

TABLE 4. HEAT LOSS CALCULATION SHEET FOR UNINSULATED RESIDENCE (FIG. 2)

A	B	C	D	E	F	G
ROOM OR SPACE	PART OF STRUCTURE	NET AREA OR CRACK LENGTH	COEFFICIENT	TEMP. DIFF. ^a	HEAT LOSS (Btu per hour)	TOTALS (Btu per hour)
Bedroom A	Walls	238 sq ft	0.28	80	5330	14,440
	Glass	40 sq ft	0.45	80	1440	
	Infiltration	36 lin ft ^b	0.35 ^c	80	1010	
	Ceiling ^d	242 sq ft	0.69	39.8	6660	
Bedroom B and Closet	Walls	156 sq ft	0.28	80	3490	10,340
	Glass	40 sq ft	0.45	80	1440	
	Infiltration	36 lin ft ^e	0.35	80	1010	
	Ceiling ^d	160 sq ft	0.69	39.8	4400	
Bedroom C	Walls	114 sq ft	0.28	80	2560	7,330
	Glass	27 sq ft	0.45	80	970	
	Infiltration	18 lin ft ^f	0.35	80	500	
	Ceiling ^d	120 sq ft	0.69	39.8	3300	
Bedroom D and Closet	Walls	118 sq ft	0.28	80	2650	8,130
	Glass	20 sq ft	0.45	80	720	
	Infiltration	18 lin ft	0.35	80	500	
	Ceiling ^d	120 sq ft	0.69	39.8	3300	
Bathroom 1	Floor over Garage	110 sq ft	0.25	35 ^g	960 ^m	3,180
	Walls	30 sq ft	0.28	80	670	
	Glass	14 sq ft	0.45	80	500	
	Infiltration	18 lin ft	0.35	80	500	
Bathroom 2	Ceiling ^d	55 sq ft	0.69	39.8	1510	3,780
	Walls	79 sq ft	0.26	80	1770	
	Glass	9 sq ft	0.45	80	320	
	Infiltration	15 lin ft	0.35	80	420	
Living Room	Ceiling ^d	35 sq ft	0.69	39.8	960	10,180
	Floor over Garage	35 sq ft	0.25	35	310 ^m	
	Walls	267 sq ft	0.28	80	5980	
	Walls (adjoining garage)	94 sq ft	0.39 ^h	35	1280 ^m	
Dining Room	Glass	50 sq ft	0.45	80	1800	8,470
	Infiltration	40 lin ft	0.35	80	1120	
	Walls	166 sq ft	0.28	80	3720	
	Glass (doors)	35 sq ft	1.13	80	3160	
Kitchen and Entrance to Garage	Glass (window)	20 sq ft	0.45	80	720	4,560
	Infiltration ⁱ	31 lin ft	0.35	80	870	
	Walls (outside)	96 sq ft	0.28	80	2150	
	Walls (adjoining garage)	51 sq ft	0.39 ^h	35	700 ^m	
Lavette and Vestibule	Infiltration	27 lin ft	0.35	80	760	4,630
	Glass	18 sq ft	0.45	80	650	
	Door to garage	17 sq ft	0.51	35	300 ^m	
	Walls (outside)	82 sq ft	0.28	80	1840	
Entrance Hall	Walls (adjoining garage)	35 sq ft	0.39 ^h	35	1160 ^m	4,560
	Door	19 sq ft	0.51	80	780	
	Glass	9 sq ft	0.45	80	320	
	Infiltration	19 lin ft	0.35	80	530	
Garage	Walls	39 sq ft	0.28	80	870	3,530
	Door	21 sq ft	0.38	80	640	
	Infiltration	20 lin ft	0.35	80	560	
	Ceiling ^{d, p}	87 sq ft	0.69	39.8	2490	
Recreation Room ⁿ	Walls	167 sq ft	0.28	45	2110	2,620
	Glass	53 sq ft	1.13	45	2700	
	Doors	44 sq ft	0.51	45	1010	
	Infiltration	37 lin ft	1.62 ^k	45	2700	
Total	Floor (heat gain)	185 sq ft	0.10 ^k	-15 ^k	-280	85,750
	Heat gain				-4710 ^m	
	Floor	287 sq ft	0.10	20	570	
	Walls	220 sq ft	0.10	38	840	
Total	Glass	8 sq ft	1.13	80	720	2,620
	Infiltration	8 lin ft	0.76	80	490	

Heating Load

NOTES FOR TABLE 4.

- ^aThe inside-outside temperature difference is 70 - (-10) or 80 F, except where otherwise noted.
- ^bOnly the south windows are used for arriving at the window crack for this room, on the assumption that whatever air enters through the south window cracks will leave through the west window or elsewhere.
- ^cDouble-hung wood windows with storm sash are assumed to have the same leakage per foot of c. as weatherstripped windows. The air leakage per foot of crack is about 19.5 cu ft per foot of crack ft. wind velocity of 12.5 mph. (See Table 2, Chapter 8.) The heat equivalent of the air leakage per (hot) (degree temperature difference per foot of crack) is obtained by multiplying this value by 0.018, or 19.5 × 0.018 = 0.35.
- ^dIn this problem the ceiling heat losses are calculated by estimating the attic temperature and then calculating the loss through the ceiling using the proper temperature difference. This unheated attic is not ventilated during the winter months. The attic temperature is estimated from Equation 4 to be 30.2 F when the outside temperature is -10 F and the room temperature is 70 F. The temperature difference is therefore 70 - 30.2 or 39.8 F.
- ^eThe window crack in the west wall having two windows is used.
- ^fOne-half the total crack is used in these rooms.
- ^gTemperature in garage assumed to be 35 F.
- ^hCoefficient for wall adjoining garage calculated on basis of metal lath and plaster on both sides of studs. ($U = 0.39$.)
- ⁱThe door crack is used for estimating the infiltration in this room and as the French doors are weatherstripped the infiltration coefficient is assumed to be the same as in Note b.
- ^jThe leakage for the garage doors is assumed to be twice that for poorly-fitted double-hung wood windows or about 90 cu ft per foot of crack for a wind velocity of 12.5 mph. The infiltration coefficient is therefore 0.018 × 90 or 1.62.
- ^kThe ground temperature is assumed to be 50 F and, as the garage temperature is 35 F, the heat transfer will be from the ground to the garage, and this heat gain should therefore be subtracted from the heat loss.
- ^lThe heat losses from various rooms into the garage are heat gains for the garage.
- ^mHeat is to be provided for the recreation room and this space is therefore figured on the basis of a 70 F temperature. Heat loss into the basement from recreation room is neglected, the calculations being based only on losses through the outside walls, glass and floor.
- ⁿThe upstairs hall ceiling is included with the downstairs entrance hall because these are connected by means of the stairway. The heat should be provided downstairs.

Example 5 (continued)

Floor (Basement and Garage): 4 in. stone concrete on 3 in. cinder concrete (0.10).

Solution: The calculations for this problem are given in Table 4, and a summary of the results in Table 5. The values in column F of Table 4 were obtained by multiplying together the figures in columns C, D and E. The heat losses are calculated to the nearest 10 Btu. See reference notes for Table 4 for further explanation of data.

Attention is called to the summary of heat losses (Table 5) of the uninsulated residence (Fig. 2). As storm windows are used in this instance the glass and door trans-

TABLE 5. SUMMARY OF HEAT LOSSES OF UNINSULATED RESIDENCE

Heat losses given in Btu per hour

ROOM OR SPACE	WALLS	CEILING AND ROOF	FLOOR	GLASS AND DOOR	INFILTRATION	TOTALS
Bedroom A	5330	6660		1440	1010	14,440
Bedroom B	3490	4400		1440	1010	10,340
Bedroom C	2560	3300		970	500	7,330
Bedroom D	2650	3300	960	720	500	8,130
Bathroom 1	670	1510		500	500	3,180
Bathroom 2	1770	960	310	320	420	3,780
Living Room	7280			1800	1120	10,180
Dining Room	3720			3880	870	8,470
Kitchen	2850			950	760	4,560
Lavette	3000			1100	530	4,630
Entrance Hall	870	2490		640	560	4,560
Garage	-1030 ^a		-1550 ^b	3410	2700	3,530
Recreation	840		570	720	490	2,620
Totals	33,980	22,620	290	17,890	10,970	85,750
Percentages	39.6	26.4	0.3	20.9	12.8	100.0

^aWall heat loss of 2110 Btu minus wall heat gain of 3140 Btu.

^bHeat gains; 960, 310 and 280 Btu.