$$= \frac{1}{0.17 + 0.44 + 1.16 + 0.91 + 0.42 + 0.61} = \frac{1}{3.71} = 0.27$$

When 2 in. of bat insulation is added in the air space in the wall, an air space will still be left since it was originally 3⅝ in. wide. Then,

$$U = \frac{1}{3.71 + \frac{2}{0.27}} = \frac{1}{11.11} = 0.090$$

This coefficient (0.090) applies only to the wall where no studding or framing is present and is assumed to constitute 85 per cent of the whole wall. Then for 1 sq ft of wall the heat transfer through the insulated portion is 0.85 × 0.090 or 0.0765 Btu.

In the portion of wall where framing is present, the air space will be replaced with an equivalent thickness of wood framing. Then,

$$U \text{ (through framing)} = \frac{1}{\frac{1}{6.0} + \frac{1}{2.27} + \frac{1}{0.86} + \frac{3.625}{0.80} + \frac{1}{2.4} + \frac{1}{1.65}}$$

$$U = 0.136$$

Then for 1 sq ft of wall the heat transfer through the framing is 15 per cent of 0.136 or 0.0204 Btu. The total heat transfer through 1 sq ft of wall (with 3⅝ in. framing covering 15 per cent of area) equals

$$U \text{ (corrected)} = 0.0765 + 0.0204 = 0.097 \text{ Btu}$$

This is the value shown for No. 49-B in Table 6, which is included to eliminate the need for the calculation of framing corrections when insulation is used in frame construction.

In making the calculations for values of U shown in Tables 5 to 18, 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 ¾ 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 per cent of wall area.
Actual thicknesses of lumber assumed to be as follows:

Nominal	*Actual*
1 in. (S-2-S)	25/32 in.
1½ in. (S-2-S)	1 5/16 in.
2 in. (S-2-S)	1⅝ in.
2½ in. (S-2-S)	2⅛ in.
3 in. (S-2-S)	2⅝ in.
4 in. (S-2-S)	3⅝ in.
Finish flooring, (maple or oak)	13/16 in.

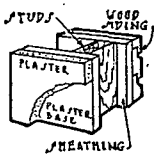
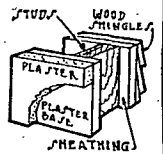
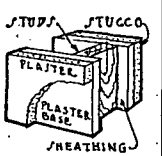
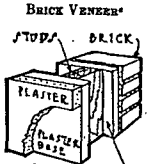
Coefficients for frame construction are corrected for the effect of framing where such correction would increase the coefficients, but not where the correction would decrease the coefficients [7].

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

TABLE 5. COEFFICIENTS OF TRANSMISSION (U) OF FRAME 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 on an outside wind velocity of 15 mph.

NO INSULATION BETWEEN STUDS[a] (SEE TABLE 6)

EXTERIOR FINISH	INTERIOR FINISH	TYPE OF SHEATHING				WALL NUMBER
		GYPSUM (½ IN. THICK)	PLYWOOD (⅝ IN. THICK)	WOOD[f] (25/32 IN. THICK) BLDG. PAPER	INSULATING BOARD (25/32 IN. THICK)	
		A	B	C	D	
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.