Table 18. Combined Coefficients of Transmission (U) of Pitched Roofs[a] and Horizontal Ceilings—Based on Ceiling Area[b]

Coefficients are expressed in Btu per (hour) (square foot of ceiling area) (Fahrenheit degree difference in temperature between the air on the two sides), and are based on an outside wind velocity of 15 mph.

Ceiling Coefficients (From Table 12)	Type of Roofing and Roof Sheathing: Wood Shingles on Wood Strips[d] — No Roof Insulation (Rafters Exposed) (U_r = 0.48)	Wood Shingles on Wood Strips[d] — ½ In. Insulating Board on Under Side of Rafters (U_r = 0.22)	Wood Shingles on Wood Strips[d] — 1 In. Insulating Board on Under Side of Rafters (U_r = 0.16)	Asphalt Shingles[e] or Roll Roofing on Wood Sheathing[e] — No Roof Insulation (Rafters Exposed) (U_r = 0.53)	Asphalt Shingles[e] or Roll Roofing on Wood Sheathing[e] — ½ In. Insulating Board on Under Side of Rafters (U_r = 0.23)	Asphalt Shingles[e] or Roll Roofing on Wood Sheathing[e] — 1 In. Insulating Board on Under Side of Rafters (U_r = 0.17)	Number
	A	B	C	D	E	F	
0.10	0.085	0.073	0.066	0.087	0.074	0.067	19
0.11	0.092	0.078	0.07	0.094	0.079	0.071	20
0.12	0.099	0.082	0.074	0.10	0.083	0.075	21
0.13	0.11	0.087	0.078	0.11	0.088	0.079	22
0.14	0.11	0.091	0.081	0.11	0.093	0.083	23
0.15	0.12	0.096	0.084	0.12	0.097	0.086	24
0.16	0.13	0.10	0.087	0.13	0.10	0.089	25
0.17	0.13	0.10	0.090	0.13	0.10	0.092	26
0.18	0.14	0.11	0.093	0.14	0.11	0.095	27
0.19	0.14	0.11	0.095	0.15	0.11	0.098	28
0.20	0.15	0.11	0.098	0.15	0.12	0.10	29
0.21	0.15	0.12	0.10	0.16	0.12	0.10	30
0.22	0.16	0.12	0.10	0.17	0.12	0.11	31
0.23	0.16	0.12	0.10	0.17	0.12	0.11	32
0.24	0.17	0.13	0.11	0.18	0.12	0.11	33
0.25	0.17	0.13	0.11	0.18	0.13	0.11	34
0.26	0.18	0.13	0.11	0.19	0.13	0.11	35
0.27	0.18	0.13	0.11	0.19	0.13	0.12	36
0.28	0.19	0.14	0.12	0.19	0.14	0.12	37
0.29	0.19	0.14	0.12	0.20	0.14	0.12	38
0.30	0.20	0.14	0.12	0.20	0.14	0.12	39
0.34	0.21	0.15	0.12	0.22	0.15	0.13	40
0.35	0.22	0.15	0.13	0.22	0.15	0.13	41
0.36	0.22	0.15	0.13	0.23	0.15	0.13	42
0.37	0.23	0.15	0.13	0.23	0.16	0.13	43
0.45	0.25	0.17	0.13	0.26	0.17	0.14	44
0.59	0.29	0.18	0.14	0.30	0.19	0.15	45
0.61	0.29	0.18	0.15	0.31	0.19	0.15	46
0.62	0.30	0.19	0.15	0.31	0.19	0.15	47
0.67	0.31	0.19	0.15	0.33	0.20	0.16	48
0.69	0.31	0.19	0.15	0.33	0.20	0.16	49

(See text on p. 184.)

[a] Calculations based on ½ pitch roof (n = 1.2) using the following formula:

$$U = \frac{U_r \times U_{ce}}{U_r + \frac{U_{ce}}{n}}$$

U = combined coefficient to be used with ceiling area.
U_r = coefficient of transmission of the roof.
U_{ce} = coefficient of transmission of the ceiling.
n = the ratio of the area of the *roof* to the area of the ceiling.

Use ceiling area (not roof area) with these coefficients.

[c] Coefficients in Columns D, E and F may be used with sufficient accuracy for tile, slate and rigid asbestos shingles on wood sheating.

[d] Based on 1 x 4 in. strips spaced 2 in. apart.

[e] Sheathing assumed ¾ in. thick.

[f] Values of U_{ce} to be used in this column may be selected from Table 12.

Table 19. Coefficients of Transmission (U) of Solid Wood Doors

Coefficients are expressed in Btu per (hour) (square foot) (Fahrenheit degree difference in temperature between the air on the two sides), and are based upon an outside wind velocity of 15 mph.

Nominal Thickness Inches	Actual Thickness Inches	U[a,b] Exposed Door	U[a,b] With Glass Storm Door[c]
1	⅞	0.69	0.35
1¼	1 1/16	0.59	0.32
1½	1 5/16	0.52	0.30
1¾	1⅝	0.51	0.30
2	1⅝	0.46	0.28
2½	2⅛	0.38	0.25
3	2⅝	0.33	0.23

[a] Computed using k = 1.15 for wood; f_i = 1.65, f_o = 6.0 and 1.10 for air space.

[b] A U value of 0.85 may be used for single exposed doors containing thin wood panels or single panes of glass, and 0.39 for the same with glass storm doors.

[c] 50 percent glass and thin wood panels.

Table 20. Coefficients of Transmission (U) of Windows, Skylights and Glass Block Walls

Coefficients are expressed in Btu per (hour) (square foot) (Fahrenheit degree difference in temperature between the air on the two sides), and are based upon the following outdoor conditions: 0 F air temperature, clear skies, no solar radiation

Section A—Vertical Glass Sheets

Number of Sheets	One	Two			Three		
Air Space, inches	None	¼	½	1[a]	¼	½	1[a]
U	1.13	0.61	0.55	0.53	0.41	0.36	0.34

Section B—Horizontal Glass Sheets (heat flow up)

Number of Sheets	One	Two		
Air Space, inches	None	¼	½	1[a]
U	1.40	0.70	0.66	0.63

Section C—Walls of Hollow Glass Block

Description	U
5¾ x 5¾ x 3⅞ in. thick	0.60
7¾ x 7¾ x 3⅞ in. thick	0.56
7¾ x 7¾ x 3⅞ in. thick with glass fiber screen dividing the cavity	0.48

Section D—Approximate Application Factors for Windows
Multiply Flat Glass U Values by These Factors

Window Description	Single Glass		Double Glass[b]		Windows with Storm Sash[c]	
	Percent[d] Glass	Factor	Percent[d] Glass	Factor	Percent[d] Glass	Factor
Sheets	100	1.00	100	1.00		
Wood Sash	80	0.90	80	0.95	80	0.90
Wood Sash	60	0.80	60	0.85	60	0.80
Metal Sash	80	1.00	80	1.20	80	1.00[e]

(See text p. 187.)

[a] For 1 in. or greater.

[b] Unit type double glazing (two lights or panes in same opening).

[c] Use with U values for two sheets with 1 in. air space.

[d] Based on area of exposed portion of sash; does not include frame or portions of sash concealed by frame.

[e] For metal storm sash or metal sash with attached storm pane.