other design temperatures are given in Table 23 in a later section, Effect of Deviation from Design Conditions.

Tables 13 and 14 may be used for other types of glass with good accuracy, by using the factors given in Table 15. Table 13 values are multiplied by the appropriate factor given in Table 15 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 14 values are multiplied by the appropriate coefficient of X listed in Table 15. Second, Table 16 values are multiplied by the appropriate coefficient of Y listed in Table 15, and added to the first value. All convection and radiation

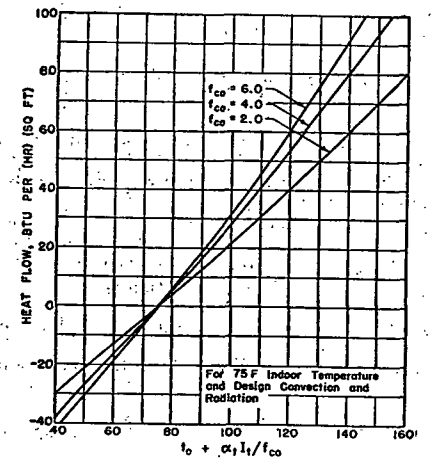


FIG. 3. CONVECTION AND RADIATION HEAT FLOW FOR VERTICAL SINGLE GLASS

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 9: Find the total instaneous 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 80 F.

Solution: From Table 13 the heat gain due to transmitted radiation is 148 Btu per (hr) (sq ft) for common window glass; from Table 15, the factor for regular plate glass is 0.87. The coefficient of X in Table 15 is 1.0, while X is found from Table 14 for common window glass for the same hour, orientation and latitude. The coefficient of Y in Table 15 is 0.25, while the Y value is found from Table 16 for a southwest wall at 2:00 p.m. and 40 deg north latitude. The correction for design dry-bulb temperature is found from Table 23 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 2a,

$$q = 0.87 \times 148 + 1.0 \times 19 + 0.25 \times 27 + 1.0\ (98 - 95)$$
$$= 157.5 \text{ Btu per (hr) (sq ft)}.$$

TABLE 13. 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 14 values.

Latitude	Sun Time AM → ↓		Instantaneous Heat Gain in Btu per (hr) (sq ft)								
			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	162	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	17	252
	12		17	17	19	64	98	64	19	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	16	227
	12		16	16	18	96	144	96	18	16	234
		↑ PM →	N	NW	W	SW	S	SE	E	NE	Horiz.

TABLE 14. 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 80 F Indoor Temperature

Note: For total instantaneous heat gain, add these values to the Table 13 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		−6	−6	−6	−6	−6	−6	−6	−6	−6
6	74		−5	−4	−4	−5	−5	−6	−6	−6	−5
7	75		−5	−2	−2	−3	−5	−5	−5	−5	−3
8	77		−3	0	1	0	−2	−3	−3	−3	0
9	80		0	2	4	3	1	0	0	0	3
10	83		3	4	6	6	5	3	3	3	8
11	87		8	8	10	11	10	9	8	8	13
12	90	30, 40, 50	12	12	12	13	14	13	12	12	16
1 p.m.	93		15	15	15	16	17	17	17	15	20
2	94		16	16	16	16	18	19	19	17	21
3	95		17	17	17	17	19	21	21	19	21
4	94		16	16	16	16	17	20	20	19	19
5	93		15	15	15	15	15	18	19	18	17
6	91		13	13	13	13	13	14	15	15	13
7	87		8	8	8	8	8	8	8	8	8
8	85		6	6	6	6	6	6	6	6	6
9	83		3	3	3	3	3	3	3	3	3