and since $H = H_1 = H_2 = H_c$, the right hand members of equations (1), (2), (3) and (4) are all equal.

The coefficient U may be determined by test, or it may be computed for any wall provided values for K_1, K_2 and C are known. By proper substitution in the four equations, the unknown temperatures t_1 and t_2 can be eliminated and the value of the transmission coefficient for a simple wall x inches thick is

$$U = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{x}{C}} \qquad (5)$$

and for a compound wall of several materials having thickness in inches of x_1, x_2, x_3, etc., the coefficient is

$$U = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{x_1}{C_1} + \frac{x_2}{C_2} + \frac{x_3}{C_3} + \text{etc.}} \qquad (6)$$

As in the case of the simple wall, K_1 and K_2 are always the inside and outside surface coefficients for the two materials in contact with air. If the air is still (no wind), then for the same material K_1 and K_2 are the same, and $K_1 = K_2$; but if the outside air is in motion then K_2 is always greater than K_1 and will increase as the wind velocity increases. Values for K_1 in still air as determined by various investigators are given in Table 3. Values for C, the conductivity of building materials, are given in Table 4, and are taken from the published values of various investigators. It should be noted that values of C as well as U are dependent on the temperature range, and it is therefore desirable that the investigator determine conductivity values when the wall is subjected to an air temperature of about 70 deg. fahr. on the inside and about zero on the outside.

TABLE 3. SURFACE COEFFICIENTS (K_1) FOR VARIOUS BUILDING MATERIALS UNDER STILL AIR (NO WIND) CONDITIONS

The values in the table are in B.t.u. per sq. ft. of wall surface per hour per 1 deg. fahr. difference between the mean air temperature in the room and the inside surface temperature of the wall.

Building Material	Surface Coefficient K1 (Still Air) Harding and Willard	Wood
Asbestos (sheet)	1.40	
Brickwork (ordinary)	1.40	
Cement Plaster (finished)	0.93	
Concrete	1.30	
Corkboard	1.25	1.20
Glass (window)	1.50	1.90*
Magnesia (blocks)	1.45	
Wood (finished surface)	1.40	
Building paper		1.40
Average of all values	1.34	

*Average of both sides of glass 0.12 in. thick and for 70 deg. fahr. total temperature difference from air to air with moving air on one side. Probable value for still air on both sides 1.60.

TABLE 4. CONDUCTIVITY COEFFICIENTS FOR VARIOUS BUILDING MATERIALS[2]

BUILDING MATERIAL	COEFFICIENT OF CONDUCTIVITY C AND WEIGHT PER CU. FT.				
Authority	*Harding and Willard		Peebles**	Norton	U. S. Bur. Standards
	Lb. per Cu. Ft.	C	C	C	C
Asbestos (sheet)	48.3	0.29			
Asbestos Board (corrugated)	20.4	0.48			
Brickwork	132.0	4.00*			
Concrete (Stone 1:2:4 Mix)	140.0	8.30	6.30	6.30	
Cinder Concrete			5.20		
Cork Board	9.7	0.32	0.30		
Magnesia (board)	13.5	0.51			
Wood (Fir, ⅞ in. thick)	33.4	1.00			
Yellow Pine Sheathing			1.00		
Drop Siding			1.10		
Pine Plank				1.25	
Maple Flooring			1.20		
Mortar (lime)		8.00			
Oak Door			1.30		
Wood Lath and Plaster			1.10		
Metal Lath and Plaster			1.25		
Gypsum Partition Tile			1.00		
Pyrobar (gypsum)				0.83	
Gypsum Reinforced Roof Tile			1.20		
Insulex (very light gypsum)			0.50		
Cabot's Quilt			0.40		
Insulite			0.33		
Celotex			0.33		
Fibrofelt					0.329
Linofelt					0.300
Lith					0.379
Mineral Wool (medium packed)					0.275
Plaster Board					3.040
Porete					0.941
Sawdust (ordinary)					1.040
Shavings (ordinary)					0.707
Cypress (across grain)					0.667
Keystone Hair			0.29		
Hair Felt			0.25		
Roofing Paper and Pitch				1.382	
One thickness building paper			4.20***		
One course No. 2 tar felt			3.00***		
Cornell Wall Board $\frac{3}{16}$ in. thick			2.50***		
Glass (act. glass 91.4% total area)		2.06			
Double Glass ½ in. air space (glass 69.3% total area)		1.50***			
2 in. Tile, ½ in. plast. both surf		1.00***			
4 in. Tile, ½ in. plast. both surf		0.60***			
6 in. Tile, ½ in. plast. both surf		0.47***			
2 in. Tile, plastered as above and roofing covered		0.84			

*For damp or wet brickwork take $C = 5$.
**Flat plate method using a test sample 18 in. square and up to 4 in. in thickness.
***For thickness and construction stated, not per 1 in. of thickness.

The values in the tables are in B.t.u. per square foot of wall surface per hour per inch thickness per 1 deg. fahr. difference between the two surfaces, for thoroughly dry materials. For use where air temperature difference on two sides of wall is about 70 deg. and outside air is near zero.

[2]See Chapter IX by Charles H. Herter of the Report of the Insulation Committee, *A. S. R. E.*, Annual Meeting 1922, Revised to 1924, entitled "Heat Transmission of Insulating Materials," for the most comprehensive collection of heat transmission data relating to building and insulating material which is now in print.