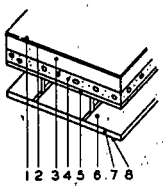
TABLE 13A. COEFFICIENTS OF TRANSMISSION (*U*) OF FLAT MASONRY ROOFS WITH BUILT-UP ROOFING, WITH AND WITHOUT SUSPENDED CEILINGS[a]

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.



EXAMPLE

Resistances used are given below in this table or in Table 3 or 4.

Construction (heat flow up)	Resistance (*R*)
1. Outside surface (15 mph wind)	*0.17*
2. Built-up roofing—⅜ in.	*0.33*
3. Roof insulation (none)	—
4. Concrete slab (lt. wt. agg.) 2 in.	***2.22***
5. Corrugated metal	*0*
6. Air space[b]	*0.85*
7. Metal lath and ¾ in. plas. (lt. wt. agg.)	*0.47*
8. Inside surface (still air)	*0.61*
Total resistance	*4.65*
$U = 1/R = 1/4.65 =$	0.22

See value 0.22 in bold face type in table below.

TO ADJUST *U* VALUES FOR CONSTRUCTION WITH ADDED INSULATION IN AIR SPACE, SEE TABLE 16.

EXAMPLE OF SUBSTITUTION

Resistances used are given below in this table or in Table 3 or 4.

Replace items 4 and 6 with 4 in. concrete slab (gravel agg.) and roof insulation ($C = 0.24$) on top of slab.

Total resistance	*4.65*
Deduct	
4. Concrete slab (lt. wt. agg.) (2 in.)	***2.22***
Resistance deducted	***2.22***
	2.43
Add	
3. Roof insulation ($C = 0.24$)	***2.78***
4. Concrete slab (gravel agg.) 4 in.	*0.44*
Resistance added	***3.22***
Total resistance	*5.66*
$U = 1/R = 1/5.66$	0.18

DIRECTION OF HEAT FLOW		UPWARD FLOW (WINTER CONDITIONS)																			
		TYPE OF CEILING																			
		ROOF INSULATION NO CEILING							SUSPENDED CEILING[h]												
		C VALUE OF ROOF INSULATION							GYPSUM BD. (⅜ IN.) AND PLAS.			METAL LATH AND PLAS.		ACOUSTICAL TILE							
TYPE OF DECK	TYPE OF FORM	None	0.72	0.36	0.24	0.19	0.15	0.12	No Plas.	Lt. Wt. Agg. ½ in.	Sand Agg. ½ in.	Lt. Wt. Agg. ¾ in.	Sand Agg. ¾ in.	On Furring or Channels		On Gypsum Bd. (⅜ in.)					
														½ in.	¾ in.	½ in.	¾ in.				
	RESISTANCE →	—	*1.39*	*2.78*	*4.17*	*5.26*	*6.67*	*8.33*	*0.32*	*0.64*	*0.41*	*0.47*	*0.13*	*1.19*	*1.75*	*1.51*	*2.10*				

MATERIAL	*R*	MATERIAL	*R*	*U*	*U*	*U*	*U*	*U*	*U*	*U*	*U*	*U*	*U*	*U*	*U*	*U*	*U*	*U*	*U*
Concrete slab[d]																			
Gravel agg.																			
(4 in.)	*0.32*	Temporary	—	0.70	0.35	0.24	0.18	0.15	0.12	0.10	0.38	0.34	0.37	0.36	0.41	0.29	0.25	0.26	0.23
(6 in.)	*0.48*	Temporary	—	0.63	0.34	0.23	0.17	0.15	0.12	0.10	0.36	0.32	0.35	0.34	0.39	0.27	0.24	0.25	0.22
(8 in.)	*0.64*	Temporary	—	0.57	0.32	0.22	0.17	0.14	0.12	0.10	0.34	0.31	0.33	0.33	0.37	0.26	0.23	0.24	0.21
Lt. wt. agg.[c]																			
(2 in.)	***2.22***	Corrugated metal[c]	*0*	0.30	0.21	0.16	0.13	0.12	0.10	0.09	0.22	0.21	0.22	**0.22**	0.23	0.19	0.17	0.18	0.16
		Insulation bd. (1 in.)	***2.78***	0.16	0.13	0.11	0.10	0.09	0.08	0.07	0.14	0.13	0.14	0.13	0.14	0.12	0.11	0.12	0.11
		Insulation bd. (1½ in.)	*4.17*	0.13	0.11	0.10	0.09	0.08	0.07	0.06	0.12	0.11	0.11	0.11	0.12	0.10	0.10	0.10	0.10
		Glass fiber bd. (1 in.)	*4.00*	0.14	0.11	0.10	0.09	0.08	0.07	0.06	0.12	0.11	0.12	0.12	0.12	0.11	0.10	0.10	0.10
(3 in.)	*3.33*	Corrugated metal[c]	*0*	0.23	0.17	0.14	0.12	0.10	0.09	0.08	0.18	0.17	0.18	0.17	0.18	0.15	0.14	0.15	0.14
		Insulation bd. (1 in.)	***2.78***	0.14	0.12	0.10	0.09	0.08	0.07	0.06	0.12	0.11	0.12	0.12	0.12	0.11	0.10	0.10	0.10
		Insulation bd. (1½ in.)	*4.17*	0.12	0.10	0.09	0.08	0.07	0.07	0.06	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09
		Glass fiber bd. (1 in.)	*4.00*	0.12	0.10	0.09	0.08	0.07	0.07	0.06	0.10	0.10	0.10	0.10	0.11	0.10	0.09	0.09	0.09
(4 in.)	*4.44*	Corrugated metal[c]	*0*	0.18	0.14	0.12	0.10	0.09	0.08	0.07	0.15	0.14	0.15	0.15	0.15	0.13	0.12	0.13	0.12
		Insulation bd. (1 in.)	***2.78***	0.12	0.10	0.09	0.08	0.07	0.07	0.06	0.11	0.10	0.10	0.10	0.11	0.10	0.09	0.09	0.09
		Insulation bd. (1½ in.)	*4.17*	0.10	0.09	0.08	0.07	0.07	0.06	0.06	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08
		Glass fiber bd. (1 in.)	*4.00*	0.10	0.09	0.08	0.07	0.07	0.06	0.06	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08
Gypsum slab[g]																			
(2 in.)	*1.20*	Gypsum bd. (½ in.)	*0.45*	0.36	0.24	0.18	0.14	0.12	0.11	0.09	0.25	0.24	0.25	0.25	0.27	0.21	0.19	0.20	0.18
		Insulation bd. (1 in.)	***2.78***	0.20	0.15	0.13	0.11	0.10	0.09	0.07	0.16	0.15	0.16	0.16	0.16	0.14	0.13	0.13	0.12
		Insulation bd. (1½ in.)	*4.17*	0.15	0.13	0.11	0.09	0.09	0.08	0.07	0.13	0.13	0.13	0.13	0.13	0.12	0.11	0.11	0.11
		Asbestos cement bd.[f] (¼ in.)	*0.06*	0.40	0.26	0.19	0.15	0.13	0.11	0.09	0.27	0.25	0.26	0.26	0.29	0.22	0.19	0.20	0.18
		Glass fiber bd. (1 in.)	*4.00*	0.16	0.13	0.11	0.10	0.09	0.08	0.07	0.13	0.13	0.13	0.13	0.14	0.12	0.11	0.12	0.11
(3 in.)	*1.80*	Gypsum bd. (½ in.)	*0.45*	0.30	0.21	0.16	0.13	0.12	0.10	0.09	0.22	0.21	0.22	0.21	0.23	0.19	0.17	0.17	0.16
		Insulation bd. (1 in.)	***2.78***	0.18	0.14	0.12	0.10	0.09	0.08	0.07	0.15	0.14	0.14	0.14	0.15	0.13	0.12	0.12	0.12
		Insulation bd. (1½ in.)	*4.17*	0.14	0.12	0.10	0.09	0.08	0.07	0.06	0.12	0.12	0.12	0.12	0.12	0.11	0.10	0.11	0.10
		Asbestos cement bd. (¼ in.)	*0.06*	0.34	0.23	0.17	0.14	0.12	0.10	0.09	0.24	0.22	0.24	0.23	0.25	0.20	0.18	0.19	0.17
		Glass fiber bd. (1 in.)	*4.00*	0.14	0.12	0.10	0.09	0.08	0.07	0.07	0.12	0.12	0.12	0.12	0.13	0.11	0.10	0.11	0.10
(4 in.)	*2.40*	Gypsum bd. (½ in.)	*0.45*	0.25	0.19	0.15	0.12	0.11	0.09	0.08	0.19	0.18	0.19	0.19	0.20	0.17	0.15	0.16	0.14
		Insulation bd. (1 in.)	***2.78***	0.16	0.13	0.11	0.10	0.09	0.08	0.07	0.13	0.13	0.13	0.13	0.14	0.12	0.11	0.12	0.11
		Insulation bd. (1½ in.)	*4.17*	0.13	0.11	0.10	0.08	0.08	0.07	0.06	0.11	0.11	0.11	0.11	0.12	0.10	0.10	0.10	0.09
		Asbestos cement bd. (¼ in.)	*0.06*	0.28	0.20	0.16	0.13	0.11	0.10	0.08	0.21	0.20	0.21	0.20	0.22	0.18	0.16	0.17	0.15
		Glass fiber bd. (1 in.)	*4.00*	0.13	0.11	0.10	0.09	0.08	0.07	0.06	0.12	0.11	0.11	0.11	0.12	0.10	0.10	0.10	0.10

[a] See text section Calculating Overall Coefficients for basis of calculations.

[b] To adjust *U* values see note just above this table.

[c] *U* values would also apply if slab were poured on metal lath, paper-backed wire, fabric, or asbestos-cement board (¼ in.).

[d] Concrete assumed to have a thermal conductivity *k* of 12.0 and a density of 140 lb per cu ft.

[e] Concrete assumed to have a thermal conductivity *k* of 0.90 and a density of 30 lb per cu ft.

[f] Gypsum slab 2¼ in. thick since this is recommended practice.

[g] Gypsum fiber concrete with 12½ percent wood chips (thermal conductivity $k = 1.66$).

[h] See Table 16 E for *U* value of roof and ceiling construction with roof insulation added to roof deck.