

Table 4 . . . 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 ^b (R)	
			(k)	(C)	Per inch thickness ($\frac{1}{k}$)	For thickness listed ($\frac{1}{C}$)
BOARD	Glass fiber.....	9.5	0.25	—	4.00	—
	Wood or cane fiber.....	—	—	—	—	—
	Acoustical tile ^c	1/4 in.	—	0.84	—	1.19
	Acoustical tile ^c	3/4 in.	—	0.66	—	1.78
	Interior finish (plank, tile, lath).....	15.0	0.35	—	2.86	—
	Interior finish (plank, tile, lath).....	15.0	—	0.70	—	1.43
	Roof deck slab.....	—	—	—	—	—
	Approx.	1 1/4 in.	—	0.24	—	4.17
	Approx.	2 in.	—	0.18	—	5.56
	Approx.	3 in.	—	0.12	—	8.33
BOARD AND SLABS	Sheathing (impreg. or coated).....	20.0	0.38	—	2.63	—
	Sheathing (impreg. or coated).....	20.0	—	0.76	—	1.32
	Sheathing (impreg. or coated).....	20.0	—	0.49	—	2.06
	Cellular glass.....	9.0	0.40	—	2.50	—
	Corkboard (without added binder).....	6.5-8.0	0.27	—	3.70	—
LOOSE FILL	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	—
	Macerated paper or pulp products.....	2.5-3.5	0.28	—	3.57	—
	Mineral wool (glass, slag, or rock).....	2.0-5.0	0.30	—	3.33	—
ROOF INSULATION	Sawdust or shavings.....	8.0-15.0	0.45	—	2.22	—
	Vermiculite (expanded).....	7.0	0.48	—	2.08	—
	Wood fiber: redwood, hemlock, or fir.....	2.0-3.5	0.30	—	3.33	—
	All types ^d	—	—	—	—	—
	Preformed, for use above deck.....	—	—	—	—	—
	Approx.	1/4 in.	—	0.72	—	1.39
	Approx.	1 in.	—	0.26	—	3.78
	Approx.	1 1/4 in.	—	0.24	—	4.17
	Approx.	2 in.	—	0.19	—	5.26
	Approx.	2 1/4 in.	—	0.15	—	6.67
MASONRY MATERIALS CONCRETES	Approx.	3 in.	—	0.12	—	8.33
	Cement mortar.....	116	5.0	—	0.20	—
	Gypsum-fiber concrete 87 1/4% gypsum, 12 1/4% 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	—
MASONRY UNITS	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	—
	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
	.....	4 in.	—	0.90	—	1.11
	.....	6 in.	—	0.66	—	1.52
	.....	8 in.	—	0.54	—	1.85
	.....	10 in.	—	0.45	—	2.22
MASONRY UNITS	.....	12 in.	—	0.40	—	2.50
	Concrete blocks, three oval core: Sand and 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	—	0.86
	.....	4 in.	—	0.90	—	1.11
	.....	8 in.	—	0.53	—	1.72
	.....	12 in.	—	0.53	—	1.89
	Gypsum partition tile: 3 x 12 x 30 in. solid.....	—	—	0.79	—	1.26
	.....	—	—	0.74	—	1.35
	.....	—	—	0.60	—	1.67

Table 4 . . . 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 ^b (R)	
			(k)	(C)	Per inch thickness ($\frac{1}{k}$)	For thickness listed ($\frac{1}{C}$)
MASONRY UNITS (Continued)	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
METALS	Stone, lime or sand.....	12 in.	—	0.44	—	2.27
	.....	—	12.50	—	0.08	—
	(See Chapter 5, Table 1)	—	—	—	—	—
PLASTERING MATERIALS	Cement plaster, sand aggregate.....	116	5.0	—	0.20	—
	Sand aggregate.....	1/4 in.	—	10.00	—	0.10
	Sand aggregate.....	3/4 in.	—	6.66	—	0.15
	Gypsum plaster: Lightweight aggregate.....	45	—	3.12	—	0.32
	.....	45	—	2.67	—	0.39
	Lightweight agg. on metal lath.....	3/4 in.	—	2.13	—	0.47
	Perlite aggregate.....	45	1.5	—	0.67	—
	Sand aggregate.....	105	5.6	—	0.18	—
	Sand aggregate.....	1/4 in.	—	11.10	—	0.09
	Sand aggregate.....	3/4 in.	—	9.10	—	0.11
ROOFING	Sand aggregate on metal lath.....	105	—	7.70	—	0.13
	Sand aggregate on wood lath.....	—	—	2.50	—	0.40
	Vermiculite aggregate.....	45	1.7	—	0.59	—
	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.....	3/4 in.	—	3.00	—	0.33
	Slate.....	20.00	—	20.00	—	0.05
	Sheet metal.....	—	400+	—	Neg ^d	—
	Wood shingles.....	—	—	1.06	—	0.94
SIDING MATERIALS (ON FLAT SURFACE)	Shingles: Wood, 16-in. 7 1/4-in. exposure.....	—	—	1.15	—	0.87
	.....	—	—	0.84	—	1.19
	Wood, double, 16-in., 12-in. exposure.....	—	—	0.71	—	1.40
	Wood, plus insul. backer board.....	3/4 in.	—	—	—	—
	Siding: Asbestos-cement, 1/4 in., lapped.....	—	—	4.76	—	0.21
	Asphalt roll siding.....	—	—	6.50	—	0.15
	Asphalt insulating siding (1/4 in. bd.).....	—	—	0.69	—	1.45
	Wood, drop, 1 x 8 in., lapped.....	—	—	1.27	—	0.79
	Wood, bevel, 1 1/4 x 8 in., lapped.....	—	—	1.23	—	0.81
	Wood, bevel, 1 1/4 x 10 in., lapped.....	—	—	0.95	—	1.05
WOODS	Wood, plywood, 3/4 in., lapped.....	—	—	1.59	—	0.59
	Structural glass.....	—	—	10.00	—	0.10
	Maple, oak, and similar hardwoods.....	45	1.10	—	0.91	—
WOODS	Fir, pine, and similar softwoods.....	32	0.80	—	1.25	—

^a Representative values for dry materials at 75 F mean temperature, selected by the ASHRAE 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 for spaces faced both sides with ordinary nonreflective materials ($\epsilon = 0.90$ and $R = 0.83$) and are based on following conditions: Winter—50 F mean temperature and 30 deg temperature difference, Summer—80 F mean temperature and 10 deg temperature difference except for horizontal air space with heat flow downward which is based on 30 deg temperature difference.

^c Surface resistance values shown here are for ordinary nonreflective 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 3, 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 257-66, 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, thicknesses supplied by different manufacturers may vary depending on the conductivity k value of the particular material.

^h Resistance values are the reciprocals of C before rounding C off to two decimal places.