemented in preformed slabs)	22.0	0.55	—	1.82	—
LOOSE FILL	Macerated paper or pulp products	2.5–3.5	0.28	—	3.57	—
	Redwood bark shredded	2.5–3.5	0.30	—	3.33	—
	Mineral wool (glass, slag, or rock)	2.0–5.0	0.30	—	3.33	—
	Sawdust or shavings	8.0–15.0	0.45	—	2.22	—
	Vermiculite (expanded)	7.0	0.48	—	2.08	—
ROOF INSULATION	All types[g]					
	Preformed, for use above deck.					
	Approx. ½ in.	—	—	0.72	—	1.39
	Approx. 1 in.	—	—	0.36	—	2.78
	Approx. 1½ in.	—	—	0.24	—	4.17
	Approx. 2 in.	—	—	0.19	—	5.26
	Approx. 2½ in.	—	—	0.15	—	6.67
	Approx. 3 in.	—	—	0.12	—	8.33
MASONRY MATERIALS CONCRETES	Cement mortar	116	5.0	—	0.20	—
	Gypsum-fiber concrete 87½% gypsum, 12½% wood chips	51	1.66	—	0.60	—
	Lightweight aggregates including expanded shale, clay *or* slate; expanded slags; cinders; pumice; perlite; vermiculite; also cellular concretes	120	5.2	—	0.19	—
		100	3.6	—	0.28	—
		80	2.5	—	0.40	—
		60	1.7	—	0.59	—
		40	1.15	—	0.86	—
		30	0.90	—	1.11	—
		20	0.70	—	1.43	—
	Sand and gravel or stone aggregate (oven dried)	140	9.0	—	0.11	—
	Sand and gravel or stone aggregate (not dried)	140	12.0	—	0.08	—
	Stucco	116	5.0	—	0.20	—
MASONRY UNITS	Brick, common	120	5.0	—	0.20	—
	Brick, face	130	9.0	—	0.11	—
	Clay tile, hollow:					
	1 cell deep 3 in.	—	—	1.25	—	0.80
	1 cell deep 4 in.	—	—	0.90	—	1.11
	2 cells deep 6 in.	—	—	0.66	—	1.52
	2 cells deep 8 in.	—	—	0.54	—	1.85
	2 cells deep 10 in.	—	—	0.45	—	2.23
	3 cells deep 12 in.	—	—	0.40	—	2.50
	Concrete blocks, three oval core:					
	Sand & gravel aggregate 4 in.	—	—	1.40	—	0.71
	8 in.	—	—	0.90	—	1.11
	12 in.	—	—	0.78	—	1.28
	Cinder aggregate 3 in.	—	—	1.16	—	0.56
	4 in.	—	—	0.90	—	1.11
	8 in.	—	—	0.58	—	1.72
	12 in.	—	—	0.53	—	1.89
	Gypsum partition tile:					
	3 x 12 x 30 in. solid	—	—	0.79	—	1.26
	3 x 12 x 30 in. 4-cell	—	—	0.74	—	1.35
	4 x 12 x 30 in. 3-cell	—	—	0.60	—	1.67
	Lightweight aggregate (expanded shale, clay, slate or slag; pumice) 3 in.	—	—	0.79	—	1.27
	4 in.	—	—	0.67	—	1.50
	8 in.	—	—	0.50	—	2.00
	12 in.	—	—	0.44	—	2.27
	Stone, lime or sand	—	12.50	—	0.08	—
METALS	(See Chapter 5, Table 1)					
PLASTERING MATERIALS	Cement plaster, sand aggregate ½ in.	116	5.0	—	0.20	—
	Sand aggregate ¾ in.	—	—	10.00	—	0.10
	Sand aggregate	—	—	6.66	—	0.15
	Gypsum plaster:					
	Lightweight aggregate ½ in.	45	—	3.12	—	0.32
	Lightweight aggregate ⅝ in.	45	—	2.67	—	0.39
	Lightweight agg. on metal lath ¾ in.	—	—	2.13	—	0.47

TABLE 2. CONDUCTIVITIES (k), CONDUCTANCES (C) AND RESISTANCES (R) OF BUILDING AND INSULATING MATERIALS (*Concluded*)

(Design Values)[a]

MATERIAL	DESCRIPTION	DENSITY (LB, PER CU FT)	CONDUCTIVITY OR CONDUCTANCE		RESISTANCE (R)	
			(k)	(C)	Per Inch Thickness $\left(\frac{1}{k}\right)$	For Thickness Listed $\left(\frac{1}{C}\right)$
PLASTERING MATERIALS	Perlite aggregate	45	1.5	—	0.67	—
	Sand aggregate	105	5.6	—	0.18	—
	Sand aggregate ½ in.	105	—	11.10	—	0.09
	Sand aggregate ⅝ in.	105	—	9.10	—	0.11
	Sand aggregate on metal lath ¾ in.	—	—	7.70	—	0.13
	Sand aggregate on wood lath	—	—	2.50	—	0.40
	Vermiculate aggregate	45	1.7	—	0.59	—
ROOFING	Asbestos-cement shingles	120	—	4.76	—	0.21
	Asphalt roll roofing	70	—	6.50	—	0.15
	Asphalt shingles	70	—	2.27	—	0.44
	Built-up roofing ⅜ in.	70	—	3.00	—	0.33
	Slate ½ in.	—	—	20.00	—	0.05
	Sheet metal	—	400+	—	Negl	
	Wood shingles	—	—	1.06	—	0.94
SIDING MATERIALS (ON FLAT SURFACE)	Shingles					
	Wood, 16-in. 7½-in. exposure	—	—	1.15	—	0.87
	Wood, double, 16-in., 12-in. exposure	—	—	0.84	—	1.19
	Wood, plus insul. backer board 5/16 in.	—	—	0.71	—	1.40
	Siding					
	Asbestos-cement, ¼ in., lapped	—	—	4.76	—	0.21
	Asphalt Roll Siding	—	—	6.50	—	0.15
	Asphalt Insulating Siding (½ in. bd.)	—	—	0.69	—	1.45
	Wood, Drop, 1 x 8 in.	—	—	1.27	—	0.79
	Wood, Bevel, ½ x 8 in., lapped	—	—	1.23	—	0.81
	Wood, Bevel, ¾ x 10 in., lapped	—	—	0.95	—	1.05
	Wood, Plywood, ⅜ in., lapped	—	—	1.59	—	0.59
	Structural glass			10.00		0.10
WOODS	Maple, oak, and similar hardwoods	45	1.10	—	0.91	—
	Fir, pine, and similar softwoods	32	0.80	—	1.25	—

[a] Representative values for dry materials at 75 F mean temperature, selected by the A.S.H.A.E. Technical Advisory Committee on Insulation. They are *intended as design* (not specification) values for materials of building construction in normal use. For conductivity of a particular product, the user may obtain the value supplied by the manufacturer or secure the results of unbiased tests.

[b] Air space resistance values shown here are based on a temperature difference of 20 F deg and a mean temperature of 50 F for spaces faced both sides with ordinary *non-reflective* materials ($\epsilon = 0.90$ and $E = 0.82$).

[c] Surface resistance values shown here are *for ordinary non-reflective* materials ($\epsilon = 0.90$).

[d] See also Insulating Materials, Board.

[e] Includes paper backing and facing if any. In cases where the insulation forms a boundary (highly reflective or otherwise) of an air space, refer to Table 1, Sections B and C, to obtain the insulating value of the air space for the appropriate effective emissivity and temperature conditions of the space.

[f] Insulating values of acoustical tile vary depending on density of the board and on the type, size and depth of the perforations. An average conductivity k value is 0.42.

[g] The *U. S. Department of Commerce*, Simplified Practice Recommendation for Thermal Conductance Factors for Preformed Above-Deck Roof Insulation, No. R 257–55, recognizes the specification of roof insulation on the basis of the C values shown. Roof insulation is made in thicknesses to meet these values. Therefore, thickness supplied by *different manufacturers* may vary depending on the conductivity k value of the particular material.

[h] Not oven dried—conductivity k prior to drying, approximately 1 to 3 years.

condition to the maximum density obtainable by heavy ramming. The general findings of the investigation are as follows:

Effect of Temperature. Soils were tested at several mean temperatures. The degree of influence of temperature depends upon whether it is above or below freezing. For increases of moisture content exceeding about 6 to 12 percent, the conductivity of frozen soil becomes progressively greater than that of the unfrozen soil.

Effect of Density. Density affects the thermal conductivity of a soil in about the same manner for all soils, at any moisture content, and for either the frozen or unfrozen condition. On the average, each one pound per cubic foot increase in dry density increases the thermal conductivity by about 3 percent.

Effect of Moisture. An increase in moisture content, up to the point of saturation,