TABLE 16. COMBINED COEFFICIENTS OF TRANSMISSION (U) OF PITCHED ROOFS[a] AND HORIZONTAL CEILINGS—BASED ON CEILING AREA[b]

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

CEILING COEFFICIENT[f] (FROM TABLE 10)	TYPE OF ROOFING AND ROOF SHEATHING						NUMBER
	WOOD SHINGLES ON WOOD STRIPS[d]			ASPHALT SHINGLES[c] OR ROLL ROOFING ON WOOD SHEATHING[e]			
	No Roof Insulation (Rafters Exposed) (U_r = 0.48)	½ In. Insulating Board on Under Side of Rafters (U_r = 0.22)	1 In. Insulating Board on Under Side of Rafters (U_r = 0.16)	No Roof Insulation (Rafters Exposed) (U_r = 0.53)	½ In. Insulating Board on Under Side of Rafters (U_r = 0.23)	1 In. Insulating Board on Under Side of Rafters (U_r = 0.17)	
	A	B	C	D	E	F	
0.10	0.085	0.073	0.066	0.087	0.074	0.067	19
0.11	0.093	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	0.10	0.087	0.077	0.11	0.088	0.079	22
0.14	0.11	0.092	0.080	0.11	0.093	0.083	23
0.15	0.12	0.096	0.084	0.12	0.097	0.086	24
0.16	0.12	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	0.13	0.11	0.093	0.14	0.11	0.095	27
0.19	0.14	0.11	0.096	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	0.17	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	0.11	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	0.21	0.15	0.12	0.22	0.15	0.13	41
0.36	0.22	0.15	0.12	0.23	0.15	0.13	42
0.37	0.22	0.15	0.13	0.23	0.16	0.13	43
0.45	0.25	0.17	0.13	0.26	0.17	9.14	44
0.59	0.29	0.18	0.14	0.30	0.19	0.15	45
0.61	0.29	0.18	0.14	0.31	0.19	0.15	46
0.62	0.30	0.18	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

[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.

[b]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 sheathing.

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

[e]Sheathing assumed ½ in. thick.

[f]Values of U_{ce} to be used in this column may be selected from Table 10.

TABLE 17. COEFFICIENTS OF TRANSMISSION (U) OF DOORS, WINDOWS, SKYLIGHTS AND GLASS BLOCK WALLS

Coefficients are based on a wind velocity of 15 mph, and are expressed in Btu per hour per square foot per degree Fahrenheit difference in temperature between the air inside and outside of the door, window, skylight or wall

		SINGLE	DOUBLE	TRIPLE
Section A. Windows and Skylights	U	1.13[ac]	0.45[ae]	0.281[ae]

	NOMINAL THICKNESS INCHES	ACTUAL THICKNESS INCHES	U EXPOSED DOOR	U[d] WITH GLASS STORM DOOR
Section B. Solid Wood Doors[bc]	1	25/32	0.69	0.42
	1¼	1 1/16	0.59	0.38
	1½	1 5/16	0.52	0.35
	1¾	1 3/8	0.51	0.35
	2	1 5/8	0.46	0.32
	2½	2 1/8	0.38	0.28
	3	2 5/8	0.33	0.25

	DESCRIPTION	U STILL AIR BOTH SIDES	U STILL AIR INSIDE 15 MPH OUTSIDE
Section C. Hollow Glass Block Walls	Smooth surface glass blocks 7¾ x 7¾ x 3⅞ in. thick	0.40	0.49
	Ribbed surface glass blocks 7¾ x 7¾ x 3⅞ in. thick	0.38	0.46

[a]See Heating, Ventilating and Air Conditioning, by Harding and Willard, revised edition, 1932.

[b]Computed using C = 1.15 for wood; f_i = 1.65 and f_o = 6.0.

[c]It is sufficiently accurate to use the same coefficient of transmission for doors containing thin wood panels as that of single panes of glass, namely, 1.13 Btu per hour per square foot per degree difference between inside and outside air temperatures.

[d]These values may also be used with sufficient accuracy for wood storm doors. Neglect storm doors if loose and use values for exposed doors.

[e]Air spaces assumed to be ¾ in. or more in width.

isolated cases when conditions conducive to such condensation exist. The probability of condensation increases with the relative humidity or vapor pressure and with the temperature difference and, in the case of interstitial condensation, decreases with the vapor resistance on the warm side of the wall.

Condensation on interior building surfaces[10] (surface condensation) may be eliminated by either reducing the relative humidity or by maintaining the interior surfaces at or above the dew-point temperature. Permissible relative humidities for various wall, roof or glass coefficients and temperature differences may be determined from Fig. 2. The permissible relative humidity for any specific type of construction may be determined by first ascertaining the coefficient of transmission (U) of the construction and then locating this coefficient on the horizontal scale of Fig. 2. A vertical line drawn to the proper outside temperature curve and then to the left hand scale will indicate the permissible relative humidity for the conditions involved. The dotted line shown in Fig. 2 indicates the permissible relative humidity (64 per cent) if surface condensation is to be avoided, for a frame wall having a coefficient of 0.26 and for an outside temperature of −10 F.

Condensation within the construction may likewise be prevented by eliminating the moisture at the source or by providing a barrier on the

[10]Permissible Relative Humidities in Humidified Buildings, by Paul D. Close (A.S.H.V.E. JOURNAL SECTION, *Heating, Piping and Air Conditioning*, December, 1939, p. 766).