by the tie rods per square foot of wall area is $\frac{0.00048}{1.0} \times 100 = 0.048$ percent, the error between the calculated and test values would be

$$\frac{0.150 - 0.103}{0.150} \times 100 = 31 \text{ percent.}$$

In making the calculations for values of U shown in Tables 6 to 19, the following conditions have been assumed:

Equilibrium or steady-state heat transfer, eliminating effects of heat capacity.
Surrounding surfaces at ambient air temperatures.
Exterior wind velocity of 15 mph.
Surface emissivity of ordinary building materials = 0.83.
No correction for position or direction of heat flow. (Average coefficients used).
Air spaces are ½ in. or more in width.
Variation of conductivity with mean temperature neglected.
Corrections for framing made on basis of parallel heat flow through 2 × 4 in. (nominal) studs, 16 in. on centers, the framing covering 15 percent of wall area.
Actual thicknesses of lumber assumed to be as follows:

Nominal	*Actual*	*Nominal*	*Actual*
1 in. (S-2-S)	¾ in.	3 in. (S-2-S)	2⅝ in.
1½ in. (S-2-S)	1⅜ in.	4 in. (S-2-S)	3⅝ in.
2 in. (S-2-S)	1⅝ in.	Finish flooring, (maple or oak)	1⅛ in.
2½ in. (S-2-S)	2⅛ in.		

Coefficients for frame construction are corrected for the effect of framing where such correction would increase the coefficients, but not where the correction would decrease the coefficients.[11]

It should be noted that the effects of poor workmanship in construction and installation have an increasingly greater percentage effect on heat transmission as the coefficient becomes numerically smaller. Failure to meet design estimates may be caused by lack of proper attention to exact compliance with specifications. A factor of safety may be employed as a precaution when it is judged desirable.

Roof Coefficients

Computations for wood shingle roofs applied over wood stripping are based on 1 by 4 in. wood strips, spaced 2 in. apart. Values for roofs containing Spanish and French clay roofing tile are assumed the same as for slate roofs. Values for pitched roofs in Table 17 apply where the roof is over a heated attic or top floor, so that the heat passes directly through the roof structure, including any interior finish material.

Combined Ceiling and Roof Coefficients

If the attic space between the ceiling and roof is unheated, the combined coefficient from room air below the ceiling to exterior air can be calculated from the following formula:

$$R_T = \frac{1}{U_{ce}} + \frac{1}{nU_r} \tag{4}$$

and

$$U = 1/R_T \tag{5}$$

where U = combined coefficient to be used with ceiling area.
R_T = total resistance of ceiling and roof.
U_{ce} = coefficient of transmission of ceiling.

TABLE 6. COEFFICIENTS OF TRANSMISSION (U) OF FRAME WALLS

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

NO INSULATION BETWEEN STUDS[a] (SEE TABLE 7)

EXTERIOR FINISH	INTERIOR FINISH	TYPE OF SHEATHING: GYPSUM (½ IN. THICK) A	PLYWOOD (⅜ IN. THICK) B	WOOD[f] (25/32 IN. THICK) BLDG. PAPER C	INSULATING BOARD (25/32 IN. THICK) D	WALL NUMBER
Wood Siding (Clapboard)	Metal Lath and Plaster[b]	0.33	0.32	0.26	0.20	1
	Gypsum Board (⅜ in.) Decorated	0.32	0.32	0.26	0.20	2
	Wood Lath and Plaster	0.31	0.31	0.25	0.19	3
	Gypsum Lath (⅜ in.) Plastered[c]	0.31	0.30	0.25	0.19	4
	Plywood (⅜ in.) Plain or Decorated	0.30	0.30	0.24	0.19	5
	Insulating Board (½ in.) Plain or Decorated	0.23	0.23	0.19	0.16	6
	Insulating Board Lath (½ in.) Plastered[c]	0.22	0.22	0.19	0.15	7
	Insulating Board Lath (1 in.) Plastered[c]	0.17	0.17	0.15	0.12	8
Wood[d] Shingles	Metal Lath and Plaster[b]	0.25	0.25	0.26	0.17	9
	Gypsum Board (⅜ in.) Decorated	0.25	0.25	0.26	0.17	10
	Wood Lath and Plaster	0.24	0.24	0.25	0.16	11
	Gypsum Lath (⅜ in.) Plastered[c]	0.24	0.24	0.25	0.16	12
	Plywood (⅜ in.) Plain or Decorated	0.24	0.24	0.24	0.16	13
	Insulating Board (½ in.) Plain or Decorated	0.19	0.19	0.19	0.14	14
	Insulating Board Lath (½ in.) Plastered[c]	0.19	0.18	0.19	0.13	15
	Insulating Board Lath (1 in.) Plastered[c]	0.14	0.14	0.15	0.11	16
Stucco	Metal Lath and Plaster[b]	0.43	0.42	0.32	0.23	17
	Gypsum Board (⅜ in.) Decorated	0.42	0.41	0.31	0.23	18
	Wood Lath and Plaster	0.40	0.39	0.30	0.22	19
	Gypsum Lath (⅜ in.) Plastered[c]	0.39	0.39	0.30	0.22	20
	Plywood (⅜ in.) Plain or Decorated	0.39	0.38	0.29	0.22	21
	Insulating Board (½ in.) Plain or Decorated	0.27	0.27	0.22	0.18	22
	Insulating Board Lath (½ in.) Plastered[c]	0.26	0.26	0.22	0.17	23
	Insulating Board Lath (1 in.) Plastered[c]	0.19	0.19	0.16	0.14	24
Brick Veneer[e]	Metal Lath and Plaster[b]	0.37	0.36	0.28	0.21	25
	Gypsum Board (⅜ in.) Decorated	0.36	0.36	0.28	0.21	26
	Wood Lath and Plaster	0.35	0.34	0.27	0.20	27
	Gypsum Lath (⅜ in.) Plastered[c]	0.34	0.34	0.27	0.20	28
	Plywood (⅜ in.) Plain or Decorated	0.34	0.33	0.27	0.20	29
	Insulating Board (½ in.) Plain or Decorated	0.25	0.25	0.21	0.17	30
	Insulating Board Lath (½ in.) Plastered[c]	0.24	0.24	0.20	0.16	31
	Insulating Board Lath (1 in.) Plastered[c]	0.18	0.18	0.15	0.13	32

[a] Coefficients not weighted; effect of studding neglected.
[b] Plaster assumed ¾ in. thick.
[c] Plaster assumed ½ in. thick.
[d] Furring strips (1 in. nominal thickness) between wood shingles and all sheathings except wood.
[e] Small air space and mortar between building paper and brick veneer neglected.
[f] Nominal thickness, 1 in.