

HEATING VENTILATING AIR CONDITIONING GUIDE 1940

TABLE 2. CONDUCTIVITIES (*k*) AND CONDUCTANCES (*C*) OF BUILDING MATERIALS AND INSULATORS^a

The coefficients are expressed in Btu per hour per square foot per degree Fahrenheit per 1 in. thickness unless otherwise indicated.

Material	Description	Density (Lb per Cu Ft)	Mean Temp (Deg Fahr)	Conductivity (<i>k</i>) OR Conductance (<i>C</i>)	Resistance (1/ <i>k</i>) OR Resistance (1/ <i>C</i>)	Authority
MASONRY MATERIALS						
Brick	Low density	---	---	5.00*	0.20	---
	High density	---	---	9.20*	0.11	---
Brickwork	Adobe	---	---	3.56*	0.28	---
	Damp or wet	---	---	5.00*	0.20	(2)
Cement Mortar	Typical	---	---	12.00*	0.08	---
	Various ages and mixes ^d	---	---	12.00*	0.08	---
Concrete	Cellular	40.0	75	1.06	0.94	(5)
	Cellular	50.0	75	1.44	0.69	(3)
	Cellular	60.0	75	1.80	0.56	(3)
	Cellular	70.0	75	2.18	0.46	(3)
	Typical fiber gypsum, 87.5% gypsum and 12.5% wood chips	51.2	74	1.66*	0.60	(4)
	Special concrete made with an aggregate of hardened clay—1-2-3 mix	101.0	70	3.98	0.25	(3)
	Sand and gravel	142.0	75	12.6	0.08	(4)
	Limestone	132.0	75	10.8	0.09	(4)
	Cinder	97.0	75	4.9	0.20	(4)
	Burned clay aggregate	75.0	75	4.0	0.25	(4)
	Blast furnace slag aggregate	76.0	70	1.6	0.63	(3)
	Typical	---	---	12.50*	0.08	---
Stone	Typical	---	---	12.00*	0.08	---
Stucco	Typical hollow clay (4 in.)	---	---	1.00*	1.00	---
Tile	Typical hollow clay (6 in.)	---	---	0.64*	1.57	---
	Typical hollow clay (8 in.)	---	---	0.60*	1.67	---
	Typical hollow clay (10 in.)	---	---	0.58*	1.72	---
	Typical hollow clay (12 in.)	---	---	0.40*	2.50	---
	Typical hollow clay (16 in.)	---	---	0.31*	3.23	---
	Hollow clay (2 in.) 1/2-in. plaster both sides	120.0	110	1.00	1.00	(2)
	Hollow clay (4 in.) 1/2-in. plaster both sides	127.0	100	0.60†	1.67	(2)
	Hollow clay (6 in.) 1/2-in. plaster both sides	124.3	105	0.47†	2.13	(2)
	Hollow gypsum (4 in.)	---	---	0.46†	2.18	---
	Solid gypsum	51.8	70	1.66	0.60	(4)
Tile or Terrazzo	Solid gypsum	75.6	76	2.96	0.34	(4)
	Typical flooring	---	---	12.00*	0.08	---

AUTHORITIES:

- ¹U. S. Bureau of Standards, tests based on samples submitted by manufacturers.
- ²A. C. Willard, L. C. Lichty, and L. A. Harding, tests conducted at the University of Illinois.
- ³J. C. Peebles, tests conducted at Armour Institute of Technology, based on samples submitted by manufacturers.
- ⁴F. B. Rowley, tests conducted at the University of Minnesota.
- ⁵A.S.H.V.E. Research Laboratory.
- ⁶E. A. Allcut, tests conducted at the University of Toronto.
- ⁷Lees and Charlton.
- ⁸G. B. Wilkes and C. M. F. Peterson, tests conducted at the Massachusetts Institute of Technology.
- ⁹Recommended conductivities and conductances for computing heat transmission coefficients.
- [†]For thickness stated or used on construction, not per 1 in. thickness.
- [‡]For additional conductivity data see Chapters 3 and 15, 1937 A.S.R.E. Data Book.
- [§]If outside surface of block is painted with an impervious coat of paint, add 0.07 to resistance for sand and gravel blocks. Add 0.18 to resistance for cinder blocks. Add 0.17 to resistance for burned clay aggregate blocks.
- ^{||}Recommended value. See Heating, Ventilating and Air Conditioning, by Harding and Willard, revised edition, 1932.
- [¶]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).
- ^{‡‡}The 6-in., 8-in., and 10-in. hollow tile figures are based on two cells in the direction of heat flow. The 12-in. hollow tile is based on three cells in the direction of heat flow. The 16-in. hollow tile consists of one 10-in. and one 6-in. tile, each having two cells in the direction of heat flow.
- ^{‡‡‡}Not compressed.
- ^{‡‡‡‡}Roofing, 0.15-in. thick (1.34 lb per sq ft), covered with gravel (0.83 lb per sq ft), combined thickness assumed 0.25.
- ^{‡‡‡‡‡}Values for air spaces or surfaces having an effective emissivity of $\epsilon = 0.83$ and for a temperature difference of 15 F.
- ^{‡‡‡‡‡‡}Values for air spaces or surfaces having an effective emissivity of $\epsilon = 0.05$ and for a temperature difference of 15 F.

CHAPTER 5. HEAT TRANSMISSION COEFFICIENTS AND TABLES

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

The coefficients are expressed in Btu per hour per square foot per degree Fahrenheit per 1 in. thickness unless otherwise indicated.

Material	Description					Density (Lb per Cu Ft)	Mean Temp (Deg Fahr)	Conductivity (k) OR CONDUCTANCE (C)	Resistivity (1/k) OR RESISTANCE (1/C)	Authority	
	Cement	Fine Aggregate 0-No. 4	Coarse Aggregate No. 4-1/2	Slump	Per Cent						
MASONRY MATERIALS											
—Continued											
STEAM TREATED LIMESTONE SLAG, PUMICE MINED IN CALIF.	1	7.00	Fineness Modulus 3.75	27.1 26.5	74.6 65.0	74.49 74.68	2.27 2.42	0.44 0.41	(4) (4)		
BY-PRODUCT OF MANUFACTURE OF PHOSPHATES.	1 1	8.00 8.00			25.5 21.1	86.6 91.1	74.62 74.43	3.19 3.42	0.31 0.29	(4) (4)	
EXPANDED BURNED CLAY	1	8.00	Fineness Modulus 3.75	18.4 21.8 21.8	57.9 67.1	75.57 75.89	2.28 2.89	0.44 0.35	(4) (4) (4)		
BURNED CLAY AGGREGATE	1	8.50			67.1	74.60	2.82	0.35	(4)		
BURNED CLAY AGGREGATE	1	8.50	Fineness Modulus 3.75	21.8	67.1	74.60	2.82	0.35	(4)		
Sand and gravel aggregate					126.4	40	0.90†	1.11	(4)		
Sand and gravel aggregate used for calculations					---	---	---	---	---		
Cores filled with 5.14 lb density cork					---	40	1.00*	1.00	(4)		
Crushed limestone aggregate					134.3	40	0.86*	1.16	(4)		
Cinder aggregate					86.2	40	0.58†	1.73	(4)		
Cinder aggregate used for calculations					---	---	0.60*	1.66	(4)		
Cores filled with 69.7 lb density cinders					---	40	0.39†	2.56	(4)		
Cores filled with 5.12 lb density cork					---	40	0.25*	4.00	(4)		
Cores filled with 14.2 lb density rock wool					---	40	0.27*	3.70	(4)		
Burned clay aggregate					67.7	40	0.50*	2.00	(4)		
Cores filled with 5.06 lb density cork					---	40	0.21†	4.76	(4)		
Expanded blast furnace slag aggregate, 60% fine, 40% coarse					---	40	0.49†	2.04	(4)		
Sand and gravel aggregate					124.9	40	0.78†	1.28	(4)		
Sand and gravel aggregate used for calculations					---	---	---	---	---		
Cinder aggregate					86.2	40	0.80†*	1.88	(4)		
Cores filled with 5.24 lb density cork					---	40	0.53†*	1.88	(4)		
Burned clay aggregate					76.7	40	0.24†*	4.16	(4)		
Cores filled with 5.6 lb density cork					---	40	0.47†	2.13	(4)		
Cores filled with 5.6 lb density cork					---	40	0.17†*	5.88	(4)		
Cinder aggregate					100.0	40	1.00†	1.00	(4)		
Double wall with 1 in. air space between					100.0	40	0.36†	2.78	(4)		
1 in. space filled with 9.97 lb density rock wool					100.0	40	0.20†	5.00	(4)		
5 x 8 x 12 block sand and gravel aggregate					133.7	40	0.38†	2.63	(4)		
5 x 8 x 12 block sand and gravel aggregate ^b					134.0	40	0.95†	1.15	(4)		

For notes see page 94.