

# HEATING VENTILATING AIR CONDITIONING GUIDE 1940

TABLE 4. SOLAR RADIATION IMPINGING AGAINST WALLS HAVING SEVERAL ORIENTATIONS, AND A HORIZONTAL SURFACE.

For 40 Deg Latitude on the twenty-first of July.

| SUN TIME | INTENSITY OF SOLAR RADIATION, BTU PER SQ FT PER HOUR |      |           |       |           |      |           |                    |
|----------|------------------------------------------------------|------|-----------|-------|-----------|------|-----------|--------------------|
|          | NORTHEAST                                            | EAST | SOUTHEAST | SOUTH | SOUTHWEST | WEST | NORTHWEST | HORIZONTAL SURFACE |
| 4:31     | 0                                                    | 0    | 0         |       |           |      |           | 0                  |
| 5:00     | 14                                                   | 14   | 5         |       |           |      |           | 1                  |
| 6:00     | 72                                                   | 80   | 40        |       |           |      |           | 19                 |
| 7:00     | 143                                                  | 180  | 112       |       |           |      |           | 82                 |
| 8:00     | 143                                                  | 211  | 155       | 8     |           |      |           | 152                |
| 9:00     | 104                                                  | 192  | 168       | 46    |           |      |           | 213                |
| 10:00    | 46                                                   | 143  | 156       | 77    |           |      |           | 258                |
| 11:00    |                                                      | 75   | 121       | 95    | 15        |      |           | 284                |
| 12:00    |                                                      |      | 73        | 103   | 73        |      |           | 293                |
| 1:00     |                                                      |      | 15        | 95    | 121       | 75   |           | 284                |
| 2:00     |                                                      |      |           | 77    | 156       | 143  | 46        | 258                |
| 3:00     |                                                      |      |           | 46    | 168       | 192  | 104       | 213                |
| 4:00     |                                                      |      |           | 8     | 155       | 211  | 143       | 152                |
| 5:00     |                                                      |      |           |       | 112       | 180  | 143       | 82                 |
| 6:00     |                                                      |      |           |       | 40        | 80   | 72        | 19                 |
| 7:00     |                                                      |      |           |       | 5         | 14   | 14        | 1                  |
| 7:29     |                                                      |      |           |       | 0         | 0    | 0         | 0                  |

TABLE 5. SOLAR RADIATION IMPINGING AGAINST WALLS HAVING SEVERAL ORIENTATIONS, AND A HORIZONTAL SURFACE.

For 45 Deg Latitude on the twenty-first of July.

| SUN TIME | INTENSITY OF SOLAR RADIATION, BTU PER SQ FT PER HOUR |      |           |       |           |      |           |                    |
|----------|------------------------------------------------------|------|-----------|-------|-----------|------|-----------|--------------------|
|          | NORTHEAST                                            | EAST | SOUTHEAST | SOUTH | SOUTHWEST | WEST | NORTHWEST | HORIZONTAL SURFACE |
| 4:26     | 0                                                    | 0    | 0         |       |           |      |           | 0                  |
| 5:00     | 25                                                   | 24   | 9         |       |           |      |           | 2                  |
| 6:00     | 89                                                   | 99   | 52        |       |           |      |           | 26                 |
| 7:00     | 149                                                  | 194  | 125       |       |           |      |           | 90                 |
| 8:00     | 140                                                  | 219  | 171       | 22    |           |      |           | 156                |
| 9:00     | 92                                                   | 194  | 183       | 65    |           |      |           | 210                |
| 10:00    | 33                                                   | 144  | 171       | 98    |           |      |           | 251                |
| 11:00    |                                                      | 75   | 139       | 121   | 32        |      |           | 274                |
| 12:00    |                                                      |      | 91        | 128   | 91        |      |           | 282                |
| 1:00     |                                                      |      | 32        | 121   | 139       | 75   |           | 274                |
| 2:00     |                                                      |      |           | 98    | 171       | 144  | 33        | 251                |
| 3:00     |                                                      |      |           | 65    | 183       | 194  | 92        | 210                |
| 4:00     |                                                      |      |           | 22    | 171       | 219  | 140       | 156                |
| 5:00     |                                                      |      |           |       | 125       | 194  | 144       | 90                 |
| 6:00     |                                                      |      |           |       | 52        | 99   | 89        | 26                 |
| 7:00     |                                                      |      |           |       | 9         | 24   | 25        | 2                  |

# CHAPTER 8. COOLING LOAD

Since the amount of solar intensity actually transmitted through a surface depends upon the nature of the exterior surface of wall or roof construction, it is necessary, in order to determine actual amount of solar heat transmission, to apply correction factors to the values of (*I*). Solar radiation factors and solar absorption coefficients have been determined<sup>a</sup> as indicated in Fig. 2 and Table 6 respectively.

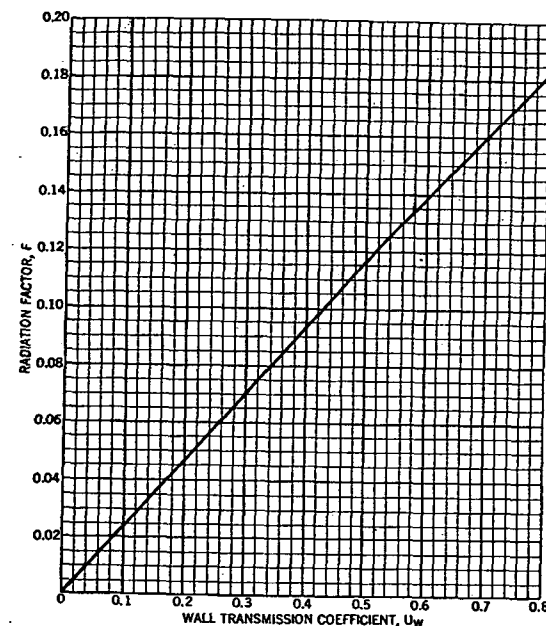


FIG. 2. SOLAR RADIATION FACTORS

The solar heat conduction through a wall or roof exposed to the sun may be expressed by the formula:

$$H_R = A F a I \quad (2)$$

where

$H_R$  = solar heat transmission, Btu per hour.

$A$  = area of wall or roof, square feet.

$F$  = radiation factor—percentage (expressed as a decimal) of the absorbed solar radiation which is transmitted to the inside (Fig. 2).

$a$  = absorption coefficient—percentage (expressed as a decimal) of the incident solar radiation which is absorbed by the surface (Table 6).

$I$  = intensity of solar radiation striking surface, Btu per hour per square foot (Tables 2, 3, 4 and 5).

The total amount of heat conducted through a wall exposed to the sun is the sum of  $H_t$  and  $H_R$  from Formulas 1 and 2.

<sup>a</sup>A Rational Heat Gain Method for the Determination of Air Conditioning Cooling Loads, by F. H. Faust, L. Levine, and F. O. Urban (A.S.H.V.E. TRANSACTIONS, Vol. 41, 1935, p. 327).