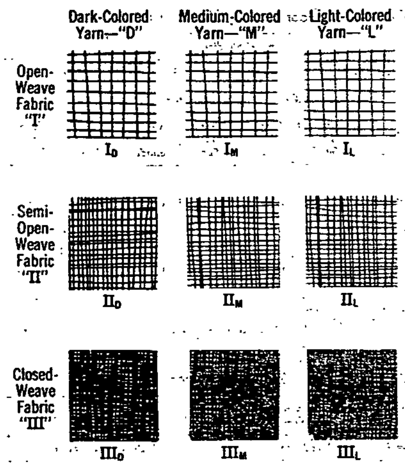

Fig. 3 .... Classification of Drapery Fabrics

Table 23 .... Properties of Representative Indoor Shading Devices Shown in Tables 20A, 20B, 21A and 21B

Indoor Shade		Solar Properties (Normal Incidence) Transmittance	Reflectance	Absorptance
Venetian Blinds[a] (Ratio of slat width to slat spacing = 1.2, slat angle = 45°)				
Light Colored Slat		—	0.6	0.4
Medium Colored Slat		—	0.4	0.6
Roller Shades (opaque)				
White Shade		0	0.80	0.20
Dark Colored Shade		0	0.12	0.88
Draperies[b]	*Openness*			
Dark Colored Fabric				
Closed Weave	0.04	0.10	0.20	0.70
Semi-Open Weave	0.14	0.20	0.20	0.60
Open Weave	0.35	0.40	0.15	0.45
Medium Colored Fabric				
Closed Weave	0.04	0.15	0.40	0.45
Semi-Open Weave	0.14	0.30	0.35	0.35
Open Weave	0.35	0.48	0.30	0.22
Light Colored Fabric				
Closed Weave	0.04	0.30	0.55	0.15
Semi-Open Weave	0.14	0.40	0.50	0.10
Open Weave	0.35	0.55	0.35	0.10

[a] The values shown in this table and preceding tables are based on horizontal Venetian Blinds. However, tests show these values may be used for vertical blinds with good accuracy.
[b] Solar properties are for unfolded fabric.

Determination of Design Air-Conditioning Load due to Heat Transfer through Glass

Heat flow through opaque structures does not contribute to the required cooling capacity until the inside surface warms sufficiently to convect heat to the space. Similarly, the solar energy through fenestrations does not contribute to the load until this energy is in the form of convective heat gain. In commercial buildings where the transmitted solar energy is absorbed by a floor of sufficient heat capacity, the time lag may be significant.

The maximum instantaneous heat gain through fenestration may occur on any day between the summer solstice (approximately June 21) and the winter solstice (approximately December 21). When it will occur depends upon the amount of glass on each orientation and the outdoor air temperatures for various months. Every month should be considered, particularly for medium and high-rise buildings.

The proper design day and time on which to base the choice of air-conditioning equipment depends obviously largely upon the net total heat gain through the fenestration. It also depends upon the contribution made by other sources of heat gain or loss (transfer through opaque walls, artificial illumination, people, infiltration, etc.) and upon the availability of outdoor air for cooling in the fall and winter. The interaction between these contributing factors is complex and requires the studied judgment of a qualified air-conditioning engineer. Values calculated from data in Tables 11 through 25 should not be used indiscriminately without considering the structure as a whole.

INSTANTANEOUS HEAT GAINS VS. INSTANTANEOUS COOLING LOADS

The difference between instantaneous heat gain and instantaneous cooling load has been mentioned previously; its practical importance is sufficient to warrant further consideration. Fig. 4 offers a simplified schematic illustration showing how the *radiative* part of the instantaneous heat gain is first absorbed by solid objects, and is not encountered by the conditioning equipment as a cooling load until some later time, when it finally appears in the air stream entering the equipment. While it is true that some lag also is inherent in convective heat transfer and the time required to change the air in the conditioned space, this is usually of the order of a few minutes to perhaps half an hour. Heat storage in the interior furnishings and structure increases according to the proportion of the instantaneous heat gain which is in the form of radiation, and also increases as the thermal capacitance of the objects and materials involved is increased.

Constituents of the total instantaneous heat gain which have appreciable radiation components include those due to glass areas, exposed walls and roofs, lighting, appliances and people.

A large difference in the time-incidence of the peaks between various spaces or parts of the same space indicates the necessity for zoning. In a building having an east and west exposure, where solar heat gains form a fair share of the cooling load, the times of individual zone peaks are apt to be some hours apart, and the peak load of one plus the off-peak load of the other will be substantially less than their combined peak loads. Proper zoning will permit operation to take full advantage of this condition or of similar conditions of nonsimultaneous peaks, and will result in a lower total load and in savings in equipment.

A factor similar in effect and closely related to the nonsimultaneous occurrence of peak loads, is diversity. Typical of this is the case of a large department store where the air-

Table 24 .... Shading Coefficients for Hollow Glass Block Wall Panels[a]

Type of Glass Block[b]	Description of Glass Block 	Shading Coefficient[c] Panels[d] in the Sun	Panels[e] in the Shade (N, NW, W, SW)
Type I	Glass Colorless or Aqua Smooth Face A, D: Smooth B, C: Smooth or wide ribs, or flutes horizontal or vertical, or shallow configuration. E: None	0.65	0.40
Type IA	Same as Type I except A: Ceramic Enamel on exterior face.	0.27	0.20
Type II	Same as Type I except E: Glass fiber screen.	0.44	0.34
Type III	Glass colorless or Aqua A, D: Narrow vertical ribs or flutes. B, C: Horizontal light-diffusing prisms, or horizontal light-directing prisms. E: Glass fiber screen.	0.33	0.27
Type IIIA	Same as Type III except E: Glass fiber screen with green ceramic spray coating, or glass fiber screen and gray glass, or glass fiber screen with light-selecting prisms.	0.25	0.18

[a] For glass block used in horizontal skylights see Tables 28 and 29, Chapter 26 of the 1963 ASHRAE GUIDE AND DATA BOOK.
[b] All values are for 7¾ × 7¾ × 3⅞ in. block, set in light-colored mortar. For 11¾ × 11¾ × 3⅞ in. block increase coefficients by 15 percent, and for 5¾ × 5¾ × 3⅞ in. blocks reduce coefficients by 15 percent.
[c] Shading coefficients are to be applied to Heat Gain Factors for one hour earlier than the time for which the load calculation is made to allow for heat storage in the panel.
[d] Shading coefficients are for peak load condition, but provide a close approximation for other conditions. For more precise values for other conditions, see Reference 41.
[e] For NE, E, and SE panels in the shade add 50 percent to the values listed for panels in the shade.

Table 25 .... Length of Horizontal Projection Required for Shading Windows and Walls
(For shading 10 ft down from projection for April 11 through September 1)

Latitude	Sun Time AM→ ↓	Projection in Feet N	NE	E	SE	S	SW	Sun Time
24 Deg North	6 a.m.	17.3	*	*	*	—	—	6 p.m.
	7	—	*	*	*	—	—	5
	8	—	10.8	16.5	15.8	1.6	—	4
	9	—	5.3	10.0	10.7	2.3	—	3
	10	—	2.3	5.8	7.5	2.7	—	2
	11	—	—	2.8	3.8	2.7	—	1
	12 N	—	—	—	2.2	2.8	2.2	12 N
32 Deg North	6 a.m.	15.8	*	*	*	—	—	6 p.m.
	7	—	*	*	*	1.7	—	5
	8	—	10.0	17.3	14.2	3.0	—	4
	9	—	4.6	10.3	10.0	3.8	—	3
	10	—	1.4	6.0	7.3	4.2	—	2
	11	—	—	2.8	5.1	4.2	1.2	1
	12 N	—	—	—	3.0	4.2	3.0	12 N
40 Deg North	6 a.m.	12.0	*	*	*	—	—	6 p.m.
	7	—	*	*	*	1.8	—	5
	8	—	9.7	18.9	16.1	4.3	—	4
	9	—	4.7	11.2	11.6	5.4	—	3
	10	—	1.3	6.5	9.1	5.8	—	2
	11	—	—	3.1	6.5	6.1	2.2	1
	12 N	—	—	—	4.3	6.3	4.3	12 N
48 Deg North	6 a.m.	7.3	*	*	*	—	—	6 p.m.
	7	—	*	*	*	3.6	—	5
	8	—	9.3	19.6	18.7	6.5	—	4
	9	—	3.3	12.0	13.7	7.5	—	3
	10	—	—	7.3	10.8	8.4	—	2
	11	—	—	3.2	8.4	8.4	3.2	1
	12 N	—	—	—	6.0	8.4	6.0	12 N
		N	NW	W	SW	S	SE	←↑PM

[*] Projection greater than 20 ft required.