

TABLE 16. INSTANTANEOUS RATES OF HEAT GAIN DUE TO TRANSMITTED DIRECT AND DIFFUSE OR SKY SOLAR RADIATION BY A SINGLE SHEET OF UNSHADED COMMON WINDOW GLASS

For Clear Atmospheres and 18 Deg Declination, North (August 1)

Note: For total instantaneous heat gain, add these values to the Table 17 values.

LATITUDE	SUN TIME		INSTANTANEOUS HEAT GAIN IN BTU PER (HR) (sq ft)								
	AM →		N	NE	E	SE	S	SW	W	NW	HORIZ.
30 DEG NORTH	6 a.m.	6 p.m.	25	98	108	52	5	5	5	5	17
	7	5	23	155	190	110	10	10	10	10	71
	8	4	16	148	205	136	14	13	13	13	137
	9	3	16	106	180	136	21	15	15	15	195
	10	2	17	54	128	116	34	17	16	16	241
	11	1	18	20	59	78	45	19	18	18	267
		12	18	19	19	35	49	35	19	19	276
40 DEG NORTH	5 a.m.	7 p.m.	3	7	6	2	0	0	0	0	1
	6	6	26	116	131	67	7	6	6	6	25
	7	5	16	149	195	124	11	10	10	10	77
	8	4	14	129	205	156	18	12	12	12	137
	9	3	15	79	180	182	42	14	14	14	188
	10	2	16	31	127	148	69	16	16	16	229
		11	1	17	18	58	113	90	23	17	252
		12	17	19	64	98	64	19	17	17	259
50 DEG NORTH	5 a.m.	7 p.m.	20	54	54	20	3	3	3	3	6
	6	6	25	128	149	81	8	7	7	7	34
	7	5	12	139	197	136	12	10	10	10	80
	8	4	13	107	202	171	32	12	12	12	129
	9	3	14	54	176	183	72	14	14	14	173
	10	2	15	18	124	174	110	16	15	15	206
		11	1	16	16	57	143	136	42	16	227
		12	16	18	18	96	144	96	18	16	234
	PM →		N	NW	W	SW	S	SE	E	NE	HORIZ.

other design temperatures are given in Table 26 in a later section, Effect of Deviation from Design Conditions.

Tables 16 and 17 may be used for other types of glass with good accuracy, by using the factors given in Table 18. Table 16 values are multiplied by the appropriate factor given in Table 18 to obtain heat gain due to transmitted solar radiation. For glasses having a transmittance for normally incident radiation differing from the table values, factors may be found by linear interpolation. To obtain instantaneous rates of heat gain by convection and radiation, two steps are required. First, Table 17 values are multiplied by the appropriate coefficient of X listed in Table 18. Second, Table 19 values are multiplied by the appropriate coefficient of Y listed in Table 18, and added to the first value. All convection and radiation gain values for double glass were computed for a $\frac{1}{4}$ -in. air space. No great error is involved in cooling load estimates if these are used for double glass with other air spaces.

Example 14: Find the total instantaneous heat gain through a single sheet of regular plate glass in a southwest wall at 2 p.m. sun time and 40 deg north latitude on August 1. The maximum dry-bulb temperature for design is 98 F; the atmosphere is clear. The indoor temperature is 75 F.

Solution: From Table 16 the heat gain due to transmitted radiation is 148 Btu per (hr) (sq ft) for common window glass; from Table 18, the factor for regular plate glass is 0.87. The coefficient of X in Table 18 is 1.0, while X is found from Table 17 for common window glass for the same hour, orientation and latitude. The coefficient of Y in Table 18 is 0.25, while the Y value is found from Table 19 for a south-

TABLE 17. INSTANTANEOUS RATES OF HEAT GAIN BY CONVECTION AND RADIATION FROM A SINGLE SHEET OF UNSHADED COMMON WINDOW GLASS

For Clear Atmospheres and 18 Deg Declination, North (August 1)

For 75 F Indoor Temperature

Note: For total instantaneous heat gain, add these values to the Table 16 values.

SUN TIME	DRY- BULB DEG F	NORTH LATITUDE DEGREES	INSTANTANEOUS HEAT GAIN IN BTU PER (HR) (SQ FT)									
			N	NE	E	SE	S	SW	W	NW	HOR.	
5 a.m.	74	30, 40, 50	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
6	74		0	1	1	0	-1	-1	-1	-1	-1	0
7	75		0	3	3	2	0	0	0	0	0	2
8	77		2	5	6	5	3	2	2	2	2	5
9	80		5	7	9	8	6	5	5	5	5	8
10	83		8	9	11	11	10	8	8	8	8	13
11	87		13	13	15	16	15	14	13	13	18	18
12	90		17	17	17	18	19	18	17	17	21	21
1 p.m.	93		20	20	20	21	22	22	22	20	25	25
2	94		21	21	21	21	23	24	24	22	26	26
3	95		22	22	22	22	24	26	26	24	26	26
4	94		21	21	21	21	22	25	25	24	24	24
5	93		20	20	20	20	20	23	24	23	22	22
6	91		18	18	18	18	18	19	20	20	18	18
7	87		13	13	13	13	13	13	13	13	13	13
8	85		11	11	11	11	11	11	11	11	11	11
9	83	8	8	8	8	8	8	8	8	8	8	

west wall at 2:00 p.m. and 40 deg north latitude. The correction for design dry-bulb temperature is found from Table 26 to be 1.0 Btu per (hr) (sq ft) per degree difference from 95 F design temperature. The total instantaneous heat gain is, from Equation 7a,

$$q = 0.87 \times 148 + 1.0 \times 24 + 0.25 \times 27 + 1.0 (98 - 95) \\ = 162.7 \text{ Btu per (hr) (sq ft).}$$

Design Tables for Rolled Figured Glass

Tables 20 and 21 give design values of instantaneous rates of heat gain for a number of common patterns of single vertical sheets of rolled figured glass. The tables are for a solar declination of 18 deg, which corresponds to a nominal August 1 day, and are based upon the solar intensity values for a clear atmosphere as given in Table 5. The values are given in terms of corrections to apply to Tables 16 and 17. The heat gain due to transmitted solar radiation is found by multiplying the Table 16 values by the approximate percentages given in Table 21. To obtain instantaneous rates of heat gain by convection and radiation, Table 19 values are multiplied by the appropriate value of Y from Table 20 and then added to

TABLE 18. APPLICATION FACTORS TO APPLY TO TABLES 16, 17 AND 19 TO OBTAIN INSTANTANEOUS RATES OF HEAT GAIN FOR VARIOUS TYPES OF SINGLE FLAT GLASS AND COMBINATIONS OF TWO SHEETS OF FLAT GLASS SPACED AT $\frac{1}{4}$ IN.

GLASS	NORMAL INCIDENCE TRANSMITTANCE	FACTOR TO APPLY TO TABLE 16	FACTOR TO APPLY TO TABLE 17
Single Common Window	0.87	1.00	$1.0(X)^b + 0.0(Y)^c$
Single Regular Plate	0.77	0.87	$1.0(X) + 0.25(Y)$
Single Heat Absorbing Plate	0.41	0.46*	$1.0(X) + 1.00(Y)$
Double Common Window	0.76	0.85	$0.6(X) + 0.10(Y)$
Double Regular Plate	0.60	0.66*	$0.6(X) + 0.55(Y)$
Heat Absorbing Plate Outdoors	0.35	0.37*	$0.6(X) + 0.75(Y)$
Regular Plate Indoors			

* For better precision, increase factors 10 percent when glass is in the shade.
 b X values are Table 17 values. c Y values are Table 19 values.