determining the heat loss through the roof construction, attic and top floor ceiling. If the unheated attic contains windows and vertical wall spaces these must be taken into consideration in calculating the roof area and also its coefficient U_r. In this case an approximate value of U_r may be obtained as the summation of the coefficient of each individual section such as the roof, vertical walls or windows times its percentage of total area. This coefficient may then be used with reasonable accuracy in Equation 4. If there are large vertical wall areas, the most accurate procedure is to estimate the attic temperature by means of Equation 1, Chapter 6 and to calculate the heat loss by using the ceiling coefficient only, and the attic temperature instead of the outside temperature. Information concerning basement floor and wall coefficients will be found on Page 100.

The values in Table 16 apply principally to hip and double hip roofs with unheated attics. In the case of gable and gambrel (Dutch Colonial) roofs having end wall surfaces, the values in Table 16 can be used with reasonable accuracy if the end wall area is considered as part of the roof area. Thus in arriving at the combined roof and ceiling coefficient for a pitched roof with insulating board applied to the under side of the rafters, the board must also be applied to the end wall surfaces in order for the values in Table 16 to be approximately applicable.

The coefficients in Table 16 are based on ⅓ pitch roofs for which the value of n, or the ratio of the roof area to the ceiling area, is 1.2. Since these combined roof and ceiling coefficients are based on the ceiling area, small variations in the pitch do not greatly alter the coefficient. An increase in pitch above the ⅓ used for calculating the values would increase the combined coefficient, and vice versa.

Basement Floor and Wall Coefficients

The dirt in contact with basement floors and walls below grade has an appreciable insulating value. The exact thickness or depth of the dirt which may contribute to the heat resistance of floors and walls in contact therewith is a variable and indeterminate quantity. Tests at the A.S.H.V.E. Research Laboratory[9] indicate that the rate of heat flow through basement floors, even without insulation, does not exceed 0.10 Btu per square foot per degree Fahrenheit temperature difference between the air above the floor and the soil under the floor at the point of maximum diffusion of the heat from the basement. As indicated in the footnote of Table 12, this coefficient is recommended for use whenever it is desirable to make allowance for the small basement floor heat loss, as may be the case with heated basements. Using this coefficient (0.10) the total heat loss per square foot of floor area will amount to only 2.0 Btu per square foot per hour, based on a temperature difference of 20 F between the air in the basement above the floor and the minimum soil temperature below the basement.

The same coefficient (0.10) may be used for calculating the heat loss through basement walls below grade but a somewhat higher temperature difference should be used for reasons explained in Chapter 6. Thus the total heat loss through basement walls will be greater than that through floors. According to present available data the unit wall heat loss will be

[9] A.S.H.V.E. Research Report No. 1213—Heat Loss Through Basement Walls and Floors, by F. C. Houghten, S. I. Taimuty, Carl Gutberlet and C. J. Brown (A.S.H.V.E. Transactions, Vol. 48, 1942, p. 369).

TABLE 10. COEFFICIENTS OF TRANSMISSION (U) OF FRAME CONSTRUCTION CEILINGS AND FLOORS

Coefficients are expressed in Btu per hour per square foot per degree Fahrenheit difference in temperature between the air on the two sides and are based on still air (no wind) conditions on both sides.

TYPE OF CEILING	INSULATION BETWEEN, OR ON TOP OF, JOISTS (No Flooring Above)													WITH FLOORING[a] (On Top of Ceiling Joists)		
	None	Insulating Board on Top of Joists		Blanket or Bat Insulation Between Joists[a]			Vermiculite Insulation Between Joists			Mineral Wool Insulation Between Joists[a]			Single Wood Floor[b]	Double Wood Floor[c]	
		½ In.	1 In.	1 In.	2 In.	3 In.	2 In.	3 In.	4 In.	2 In.	3 In.	4 In.			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	NUMBER
No Ceiling		0.37	0.24										0.45	0.34	1
Metal Lath and Plaster[d]	0.69	0.26	0.19	0.19	0.12	0.092	0.18	0.14	0.11	0.12	0.092	0.066	0.30	0.25	2
Gypsum Board (⅜ in.) Plain or Decorated	0.67	0.26	0.18	0.19	0.12	0.092	0.18	0.14	0.10	0.12	0.092	0.066	0.30	0.24	3
Wood Lath and Plaster	0.62	0.25	0.18	0.19	0.12	0.092	0.17	0.14	0.10	0.12	0.092	0.065	0.29	0.24	4
Gypsum Lath (½ in.) Plastered[e]	0.61	0.25	0.18	0.19	0.12	0.092	0.17	0.14	0.10	0.12	0.092	0.065	0.28	0.24	5
Plywood (⅜ in.) Plain or Decorated	0.59	0.24	0.18	0.19	0.12	0.09	0.17	0.14	0.10	0.12	0.090	0.065	0.28	0.23	6
Insulating Board (½ in.) Plain or Decorated	0.37	0.19	0.15	0.16	0.11	0.082	0.15	0.11	0.092	0.11	0.082	0.060	0.22[h]	0.19[h]	7
Insulating Board Lath (½ in.) Plastered[e]	0.35	0.19	0.15	0.15	0.10	0.082	0.14	0.11	0.091	0.10	0.082	0.060	0.21	0.18	8
Insulating Board Lath (1 in.) Plastered[e]	0.23	0.15	0.12	0.12	0.089	0.072	0.12	0.097	0.080	0.089	0.072	0.055	0.16	0.14	9

[a] Coefficients corrected for framing.
[b] ⅝ in. yellow pine or fir.
[c] ⅞ in. pine or fir sub-flooring plus ⅜ in. hardwood finish flooring.
[d] Plaster assumed ¾ in. thick.
[e] Plaster assumed ½ in. thick.
[f] Based on insulation in contact with ceiling and consequently no air space between.
[g] For coefficients for constructions in Columns M and N (except No. 1) with insulation between joists, refer to Table 5. *Example:* The coefficient for No. 3-N of Table 10 is 0.24. With 2 in. blanket insulation between joists, the coefficient will be 0.094. (See Table 5.) (Column D of Table 5 applicable only for 3½ in. joists.)
[h] For ⅜ in. insulating board sheathing applied to the under side of the joists, the coefficient for *single* wood floor (Column N) is 0.18 and for *double* wood floor (Column N) is 0.16. For coefficients with insulation between joists, see Table 5.