

HEATING VENTILATING AIR CONDITIONING GUIDE 1944

TABLE 2. CONDUCTIVITIES (*k*) AND CONDUCTANCES (*C*) OF BUILDING AND INSULATING MATERIALS

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

Material	Description	DENSITY (LB PER SQ FT)	MEAN TEMP (DEG FAHR)	CONDUCTIVITY OR CONDUCTANCE		RESISTANCE $\left(\frac{1}{k}\right)$ or $\left(\frac{1}{C}\right)$	AUTHORITY
				(<i>k</i>)	(<i>C</i>)		
BUILDING BOARDS (Non-Insulating)	Compressed cement and asbestos sheets	123	86	2.70	---	0.37	(1)
	Corrugated asbestos board	20.4	110	0.48	---	2.08	(2)
	Pressed asbestos mill board	60.5	86	0.84	---	1.19	(3)
	Gypsum board—gypsum between layers of heavy paper	62.8	70	1.41	---	0.71	(3)
	1/2 in. gypsum board	---	---	---	---	3.73	(3)
	1/2 in. gypsum board	---	---	---	---	2.82	(3)
FRAME CONSTRUCTION COMBINATIONS	1 in. fir sheathing and building paper	---	30	---	---	0.50	(4)
	1 in. fir sheathing, building paper and yellow pine lap siding	---	20	---	---	0.50	(4)
	1 in. fir sheathing, building paper and stucco	---	20	---	---	0.82	(4)
	Pine lap siding and building paper, siding 4 in. wide	---	16	---	---	0.85	(4)
	Yellow pine lap siding	---	---	---	---	1.28	(4)
	Yellow pine lap siding	---	---	---	---	0.78	(4)
MASONRY MATERIALS BRICK	Damp or wet	---	---	5.0*	---	0.20	(2)
	Common yellow clay brick*	---	---	4.8	---	0.21	(4)
	One tier yellow common clay brick, one tier face brick, approx. 8 in. thick*	---	---	---	---	0.77	(4)
CLAY TILE, HOLLOW	2 in. Tile, 1/2 in. plaster both sides	120.0	110	---	---	1.00	(2)
	4 in. Tile, 1/2 in. plaster both sides	127.0	100	---	---	0.60	(2)
	6 in. Tile, 1/2 in. plaster both sides	124.3	103	---	---	0.47	(2)
	8 in. Tile, average of 8 types (Walls No. 59, 63, 64, 66, 67, 90, 91, 92*)	---	---	---	---	0.52	(4)
	12 in. Clay tile wall: 8 in. x 5 in. x 12 in. and 4 in. x 5 in. x 12 in.*	---	---	---	---	0.26	(4)
CONCRETE	Sand and gravel aggregate, various ages and mixes	---	---	11.35 to 16.36	---	0.09 to 0.06	(5)
	Sand and gravel aggregate	142	75	12.6	---	0.08	(4)
	Limestone aggregate	132	75	10.8	---	0.09	(4)
	Cinder aggregate	97	75	4.9	---	0.22	(4)
	Steam treated limestone slag aggregate*	74.6	75	2.27	---	0.44	(4)
	Pumice (Mined in California) aggregate*	65.0	75	2.42	---	0.41	(4)
	Expanded burned clay aggregate*	59.9	75	2.28	---	0.44	(4)
	Burned clay aggregate*	67.1	75	2.36	---	0.35	(4)
	Blast furnace slag aggregate	76.0	70	1.6	---	0.63	(3)
	Expanded vermiculite aggregate	20	90	0.68	---	1.47	(3)
	Expanded vermiculite aggregate	26.7	90	0.76	---	1.32	(3)
	Expanded vermiculite aggregate	---	---	---	---	---	(3)
	Expanded vermiculite aggregate	---	---	---	---	---	(3)

AUTHORITIES:

- *U. S. Bureau of Standards, tests based on samples submitted by manufacturers.
- *A. C. Willard, L. C. Lichty and L. A. Harding, tests conducted at the University of Illinois.
- *J. C. Peebles, tests conducted at Armour Institute of Technology, based on samples submitted by manufacturers.
- *F. B. Rowley, et al, tests conducted at the University of Minnesota.
- *A.S.H.V.E. Research Laboratory.
- *E. A. Allcut, tests conducted at the University of Toronto.
- *See Thermal Conductivity of Building Materials, by F. B. Rowley and A. B. Algren (University of Minnesota Engineering Experimental Station Bulletin No. 12).
- *Heat Transmission Through Insulation as Affected by Orientation of Walls, by F. B. Rowley and C. E. Lund (A.S.H.V.E. JOURNAL SECTION OF HEATING, PIPING & AIR CONDITIONING, July, 1943).
- *The Effect of Convection in Ceiling Insulation, by G. B. Wilkes and L. R. Vianey (A.S.H.V.E. JOURNAL SECTION OF HEATING, PIPING & AIR CONDITIONING, February, 1943).
- *See A.S.H.V.E. RESEARCH REPORT No. 915—Conductivity of Concrete, by F. C. Houghten and Carl Gutberlet (A.S.H.V.E. TRANSACTIONS, Vol. 38, 1932, p. 47).
- *Recommended value. (See Heating, Ventilating and Air Conditioning, by Harding and Willard, revised edition, 1932).
- *See BMS13, U. S. Department of Commerce, National Bureau of Standards, Washington, D. C.
- *Roofing, 0.15 in. thick (1.34 lb per square foot), covered with gravel (0.83 lb per square foot), combined thickness assumed 0.25.

CHAPTER 4. HEAT TRANSMISSION COEFFICIENTS

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

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

Material	Description	DENSITY (LB PER SQ FT)	MEAN TEMP (DEG FAHR)	CONDUCTIVITY OR CONDUCTANCE		RESISTANCE $\left(\frac{1}{k}\right)$ or $\left(\frac{1}{C}\right)$	AUTHORITY
				(<i>k</i>)	(<i>C</i>)		
MASONRY MATERIALS (Continued) CONCRETE—(Continued)	Expanded vermiculite aggregate	35	90	0.86	---	1.16	(3)
	Expanded vermiculite aggregate	50	90	1.10	---	0.91	(3)
	Concrete plank	76	75	2.5	---	0.40	(3)
	Cellular concrete	40.0	75	1.06	---	0.94	(3)
	Cellular concrete	50.0	75	1.44	---	0.69	(3)
	Cellular concrete	60.0	75	1.80	---	0.56	(3)
	Cellular concrete	70.0	75	2.18	---	0.46	(3)
	8 in. Concrete Blocks 8 x 8 x 16 3/4-in. core concrete blocks	126.4	40	---	0.90	1.11	(4)
	8 in. three oval core, sand and gravel aggregate*	134.3	40	---	0.86	1.16	(4)
	8 in. three oval core, crushed limestone aggregate*	86.2	40	---	0.58	1.73	(4)
12 in. Concrete Blocks 8 x 12 x 16 3/4-in. core concrete blocks	8 in. three oval core, cinder aggregate*	67.7	40	---	0.50	2.00	(4)
	8 in. three oval core, burned clay aggregate*	---	40	---	0.49	2.04	(4)
	8 in. three oval core, expanded blast furnace slag aggregate*	---	40	---	---	---	(4)
	12 in. three oval core, sand and gravel aggregate*	124.9	40	---	0.78	1.28	(4)
	12 in. three oval core, cinder aggregate*	86.2	40	---	0.53	1.88	(4)
GYPHUM	12 in. three oval core, burned clay aggregate*	76.7	40	---	0.47	2.13	(4)
	3 in. solid gypsum partition tile	---	---	2.41	---	0.42	(4)
	3 in. three cell gypsum partition tile*	---	---	---	0.74	1.35	(4)
PLASTERING MATERIALS	4 in. three cell gypsum partition tile*	---	---	---	0.60	1.67	(4)
	87 1/2 per cent gypsum, 12 1/4 per cent wood chips	51.2	74	1.66	---	0.60	(4)
	Gypsum plaster	---	---	2.30	---	0.30	(4)
	Gypsum plaster, 1/2 in. thick	---	73	---	8.80	0.11	(4)
	Cement plaster	---	---	---	---	0.13	(2)
WOODS	Wood, lath and plaster, total thickness 1/2 in.	---	70	---	2.50	0.40	(4)
	Gypsum plaster and expanded vermiculite, 4 to 1 mix	39.9	75	0.85	---	1.18	(3)
	Insulating plaster 0.9 in. thick applied to 1/2 in. gypsum board	54.0	75	---	1.07	0.93	(3)
	Asbestos shingles	65.0	75	---	6.0	0.17	(3)
	Asphalt, composition or prepared	70.0	75	---	6.5	0.15	(3)
ROOFING	Asphalt shingles	70.0	75	---	6.5	0.15	(3)
	Built-up roofing, bitumen or felt, gravel or slag surfaced*	---	---	1.33	---	0.75	(2)
	Slate	---	---	10.00	---	0.10	(2)
	Wood shingles	---	---	---	1.28	0.78	(2)
	Wood shingles	---	---	---	---	---	(2)
WOODS	Balsa	20.0	90	0.58	---	1.72	(1)
	Balsa	3.8	90	0.38	---	2.63	(1)
	Balsa	7.3	90	0.33	---	3.03	(1)
	California redwood, 0 per cent moisture*	28.0	75	0.70	---	1.43	(4)
	Cypress	28.7	86	0.67	---	1.49	(1)
	Douglas fir, 0 per cent moisture*	34.0	75	0.67	---	1.49	(4)
	Eastern hemlock, 0 per cent moisture*	30.0	75	0.76	---	1.32	(4)
	Long leaf yellow pine, 0 per cent moisture*	40.0	75	0.86	---	1.16	(4)
	Mahogany	34.3	86	0.90	---	1.11	(1)
	Mahogany	---	---	---	---	---	(1)

See notes on Page 94.