

TABLE 2404.1
c₁ 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	0.50
Laminated—regular plies ^d	0.7/0.90'
Laminated—heat-strengthened plies ^d	1.5/1.8'
Laminated—fully tempered plies ^d	3.0/3.6'
Insulating Glass^b	
Regular (annealed)	1.8
Heat strengthened	3.6
Fully tempered	7.2
Laminated—regular plies ^d	1.4/1.6'
Laminated—heat-strengthened plies ^d	2.7/3.2'
Laminated—fully tempered plies ^d	5.4/6.5'

- 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:

$$F_g = W_o + D \quad (\text{Equation 24-3})$$

$$F_g = W_i + D + 0.5 S \quad (\text{Equation 24-4})$$

$$F_g = 0.5 W_i + D + S \quad (\text{Equation 24-5})$$

where:

D = Glass dead load (psf)

For glass sloped 30 degrees (0.52 rad) or less from horizontal

$$D = 3 t_g \quad (\text{For SI: } 0.0245 t_g)$$

For glass sloped more than 30 degrees (0.52 rad) from horizontal,

$$D = 13 t_g \cos \theta \quad (\text{For SI: } 0.0245 t_g \cos \theta)$$

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:

$$F_g \leq F_{ga} \quad (\text{Equation 24-6})$$

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:

$$F_{ga} = c_2 F_{ge} \quad (\text{Equation 24-7})$$

where:

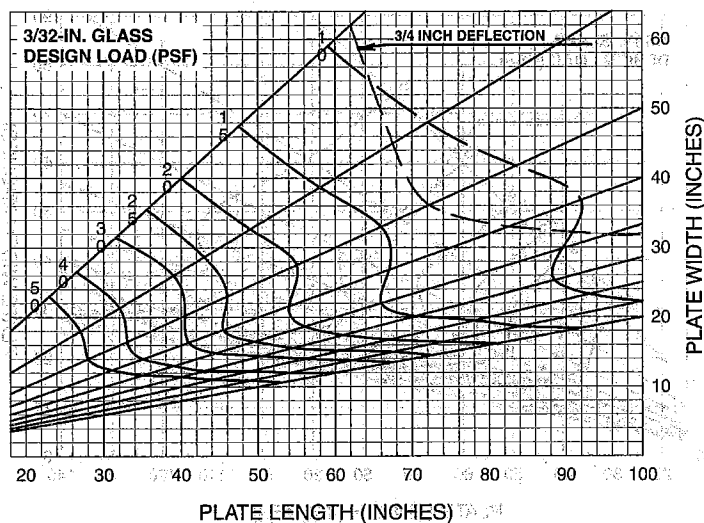
F_{ge} = Maximum allowable equivalent load (psf) determined from Figures 2404(1) through 2404(12) for the applicable glass dimensions and thickness.

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

TABLE 2404.2
c₂ 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'
Laminated—heat-strengthened plies ^d	0.8/1.2'
Laminated—fully tempered plies ^d	1.8/2.7'
Insulating Glass^b	
Regular (annealed)	1.1
Heat strengthened	2.9
Fully tempered	6.5
Laminated—regular plies ^d	0.54/0.81'
Laminated—heat-strengthened plies ^d	1.4/2.2'
Laminated—fully tempered plies ^d	3.3/4.9'

- 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.

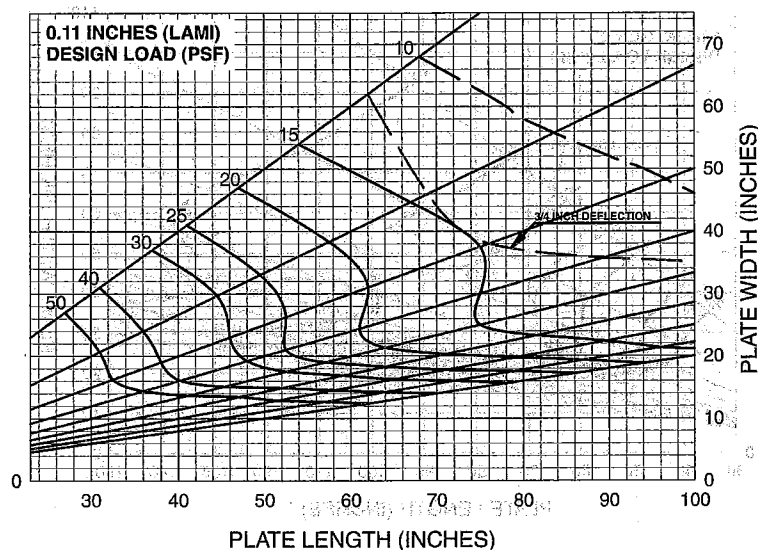


For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

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

NOTES:

- In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
- The diagonal number on each graph shows the equivalent design load in psf.
- The dashed lines indicate glass that has deflection in excess of $\frac{3}{4}$ inch.
- Interpolation between lines is permitted. Extrapolation is not allowed.
- For laminated glass, the applicable glass thickness is the total glass thickness.
- For insulating glass panes, the applicable glass thickness is the thickness of one pane.

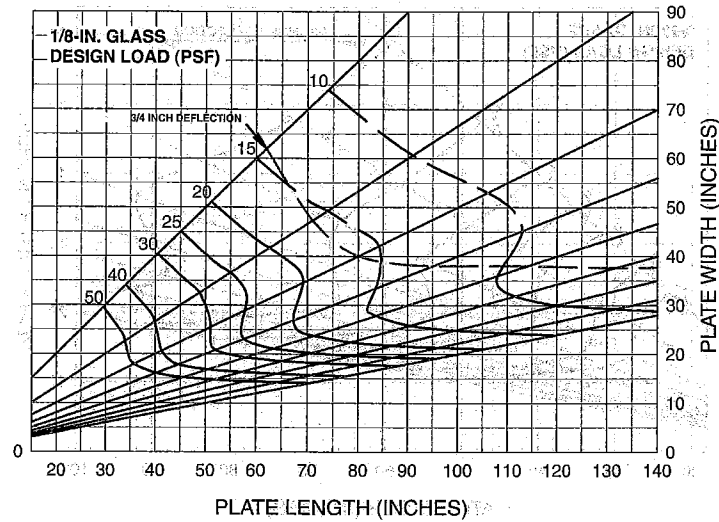


For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

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

NOTES:

- In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
- The diagonal number on each graph shows the equivalent design load in psf.
- The dashed lines indicate glass that has deflection in excess of $\frac{3}{4}$ inch.
- Interpolation between lines is permitted. Extrapolation is not allowed.
- For laminated glass, the applicable glass thickness is the total glass thickness.
- For insulating glass panes, the applicable glass thickness is the thickness of one pane.

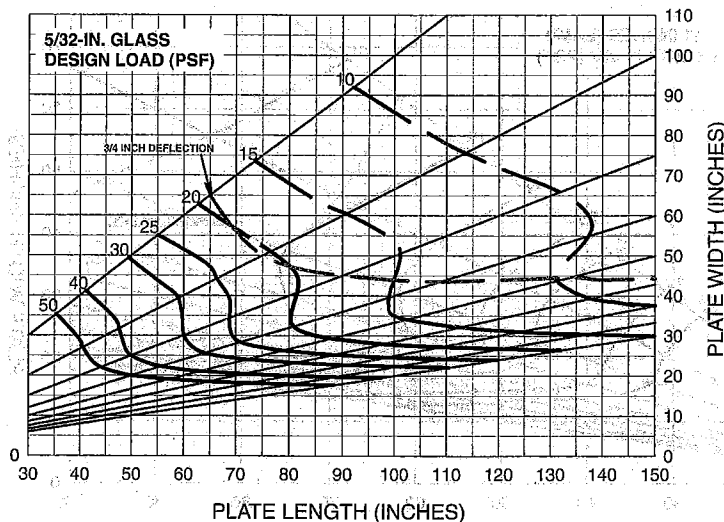


For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

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

NOTES:

- In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
- The diagonal number on each graph shows the equivalent design load in psf.
- The dashed lines indicate glass that has deflection in excess of $\frac{3}{4}$ inch.
- Interpolation between lines is permitted. Extrapolation is not allowed.
- For laminated glass, the applicable glass thickness is the total glass thickness.
- For insulating glass panes, the applicable glass thickness is the thickness of one pane.

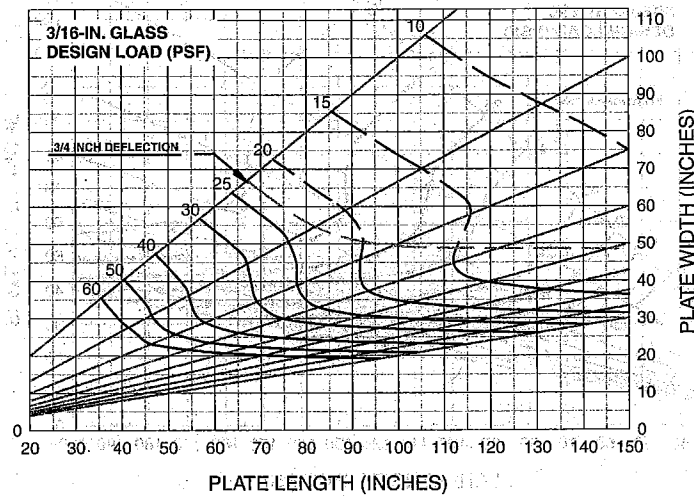


For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

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

NOTES:

- In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
- The diagonal number on each graph shows the equivalent design load in psf.
- The dashed lines indicate glass that has deflection in excess of $\frac{3}{4}$ inch.
- Interpolation between lines is permitted. Extrapolation is not allowed.
- For laminated glass, the applicable glass thickness is the total glass thickness.
- For insulating glass panes, the applicable glass thickness is the thickness of one pane.

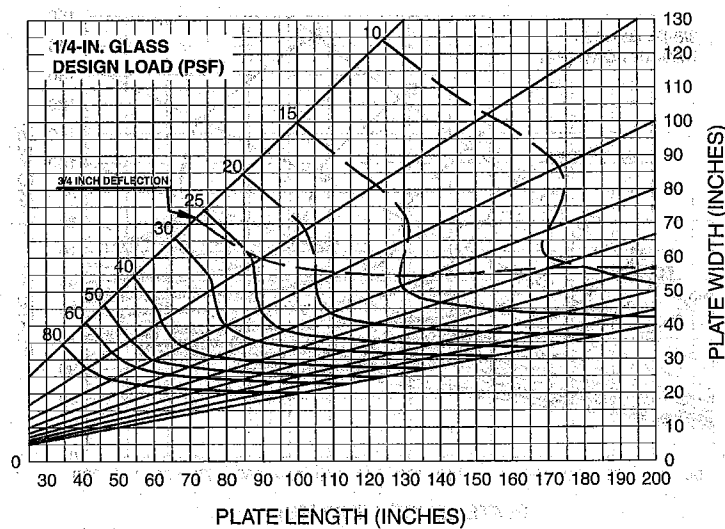


For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

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

NOTES:

- In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
- The diagonal number on each graph shows the equivalent design load in psf.
- The dashed lines indicate glass that has deflection in excess of $\frac{3}{4}$ inch.
- Interpolation between lines is permitted. Extrapolation is not allowed.
- For laminated glass, the applicable glass thickness is the total glass thickness.
- For insulating glass panes, the applicable glass thickness is the thickness of one pane.



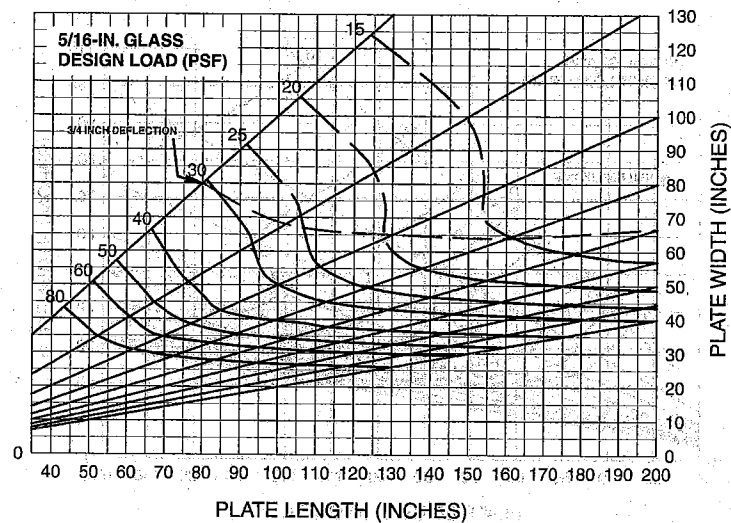
For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

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

NOTES:

- In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
- The diagonal number on each graph shows the equivalent design load in psf.
- The dashed lines indicate glass that has deflection in excess of $\frac{3}{4}$ inch.
- Interpolation between lines is permitted. Extrapolation is not allowed.
- For laminated glass, the applicable glass thickness is the total glass thickness.
- For insulating glass panes, the applicable glass thickness is the thickness of one pane.

GLASS AND GLAZING

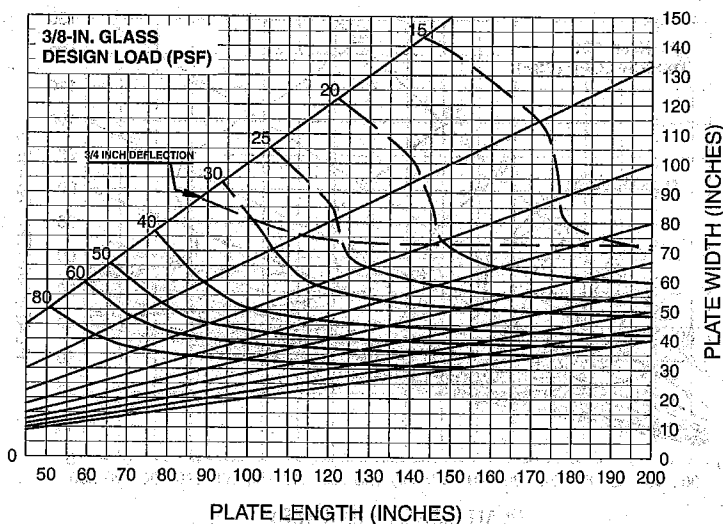


For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

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

NOTES:

- In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
- The diagonal number on each graph shows the equivalent design load in psf.
- The dashed lines indicate glass that has deflection in excess of $\frac{3}{4}$ inch.
- Interpolation between lines is permitted. Extrapolation is not allowed.
- For laminated glass, the applicable glass thickness is the total glass thickness.
- For insulating glass panes, the applicable glass thickness is the thickness of one pane.

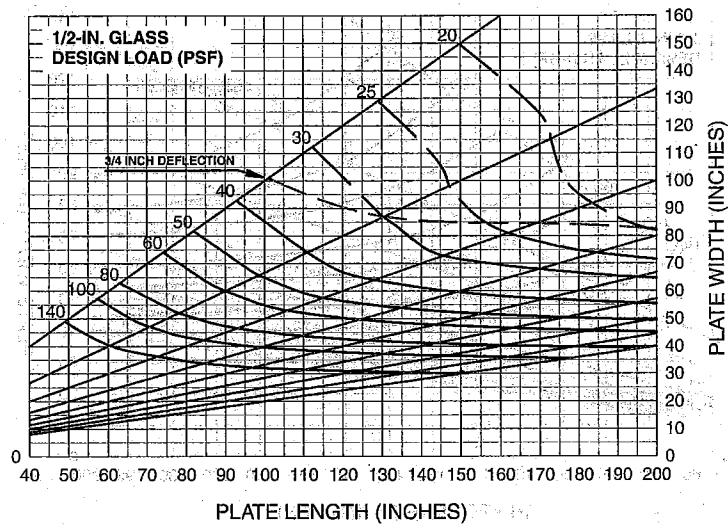


For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

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

NOTES:

- In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
- The diagonal number on each graph shows the equivalent design load in psf.
- The dashed lines indicate glass that has deflection in excess of $\frac{3}{4}$ inch.
- Interpolation between lines is permitted. Extrapolation is not allowed.
- For laminated glass, the applicable glass thickness is the total glass thickness.
- For insulating glass panes, the applicable glass thickness is the thickness of one pane.

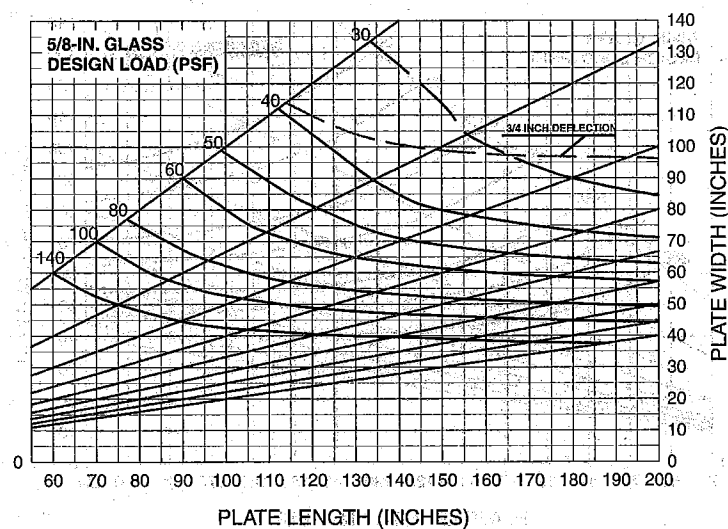


For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

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

NOTES:

- In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
- The diagonal number on each graph shows the equivalent design load in psf.
- The dashed lines indicate glass that has deflection in excess of $\frac{3}{4}$ inch.
- Interpolation between lines is permitted. Extrapolation is not allowed.
- For laminated glass, the applicable glass thickness is the total glass thickness.
- For insulating glass panes, the applicable glass thickness is the thickness of one pane.



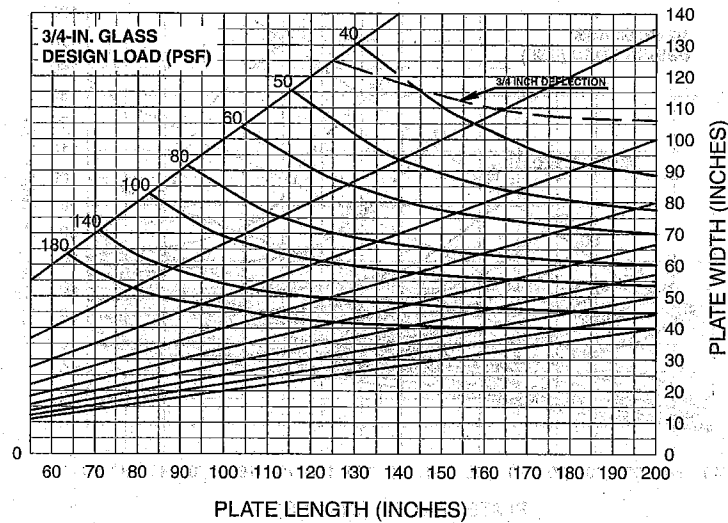
For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

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

NOTES:

- In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
- The diagonal number on each graph shows the equivalent design load in psf.
- The dashed lines indicate glass that has deflection in excess of $\frac{3}{4}$ inch.
- Interpolation between lines is permitted. Extrapolation is not allowed.
- For laminated glass, the applicable glass thickness is the total glass thickness.
- For insulating glass panes, the applicable glass thickness is the thickness of one pane.

GLASS AND GLAZING

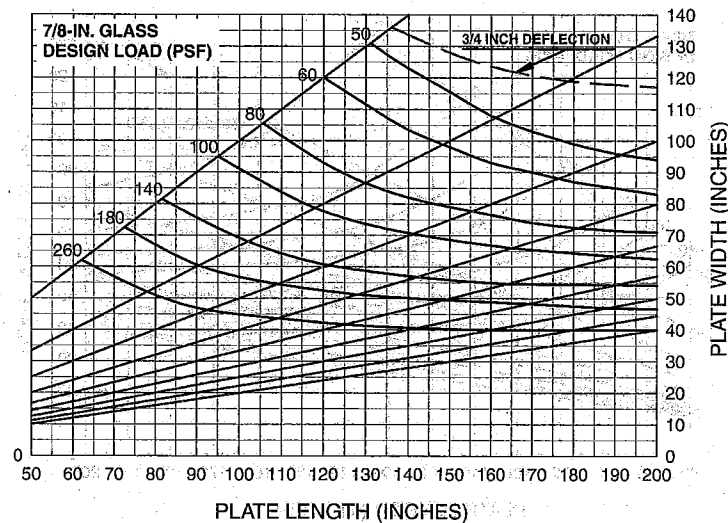


For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

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

NOTES:

- In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
- The diagonal number on each graph shows the equivalent design load in psf.
- The dashed lines indicate glass that has deflection in excess of $\frac{3}{4}$ inch.
- Interpolation between lines is permitted. Extrapolation is not allowed.
- For laminated glass, the applicable glass thickness is the total glass thickness.
- 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:

- In each graph, the vertical axis is the lesser dimension; the horizontal axis is the greater dimension.
- The diagonal number on each graph shows the equivalent design load in psf.
- The dashed lines indicate glass that has deflection in excess of $\frac{3}{4}$ inch.
- Interpolation between lines is permitted. Extrapolation is not allowed.
- For laminated glass, the applicable glass thickness is the total glass thickness.
- 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 10M.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:

$$F_g \leq PG \quad (\text{Equation 24-8})$$

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:

$$F_{gi} \leq PG_{Pos} \quad (\text{Equation 24-9})$$

$$F_{go} \leq PG_{Neg} \quad (\text{Equation 24-10})$$

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/m²) as calculated in Section 1609 and D is the dead weight of the glazing, psf (kN/m²) as determined in Section 2404.2 for glass, or by the weight of the plastic, psf (kN/m²) 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/m²) as calculated in Section 1609 and D is the dead weight of the glazing, psf (kN/m²) 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 jalouses. Louvered windows and jalouses 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 = 0.0929m²