CHAPTER 24
GLASS AND GLAZING

SECTION 2401
GENERAL

2401.1 Scope. The provisions of this chapter shall govern the materials, design, construction and quality of glass, light-transmitting ceramic and light-transmitting plastic panels for exterior and interior use in both vertical and sloped applications in buildings and structures.

2401.2 Glazing replacement. The installation of replacement glass shall be as required for new installations.

SECTION 2402
DEFINITIONS

2402.1 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

DALLE GLASS. A decorative composite glazing material made of individual pieces of glass that are embedded in a cast matrix of concrete or epoxy.

DECORATIVE GLASS. A carved, leaded or Dalle glass or glazing material whose purpose is decorative or artistic, not functional; whose coloring, texture or other design qualities or components cannot be removed without destroying the glazing material and whose surface, or assembly into which it is incorporated, is divided into segments.

SECTION 2403
GENERAL REQUIREMENTS FOR GLASS

2403.1 Identification. Each pane shall bear the manufacturer's label designating the type and thickness of the glass or glazing material. The identification shall not be omitted unless approved and an affidavit is furnished by the glazing contractor certifying that each light is glazed in accordance with approved construction documents that comply with the provisions of this chapter. Safety glazing shall be identified in accordance with Section 2406.2.

Each pane of tempered glass, except tempered spandrel glass, shall be permanently identified by the manufacturer. The identification label shall be acid etched, sand blasted, ceramic fired, embossed or shall be of a type that once applied cannot be removed without being destroyed.

Tempered spandrel glass shall be provided with a removable paper marking by the manufacturer.

2403.2 Glass supports. Where one or more sides of any pane of glass are not firmly supported, or are subjected to unusual load conditions, detailed construction documents, detailed shop drawings and analysis or test data assuring safe performance for the specific installation shall be prepared by a registered design professional.

2403.3 Framing. To be considered firmly supported, the framing members for each individual pane of glass shall be designed so the deflection of the edge of the glass perpendicular to the glass pane shall not exceed $^1/_{175}$ of the glass edge length or $^3/_4$ inch (19.1 mm), whichever is less, when subjected to the larger of the positive or negative load where loads are combined as specified in Section 1605.

2403.4 Interior glazed areas. Where interior glazing is installed adjacent to a walking surface, the differential deflection of two adjacent unsupported edges shall not be greater than the thickness of the panels when a force of 50 pounds per linear foot (plf) (730 N/m) is applied horizontally to one panel at any point up to 42 inches (1067 mm) above the walking surface.

2403.5 Louvered windows or jalousies. Float, wired and patterned glass in louvered windows and jalousies shall be no thinner than nominal $^3/_{16}$ inch (4.8 mm) and no longer than 48 inches (1219 mm). Exposed glass edges shall be smooth.

Wired glass with wire exposed on longitudinal edges shall not be used in louvered windows or jalousies.

Where other glass types are used, the design shall be submitted to the building official for approval.

SECTION 2404
WIND, SNOW, SEISMIC AND DEAD LOADS ON GLASS

2404.1 Vertical glass. Glass sloped 15 degrees (0.26 rad) or less from vertical in windows, curtain and window walls, doors and other exterior applications shall be designed to resist the wind loads in Section 1609 for components and cladding. Glass in glazed curtain walls, glazed storefronts and glazed partitions shall meet the seismic requirements of ASCE 7, Section 9.6.2.10. Glazing firmly supported on all four edges is permitted to be designed by the following provisions. Where the glass is not firmly supported on all four edges, analysis or test data ensuring safe performance for the specific installation shall be prepared by a registered design professional.

The design of vertical glazing shall be based on the following equation:

$$F_{gw} \leq F_{ga} \qquad \textbf{(Equation 24-1)}$$

where:

F_{gw} is the wind load on the glass computed in accordance with Section 1609 and F_{ga} is the maximum allowable load on the glass computed by the following formula:

$$F_{ga} = c_1 F_{ge} \qquad \textbf{(Equation 24-2)}$$

where:

F_{ge} = Maximum allowable equivalent load, pounds per square foot (psf) (kN/m^2) determined from Figures 2404(1) through 2404(12) for the applicable glass dimensions and thickness.

c_1 = Factor determined from Table 2404.1 based on glass type.

TABLE 2404.1
c_1 FACTORS FOR VERTICAL AND SLOPED GLASS[a]
[For use with Figures 2404(1) through 2404(12)]

GLASS TYPE	FACTOR
Single Glass	
Regular (annealed)	1.0
Heat strengthened	2.0
Fully tempered	4.0
Wired	0.50
Patterned[c]	1.0
Sandblasted[d]	0.50
Laminated—regular plies[e]	0.7/0.90[f]
Laminated—heat-strengthened plies[e]	1.5/1.8[f]
Laminated—fully tempered plies[e]	3.0/3.6[f]
Insulating Glass[b]	
Regular (annealed)	1.8
Heat strengthened	3.6
Fully tempered	7.2
Laminated—regular plies[e]	1.4/1.6[f]
Laminated—heat-strengthened plies[e]	2.7/3.2[f]
Laminated—fully tempered plies[e]	5.4/6.5[f]

a. Either Table 2404.1 or 2404.2 shall be appropriate for sloped glass depending on whether the snow or wind load is dominant (see Section 2404.2). For glass types (vertical or sloped) not included in the tables, refer to ASTM E 1300 for guidance.
b. Values apply for insulating glass with identical panes.
c. The value for patterned glass is based on the thinnest part of the pattern; interpolation between graphs is permitted.
d. The value for sandblasted glass is for moderate levels of sandblasting.
e. Values for laminated glass are based on the total thickness of the glass and apply for glass with two equal glass ply thicknesses.
f. The lower value applies if, for any laminated glass pane, either the ratio of the long to short dimension is greater than 2.0 or the lesser dimension divided by the thickness of the pane is 150 or less; the higher value applies in all other cases.

2404.2 Sloped glass. Glass sloped more than 15 degrees (0.26 rad) from vertical in skylights, sunrooms, sloped roofs and other exterior applications shall be designed to resist the most critical of the following combinations of loads.

$$F_g = W_o - D \qquad \textbf{(Equation 24-3)}$$

$$F_g = W_i + D + 0.5\,S \qquad \textbf{(Equation 24-4)}$$

$$F_g = 0.5\,W_i + D + S \qquad \textbf{(Equation 24-5)}$$

where:

D = Glass dead load (psf)
For glass sloped 30 degrees (0.52 rad) or less from horizontal,
$D = 13\,t_g$ (For SI: $0.0245\,t_g$)
For glass sloped more than 30 degrees (0.52 rad) from horizontal,
$D = 13\,t_g \cos\theta$ (For SI: $0.0245\,t_g \cos\theta$).

F_g = Total load, psf (kN/m²) on glass.

S = Snow load, psf (kN/m²) as determined in Section 1608.

t_g = Total glass thickness, inches (mm) of glass panes and plies.

W_i = Inward wind force, psf (kN/m²) as calculated in Section 1609.

W_o = Outward wind force, psf (kN/m²) as calculated in Section 1609.

θ = Angle of slope from horizontal.

Exception: Unit skylights shall be designed in accordance with Section 2405.5.

The design of sloped glazing shall be based on the following equation:

$$F_g \le F_{ga} \qquad \textbf{(Equation 24-6)}$$

where F_g is the maximum load on the glass determined from Equations 24-3 through 24-5, and F_{ga} is the maximum allowable load on the glass.

If F_g is determined by Equation 24-3 or 24-4 above, F_{ga} shall be computed as for vertical glazing in Section 2404.1. If F_g is determined by Equation 24-5 above, F_{ga} shall be computed by the following equation:

$$F_{ga} = c_2 F_{ge} \qquad \textbf{(Equation 24-7)}$$

where:

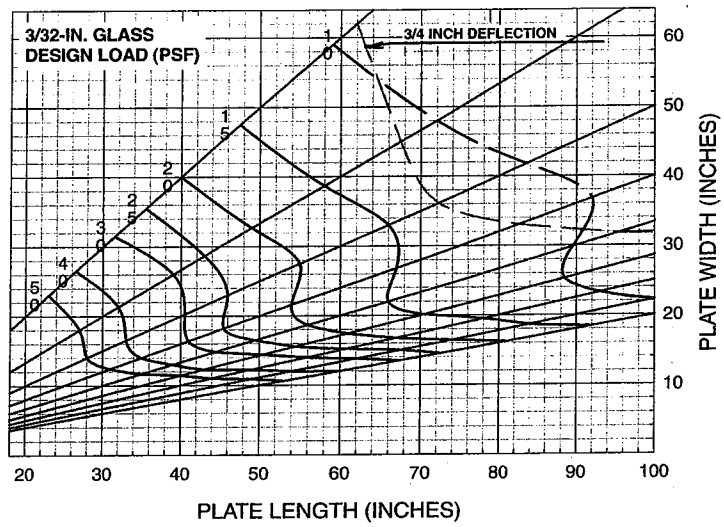
F_{ge} = Maximum allowable equivalent load (psf) determined from Figures 2404(1) through 2404(12) for the applicable glass dimensions and thickness.

c_2 = Factor determined from Table 2404.2 based on glass type.

TABLE 2404.2
c_2 FACTORS FOR SLOPED GLASS[a]
[For use with Figures 2404(1) through 2404(12)]

GLASS TYPE	FACTOR
Single Glass	
Regular (annealed)	0.6
Heat strengthened	1.6
Fully tempered	3.6
Wired	0.3
Patterned[c]	0.6
Laminated — regular plies[d]	0.3/0.45[e]
Laminated — heat-strengthened plies[d]	0.8/1.2[e]
Laminated — fully tempered plies[d]	1.8/2.7[e]
Insulating Glass[b]	
Regular (annealed)	1.1
Heat strengthened	2.9
Fully tempered	6.5
Laminated — regular plies[d]	0.54/0.81[e]
Laminated — heat-strengthened plies[d]	1.4/2.2[e]
Laminated — fully tempered plies[d]	3.3/4.9[e]

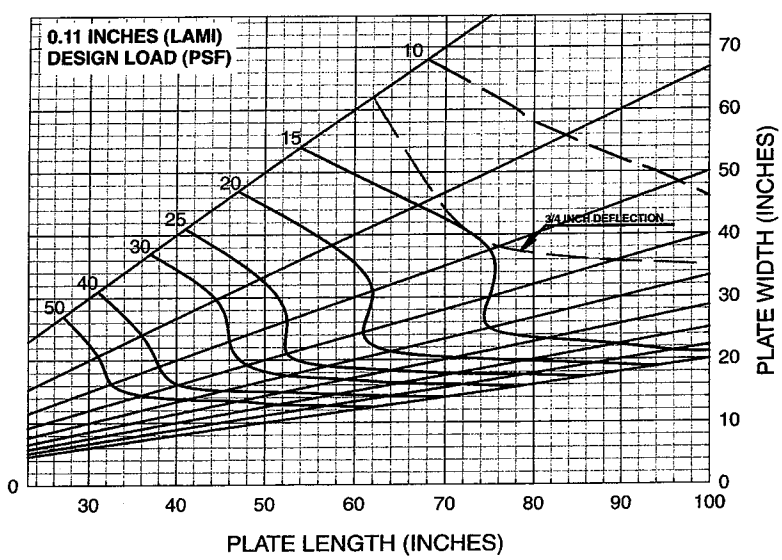
a. Either Table 2404.1 or 2404.2 shall be appropriate for sloped glass depending on whether the snow or wind load is dominant (see Section 2404.2). For glass types (vertical or sloped) not included in the tables, refer to ASTM E 1300 for guidance.
b. Values apply for insulating glass with identical panes.
c. The value for patterned glass is based on the thinnest part of the pattern; interpolation between graphs is permitted.
d. Values for laminated glass are based on the total thickness of the glass and apply for glass with two equal glass ply thicknesses.
e. The lower value applies where, for any laminated glass pane, either the ratio of the long to short dimension is greater than 2.0 or the lesser dimension divided by the thickness of the pane is 150 or less. The higher value applies in all other cases.



For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

FIGURE 2404(1)[a, b, c, d, e, f]
MAXIMUM ALLOWABLE LOAD FOR VERTICAL AND SLOPED RECTANGULAR GLASS SUPPORTED ON ALL EDGES

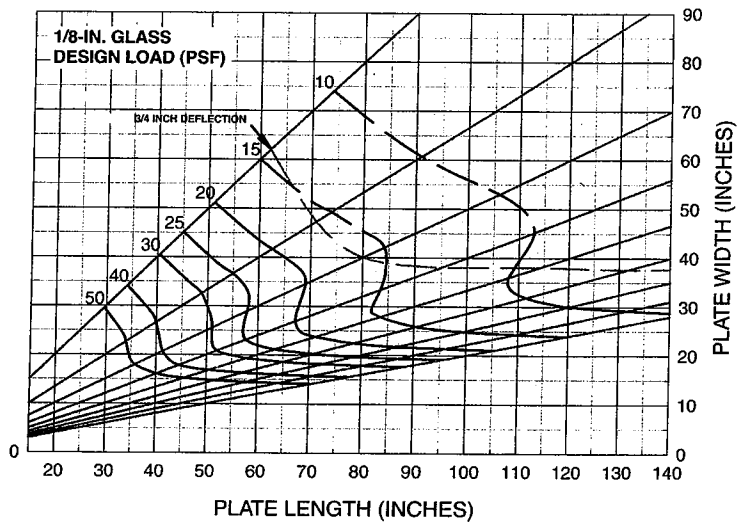
NOTES:
a. In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
b. The diagonal number on each graph shows the equivalent design load in psf.
c. The dashed lines indicate glass that has deflection in excess of $^3/_4$ inch.
d. Interpolation between lines is permitted. Extrapolation is not allowed.
e. For laminated glass, the applicable glass thickness is the total glass thickness.
f. For insulating glass panes, the applicable glass thickness is the thickness of one pane.



For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

FIGURE 2404(2)[a, b, c, d, e, f]
MAXIMUM ALLOWABLE LOAD FOR VERTICAL AND SLOPED RECTANGULAR GLASS SUPPORTED ON ALL EDGES

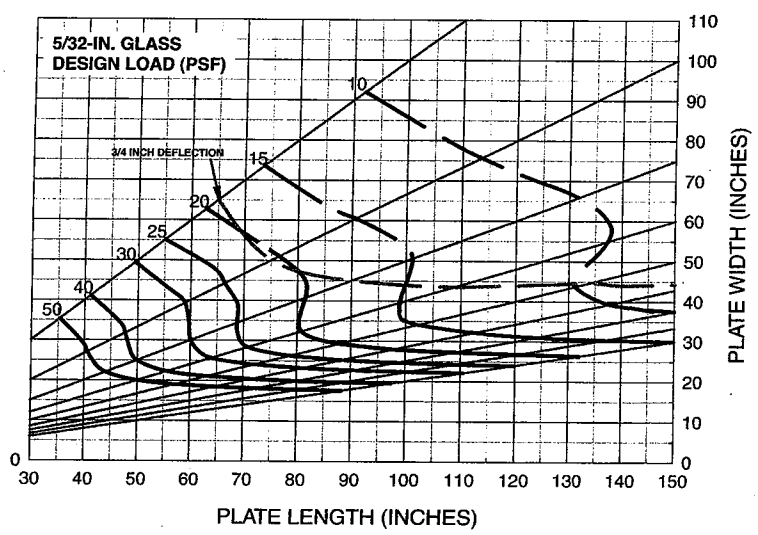
NOTES:
a. In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
b. The diagonal number on each graph shows the equivalent design load in psf.
c. The dashed lines indicate glass that has deflection in excess of $^3/_4$ inch.
d. Interpolation between lines is permitted. Extrapolation is not allowed.
e. For laminated glass, the applicable glass thickness is the total glass thickness.
f. For insulating glass panes, the applicable glass thickness is the thickness of one pane.



For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

FIGURE 2404(3)[a, b, c, d, e, f]
MAXIMUM ALLOWABLE LOAD FOR VERTICAL AND SLOPED RECTANGULAR GLASS SUPPORTED ON ALL EDGES

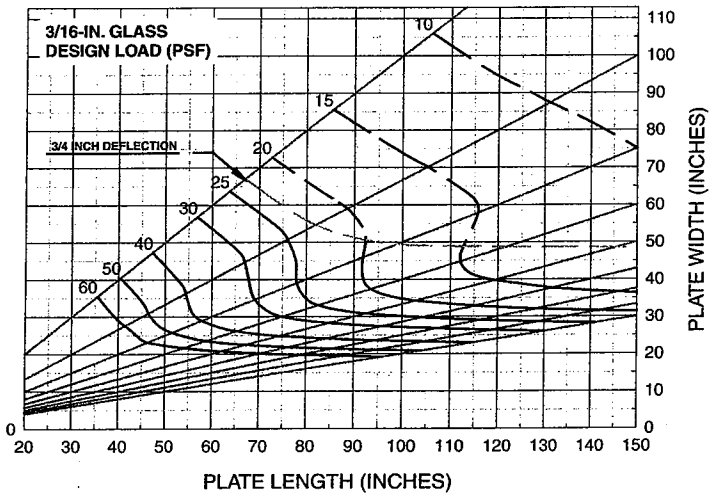
NOTES:
a. In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
b. The diagonal number on each graph shows the equivalent design load in psf.
c. The dashed lines indicate glass that has deflection in excess of $^3/_4$ inch.
d. Interpolation between lines is permitted. Extrapolation is not allowed.
e. For laminated glass, the applicable glass thickness is the total glass thickness.
f. For insulating glass panes, the applicable glass thickness is the thickness of one pane.



For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

FIGURE 2404(4)[a, b, c, d, e, f]
MAXIMUM ALLOWABLE LOAD FOR VERTICAL AND SLOPED RECTANGULAR GLASS SUPPORTED ON ALL EDGES

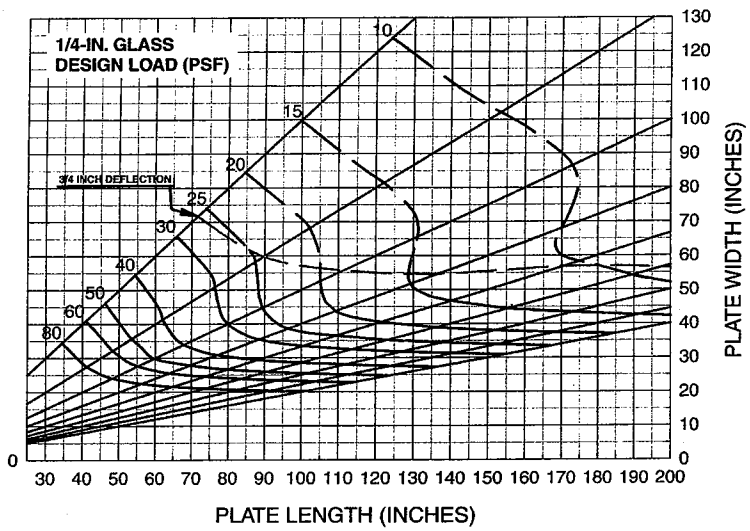
NOTES:
a. In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
b. The diagonal number on each graph shows the equivalent design load in psf.
c. The dashed lines indicate glass that has deflection in excess of $^3/_4$ inch.
d. Interpolation between lines is permitted. Extrapolation is not allowed.
e. For laminated glass, the applicable glass thickness is the total glass thickness.
f. For insulating glass panes, the applicable glass thickness is the thickness of one pane.



For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

FIGURE 2404(5)[a, b, c, d, e, f]
MAXIMUM ALLOWABLE LOAD FOR VERTICAL AND SLOPED RECTANGULAR GLASS SUPPORTED ON ALL EDGES

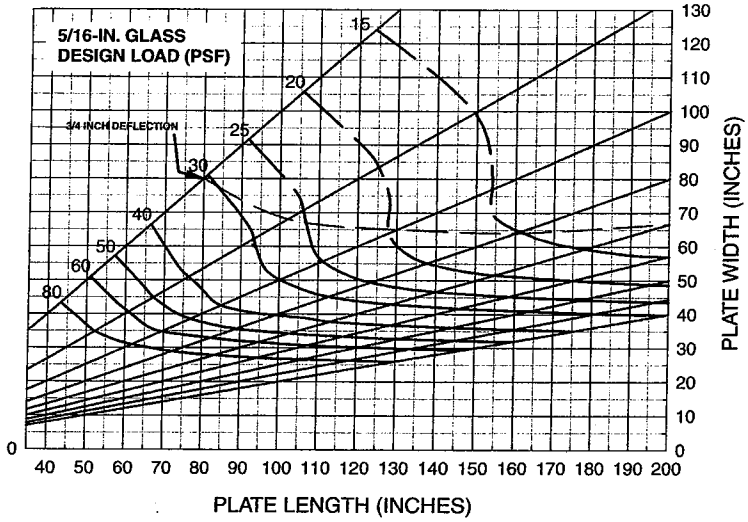
NOTES:
a. In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
b. The diagonal number on each graph shows the equivalent design load in psf.
c. The dashed lines indicate glass that has deflection in excess of $^3/_4$ inch.
d. Interpolation between lines is permitted. Extrapolation is not allowed.
e. For laminated glass, the applicable glass thickness is the total glass thickness.
f. For insulating glass panes, the applicable glass thickness is the thickness of one pane.



For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

FIGURE 2404(6)[a, b, c, d, e, f]
MAXIMUM ALLOWABLE LOAD FOR VERTICAL AND SLOPED RECTANGULAR GLASS SUPPORTED ON ALL EDGES

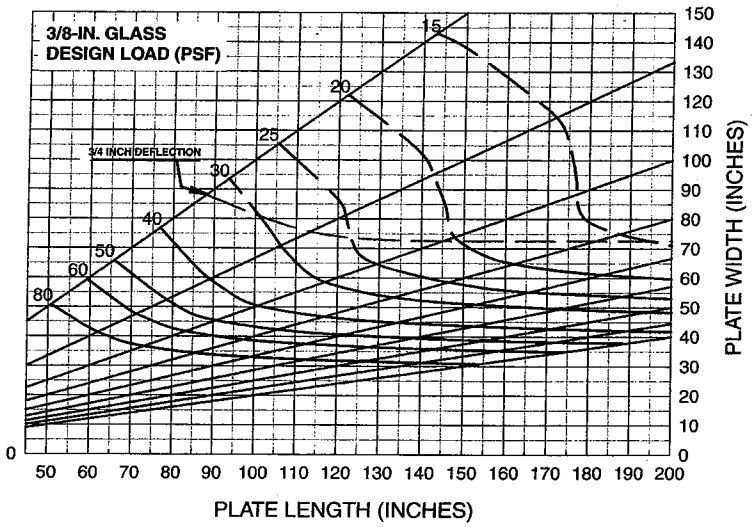
NOTES:
a. In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
b. The diagonal number on each graph shows the equivalent design load in psf.
c. The dashed lines indicate glass that has deflection in excess of $^3/_4$ inch.
d. Interpolation between lines is permitted. Extrapolation is not allowed.
e. For laminated glass, the applicable glass thickness is the total glass thickness.
f. For insulating glass panes, the applicable glass thickness is the thickness of one pane.



For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

FIGURE 2404(7)[a, b, c, d, e, f]
MAXIMUM ALLOWABLE LOAD FOR VERTICAL AND SLOPED RECTANGULAR GLASS SUPPORTED ON ALL EDGES

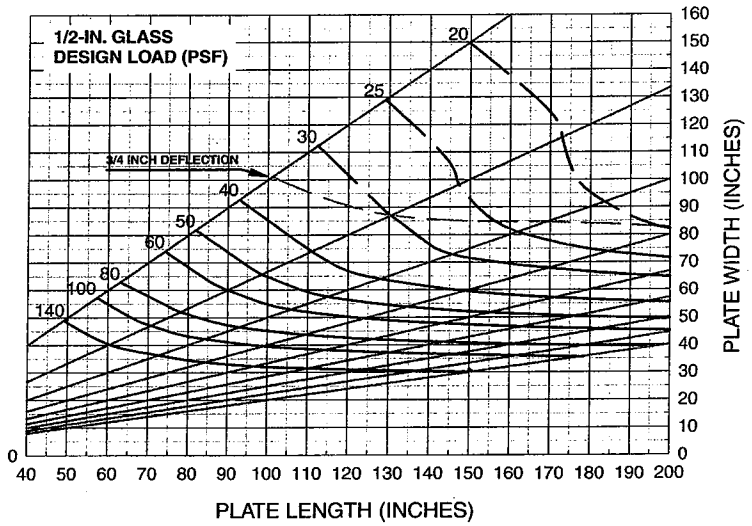
NOTES:
a. In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
b. The diagonal number on each graph shows the equivalent design load in psf.
c. The dashed lines indicate glass that has deflection in excess of $^3/_4$ inch.
d. Interpolation between lines is permitted. Extrapolation is not allowed.
e. For laminated glass, the applicable glass thickness is the total glass thickness.
f. For insulating glass panes, the applicable glass thickness is the thickness of one pane.



For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

FIGURE 2404(8)[a, b, c, d, e, f]
MAXIMUM ALLOWABLE LOAD FOR VERTICAL AND SLOPED RECTANGULAR GLASS SUPPORTED ON ALL EDGES

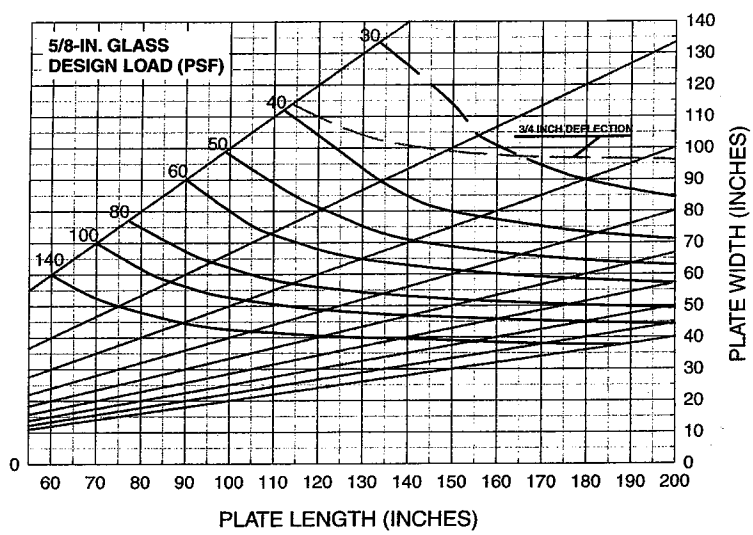
NOTES:
a. In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
b. The diagonal number on each graph shows the equivalent design load in psf.
c. The dashed lines indicate glass that has deflection in excess of $^3/_4$ inch.
d. Interpolation between lines is permitted. Extrapolation is not allowed.
e. For laminated glass, the applicable glass thickness is the total glass thickness.
f. For insulating glass panes, the applicable glass thickness is the thickness of one pane.



For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

FIGURE 2404(9)[a, b, c, d, e, f]
MAXIMUM ALLOWABLE LOAD FOR VERTICAL AND SLOPED RECTANGULAR GLASS SUPPORTED ON ALL EDGES

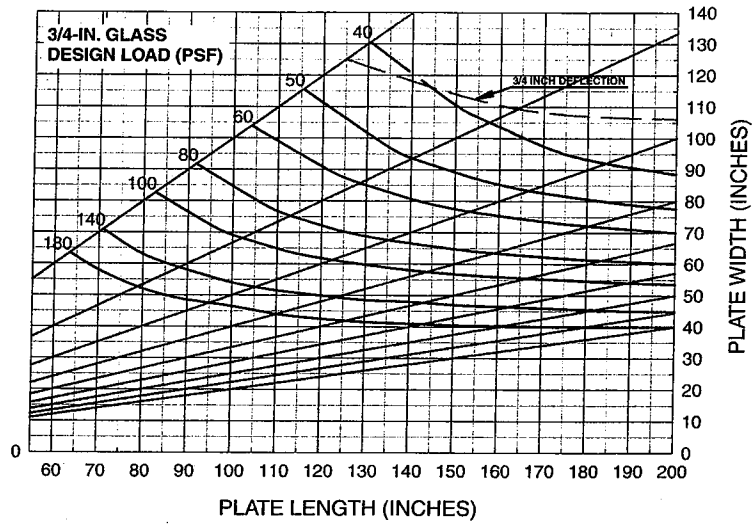
NOTES:
a. In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
b. The diagonal number on each graph shows the equivalent design load in psf.
c. The dashed lines indicate glass that has deflection in excess of $^3/_4$ inch.
d. Interpolation between lines is permitted. Extrapolation is not allowed.
e. For laminated glass, the applicable glass thickness is the total glass thickness.
f. For insulating glass panes, the applicable glass thickness is the thickness of one pane.



For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

FIGURE 2404(10)[a, b, c, d, e, f]
MAXIMUM ALLOWABLE LOAD FOR VERTICAL AND SLOPED RECTANGULAR GLASS SUPPORTED ON ALL EDGES

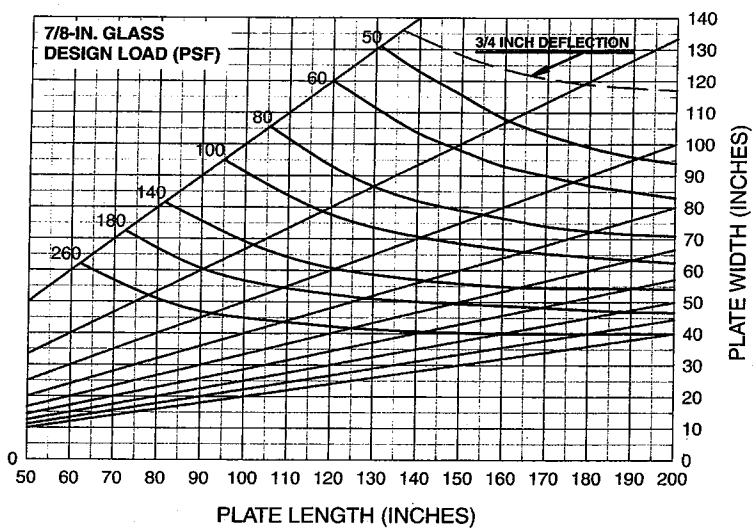
NOTES:
a. In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
b. The diagonal number on each graph shows the equivalent design load in psf.
c. The dashed lines indicate glass that has deflection in excess of $^3/_4$ inch.
d. Interpolation between lines is permitted. Extrapolation is not allowed.
e. For laminated glass, the applicable glass thickness is the total glass thickness.
f. For insulating glass panes, the applicable glass thickness is the thickness of one pane.



For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

FIGURE 2404(11)[a, b, c, d, e, f]
MAXIMUM ALLOWABLE LOAD FOR VERTICAL AND SLOPED RECTANGULAR GLASS SUPPORTED ON ALL EDGES

NOTES:
a. In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
b. The diagonal number on each graph shows the equivalent design load in psf.
c. The dashed lines indicate glass that has deflection in excess of $^3/_4$ inch.
d. Interpolation between lines is permitted. Extrapolation is not allowed.
e. For laminated glass, the applicable glass thickness is the total glass thickness.
f. For insulating glass panes, the applicable glass thickness is the thickness of one pane.



For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

FIGURE 2404(12)[a, b, c, d, e, f]
MAXIMUM ALLOWABLE LOAD FOR VERTICAL AND SLOPED RECTANGULAR GLASS SUPPORTED ON ALL EDGES

NOTES:
a. In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
b. The diagonal number on each graph shows the equivalent design load in psf.
c. The dashed lines indicate glass that has deflection in excess of $^3/_4$ inch.
d. Interpolation between lines is permitted. Extrapolation is not allowed.
e. For laminated glass, the applicable glass thickness is the total glass thickness.
f. For insulating glass panes, the applicable glass thickness is the thickness of one pane.

positive and negative pressure, then the performance grade rating shown on the label shall be the performance grade rating determined in accordance with 101/I.S.2/NAFS for both positive and negative design pressure, and the skylight shall conform to Section 2405.5.1.

2405.5.1 Unit skylights rated for the same performance grade for both positive and negative design pressure. The design of unit skylights shall be based on the following equation:

$$F_g \leq PG \qquad \textbf{(Equation 24-8)}$$

where:

F_g is the maximum load on the skylight determined from Equations 24-3 through 24-5 in Section 2404.2.

PG is the performance grade rating of the skylight.

2405.5.2 Unit skylights rated for separate performance grades for positive and negative design pressure. The design of unit skylights rated for performance grade for both positive and negative design pressures shall be based on the following equations:

$$F_{gi} \leq PG_{Pos} \qquad \textbf{(Equation 24-9)}$$

$$F_{go} \leq PG_{Neg} \qquad \textbf{(Equation 24-10)}$$

where:

PG_{Pos} is the performance grade rating of the skylight under positive design pressure,

PG_{Neg} is the performance grade rating of the skylight under negative design pressure, and

F_{gi} and F_{go} are determined in accordance with the following:

If $W_O \geq D$, where W_o is the outward wind force, psf (kN/m^2) as calculated in Section 1609 and D is the dead weight of the glazing, psf (kN/m^2) as determined in Section 2404.2 for glass, or by the weight of the plastic, psf (kN/m^2) for plastic glazing.

F_{gi} is the maximum load on the skylight determined from Equations 24-4 and 24-5 in Section 2404.2,

F_{go} is the maximum load on the skylight determined from Equation 24-3.

If $W_O < D$, where W_o is the outward wind force, psf (kN/m^2) as calculated in Section 1609 and D is the dead weight of the glazing, psf (kN/m^2) as determined in Section 2404.2 for glass, or by the weight of the plastic for plastic glazing.

F_{gi} is the maximum load on the skylight determined from Equations 24-3 through 24-5 in Section 2404.2,

$F_{go} = 0$.

SECTION 2406
SAFETY GLAZING

2406.1 Human impact loads. Individual glazed areas, including glass mirrors, in hazardous locations as defined in Section 2406.3 shall comply with Sections 2406.1.1 through 2406.1.5.

2406.1.1 CPSC 16 CFR 1201. Except as provided in Sections 2406.1.2 through 2406.1.5, all glazing shall pass the test requirements of CPSC 16 CFR 1201, listed in Chapter 35. Glazing shall comply with the CPSC 16 CFR, Part 1201 criteria, for Category I or II as indicated in Table 2406.1.

2406.1.2 Wired glass. In other than Group E, wired glass installed in fire doors, fire windows and view panels in fire-resistant walls shall be permitted to comply with ANSI Z97.1.

2406.1.3 Plastic glazing. Plastic glazing shall meet the weathering requirements of ANSI Z97.1.

2406.1.4 Glass block. Glass-block walls shall comply with Section 2101.2.5.

2406.1.5 Louvered windows and jalousies. Louvered windows and jalousies shall comply with Section 2403.5.

2406.2 Identification of safety glazing. Except as indicated in Section 2406.2.1, each pane of safety glazing installed in hazardous locations shall be identified by a label specifying the labeler, whether the manufacturer or installer, and the safety glazing standard with which it complies, as well as the information specified in Section 2403.1. The label shall be acid etched, sand blasted, ceramic fired or an embossed mark, or shall be of a type that once applied cannot be removed without being destroyed.

Exceptions:

1. For other than tempered glass, labels are not required, provided the building official approves the use of a certificate, affidavit or other evidence confirming compliance with this code.
2. Tempered spandrel glass is permitted to be identified by the manufacturer with a removable paper label.

2406.2.1 Multilight assemblies. Multilight glazed assemblies having individual lights not exceeding 1 square foot (0.09 square meter) in exposed area shall have at least one

TABLE 2406.1
MINIMUM CATEGORY CLASSIFICATION OF GLAZING

EXPOSED SURFACE AREA OF ONE SIDE OF ONE LITE	GLAZING IN STORM OR COMBINATION DOORS (Category class)	GLAZING IN DOORS (Category class)	GLAZED PANELS REGULATED BY ITEM 7 OF SECTION 2406.3 (Category class)	GLAZED PANELS REGULATED BY ITEM 6 OF SECTION 2406.3 (Category class)	DOORS AND ENCLOSURES REGULATED BY ITEM 5 OF SECTION 2406.3 (Category class)	SLIDING GLASS DOORS PATIO TYPE (Category class)
9 square feet or less	I	I	No requirement	I	II	II
More than 9 square feet	II	II	II	II	II	II

For SI: 1 square foot = 0.0929m^2.

6. Louvered windows and jalousies complying with the requirements of Section 2403.5.
7. Mirrors and other glass panels mounted or hung on a surface that provides a continuous backing support.

2406.4 Fire department access panels. Fire department glass access panels shall be of tempered glass. For insulating glass units, all panes shall be tempered glass.

SECTION 2407
GLASS IN HANDRAILS AND GUARDS

2407.1 Materials. Glass used as structural balustrade panels in railings shall be constructed of either single fully tempered glass, laminated fully tempered glass or laminated heat-strengthened glass. Glazing in railing in-fill panels shall be of an approved safety glazing material that conforms to the provisions of Section 2406.1.1. For all glazing types, the minimum nominal thickness shall be $^1/_4$ inch (6.4 mm). Fully tempered glass and laminated glass shall comply with Category II of CPSC 16 CFR 1201, listed in Chapter 35.

2407.1.1 Loads. The panels and their support system shall be designed to withstand the loads specified in Section 1607.7. A safety factor of four shall be used.

2407.1.2 Support. Each handrail or guard section shall be supported by a minimum of three glass balusters or shall be otherwise supported to remain in place should one baluster panel fail. Glass balusters shall not be installed without an attached handrail or guard.

2407.1.3 Parking garages. Glazing materials shall not be installed in railings in parking garages except for pedestrian areas not exposed to impact from vehicles.

SECTION 2408
GLAZING IN ATHLETIC FACILITIES

2408.1 General. Glazing in athletic facilities and similar uses subject to impact loads, which forms whole or partial wall sections or which is used as a door or part of a door, shall comply with this section.

2408.2 Racquetball and squash courts.

2408.2.1 Testing. Test methods and loads for individual glazed areas in racquetball and squash courts subject to impact loads shall conform to those of CPSC 16 CFR, Part 1201, listed in Chapter 35, with impacts being applied at a height of 59 inches (1499 mm) above the playing surface to an actual or simulated glass wall installation with fixtures, fittings and methods of assembly identical to those used in practice.

Glass walls shall comply with the following conditions:

1. A glass wall in a racquetball or squash court, or similar use subject to impact loads, shall remain intact following a test impact.
2. The deflection of such walls shall not be greater than $1^1/_2$ inches (38 mm) at the point of impact for a drop height of 48 inches (1219 mm).

Glass doors shall comply with the following conditions:

1. Glass doors shall remain intact following a test impact at the prescribed height in the center of the door.
2. The relative deflection between the edge of a glass door and the adjacent wall shall not exceed the thickness of the wall plus $^1/_2$ inch (12.7 mm) for a drop height of 48 inches (1219 mm).

2408.3 Gymnasiums and basketball courts. Glazing in multipurpose gymnasiums, basketball courts and similar athletic facilities subject to human impact loads shall comply with Category II of CPSC 16 CFR 1201, listed in Chapter 35.

SECTION 2409
GLASS IN FLOORS AND SIDEWALKS

2409.1 General. Glass installed in the walking surface of floors, landings, stairwells and similar locations shall comply with Sections 2409.2 through 2409.4.

2409.2 Design load. The design for glass used in floors, landings, stair treads and similar locations shall be determined as indicated in Section 2409.4 based on the load that produces the greater stresses from the following:

1. The uniformly distributed unit load (F_u) from Section 1605;
2. The concentrated load (F_c) from Table 1607.1; or
3. The actual load (F_a) produced by the intended use.

The dead load (D) for glass in psf (kN/m^2) shall be taken as the total thickness of the glass plies in inches by 13 (For SI: glass plies in mm by 0.0245). Load reductions allowed by Section 1607.9 are not permitted.

2409.3 Laminated glass. Laminated glass having a minimum of two plies shall be used. The glass shall be capable of supporting the total design load, as indicated in Section 2409.4, with any one ply broken.

2409.4 Design formula. Glass in floors and sidewalks shall be designed to resist the most critical of the following combinations of loads:

$$F_g = 2F_u + D \qquad \textbf{(Equation 24-11)}$$

$$F_g = (8F_c/A) + D \qquad \textbf{(Equation 24-12)}$$

$$F_g = F_a + D \qquad \textbf{(Equation 24-13)}$$

where:

A = Area of rectangular glass, ft^2 (m^2).
D = Glass dead load (psf) = 13 t_g (for SI: 0.0245 t_g, kN/m^2).
t_g = Total glass thickness, inches (mm).
F_a = Actual intended use load, psf (kN/m^2).
F_c = Concentrated load, pounds (kN).

F_g = Total load, psf (kN/m^2) on glass.

F_u = Uniformly distributed load, psf (kN/m^2).

The design of the glazing shall be based on

$$F_g \leq F_{ga} \qquad \textbf{(Equation 24-14)}$$

where F_g is the maximum load on the glass determined from the load combinations above, and F_{ga} is the maximum allowable load on the glass, computed by the following formula:

$$F_{ga} = 0.67\, c_2 F_{ge} \qquad \textbf{(Equation 24-15)}$$

where:

F_{ge} = Maximum allowable equivalent load, psf (kN/m^2), determined from Figures 2404(1) through 2404(12) for the applicable glass dimensions and thickness; and

c_2 = Factor determined from Table 2404.2 based on glass type.

The factor, c_2, for laminated glass found in Table 2404.2 shall apply to two-ply laminates only. The value of F_a shall be doubled for dynamic applications.