TABLE 22. INSTANTANEOUS RATES OF HEAT GAIN DUE TO TRANSMITTED DIRECT AND DIFFUSE SOLAR RADIATION BY UNSHADED WALLS OF 8-IN HOLLOW GLASS BLOCK OF TYPES II, III, IV, IVA AND V PATTERNS

Multiply the Table 20 Values for Type I by These Percentage Factors

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

For 30, 40, and 50 Deg North Latitude

Note: To obtain total instantaneous heat gain add adjusted Table 20 values to the Table 21 values.

INSTANTANEOUS HEAT GAIN DUE TO TRANSMITTED SOLAR RADIATION AS A PERCENTAGE OF TYPE I PATTERN

SUN TIME	TYPE II PATTERN					TYPE III PATTERN				
AM → ↓	N, NW, W, SW	NE	E	SE	S	N, NW, W, SW	NE	E	SE	S
5 a.m. 7 p.m.	100	100	100	100	100	70	70	70	70	70
6 6	100	95	95	90	100	70	65	65	70	70
7 5	100	90	90	90	100	70	65	60	65	70
8 4	100	95	90	90	100	70	65	60	65	70
9 3	100	95	85	90	90	70	65	65	70	65
10 2	100	95	95	95	95	70	70	70	75	65
11 1	100	100	95	95	100	70	70	70	80	75
12	100	100	100	100	100	70	70	70	75	90
↑ PM →	N, NE, E, SE	NW	W	SW	S	N, NE, E, SE	NW	W	SW	S

SUN TIME	TYPE IV PATTERN					TYPE IVA PATTERN				
AM → ↓	N, NW, W, SW	NE	E	SE	S	N, NW, W, SW	NE	E	SE	S
5 a.m. 7 p.m.	55	45	35	75	55	55	45	35	30	55
6 6	55	45	35	80	55	55	35	35	30	55
7 5	55	45	35	60	55	55	35	40	35	55
8 4	55	45	30	40	55	55	45	45	45	55
9 3	55	50	25	30	60	55	50	65	65	50
10 2	55	55	35	30	50	55	55	85	90	60
11 1	55	55	45	35	40	55	55	70	105	95
12	55	55	55	50	45	55	55	55	100	115
↑ PM →	N, NE, E, SE	NW	W	SW	S	N, NE, E, SE	NW	W	SW	S

SUN TIME	TYPE V PATTERN				
AM → ↓	N, NW, W, SW	NE	E	SE	S
5 a.m. 7 p.m.	60	35	35	30	60
6 6	60	35	35	30	60
7 5	60	35	40	35	60
8 4	60	50	65	50	60
9 3	60	80	90	90	60
10 2	60	70	105	105	90[a]
11 1	60	60	80	110	105[a]
12	60	60	60	85	115[a]
↑ PM →	N, NE, E, SE	NW	W	SW	S

Designation of Block Type
II—Semi-Light Diffusing
III—Light Diffusing
IV—Light Diffusing
IVA—Light Diffusing
V—Light Directing

[a] Reduce by 30% for 30 deg N latitude only.

TABLE 23. APPROXIMATE CORRECTIONS TO TABLES 14 AND 21 FOR DEVIATIONS FROM INDOOR AND OUTDOOR DESIGN TEMPERATURES

For each degree the design room temperature exceeds 80 F, subtract correction. For each degree the design outdoor dry-bulb temperature exceeds 95 F, add correction. Apply these corrections to each value in Table 14 or Table 21.

GLASS TYPE	CORRECTION BTU PER (HR) (SQ FT)
Single Flat or Rolled Figured Glass	1.0
Double Flat Glass and Glass Block	0.5

the corresponding Table 14 values. The total instantaneous heat gain is the sum of the gain due to transmitted solar radiation and the gain by convection and radiation.

The values given in Tables 17 and 18 are based upon an A.S.H.V.E. research paper[23] to which the reader is directed for additional data. The values in Tables 17 and 18 may be used with fair precision for other patterns of similar transmittance and surface characteristics. For example, the data for hammered glass may be used for glass having shallow, closely-spaced ribs or for glass having small, closely-spaced circular indentations. Because some patterns have distinct orientation properties, no attempt has been made to give values for non-vertical glass.

Design Tables for Glass Block Walls

Tables 20 and 21 give design values of instantaneous rates of heat gain for sunlit walls of Type I pattern 8-in. hollow glass block for a solar declination of 18 deg (see Table 19 for description of block patterns). These tables are based upon the solar intensity values for a clear atmosphere as given in Table 4. For solar energy transmittance data the reader is referred to reference 21. Table 20 presents values of transmitted direct and diffuse solar radiation, while Table 21 gives values of instantaneous rates of heat gain by convection and radiation from the wall. The latter values are for an indoor temperature of 80 F and a 95 F maximum dry-bulb temperature, as indicated in the table, and are based upon experimentally-determined values of solar energy absorption and temperature difference between the two faces. Because the exact dependence of the latter on weather conditions has not been determined, the values of convection and radiation gain cannot be regarded as exact for the assumed design conditions. Indoor and outdoor convection and radiation heat transfer data are the same as those used for common window glass. Table 23 gives corrections to be applied for other design temperatures.

To obtain transmitted direct and diffuse solar radiation for other types of 8-in. block, the Table 20 values are multiplied by the approximate percentages given in Table 22. Note that corrections are the same for all latitudes, and that they vary only on the surfaces exposed to the direct sun. The convection and radiation gain values for all blocks are so nearly the same that a single table suffices. Note, however, that corrections must be made for certain hours for east and west facing walls of some patterns.

Example 10: Find the total instantaneous heat gain through an east wall of 8-in. hollow glass block of Type V pattern at 8 a.m. and 50 deg north latitude. The design temperatures are 80 F indoors and 95 F maximum outdoor dry-bulb, clear atmosphere.

Solution: The gain due to transmitted solar radiation is found from Table 20 for Type I pattern. The factor for Type V is found from Table 22. The convection and radiation gain is found from Table 21 (note the footnote).

The total instantaneous heat gain is, from Equation 2a,

$$q = 86 \times 0.65 + 26 \times 1.4 = 92.3 \text{ Btu per (hr)(sq ft)}.$$

Effect of Deviations from Design Conditions

If the indoor temperature differs from 80 F, or the design outdoor dry-bulb temperature differs from 95 F, corrections can be made to the convection and radiation gain values for flat glass, rolled figured glass, and glass block according to the schedule in Table 23.

The effect of the humid industrial type atmosphere is to cause a con-