



Analysis of Glass Panel, 22mm THK Glass per ASTM E1300-16

Supported: *2-sides simple supported*

Unsupported side: $L_a := 120\text{in} - 3.5\text{in} = 116.5\text{in}$

Supported side: $L_b := 48\text{in} = 48\text{in}$

Nominal THK. of glass: $t_{\text{nom}} := \frac{7}{8}\text{in} = 0.875\text{in}$

Minimum THK. of glass: $t_{\text{min}} := 0.844\text{in}$

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6.2.3 For Monolithic Single Glazing Simply Supported Continuously Along Two Opposite Sides:

6.2.3.1 Determine the NFL from the upper chart of Fig. A1.27 for the designated glass thickness and length of unsupported edges.

6.2.3.2 Determine the GTF for the appropriate glass type and load duration (short or long) from Table 1.

6.2.3.3 Multiply NFL by GTF to get the LR of the lite.

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TABLE 4 Nominal and Minimum Glass Thicknesses

Nominal Thickness or Designation, mm (in.)	Minimum Thickness, mm (in.)
2.0 (picture)	1.80 (0.071)
2.5 (f/a)	2.16 (0.085)
2.7 (lami)	2.59 (0.102)
3.0 (1/4)	2.92 (0.115)
4.0 (f/a)	3.78 (0.149)
5.0 (f/a)	4.57 (0.180)
6.0 (1/4)	5.56 (0.219)
8.0 (f/a)	7.42 (0.292)
10.0 (3/4)	9.02 (0.355)
12.0 (1/2)	11.91 (0.469)
16.0 (3/4)	15.09 (0.595)
19.0 (3/4)	18.26 (0.719)
22.0 (1/2)	21.44 (0.844)
25.0 (1)	24.61 (0.969)

Non-Factored Load: NFL := 24.5psf [ASTM E 1300-16, FIG. A1.27]

Glass type factor: $GTF_o := 2.0$ [HS, ASTM E 1300-16, Table 1]

Load Resistance: $LR := NFL \cdot GTF_o = 49.0 \cdot \text{psf}$

Load X L^4: $LR \cdot L_a^4 = 435 \text{ kip} \cdot \text{ft}^2$

Deflection due to load: Def := 1.5in [ASTM E 1300, FIG. A1.27]

TABLE 1 Glass Type Factors (GTF) for a Single Lite of Monolithic or Laminated Glass (LG)

Glass Type	GTF	
	Short Duration Load (3 s)	Long Duration Load (30 days)
AN	1.0	0.43
HS	2.0	1.3
FT	4.0	3.0

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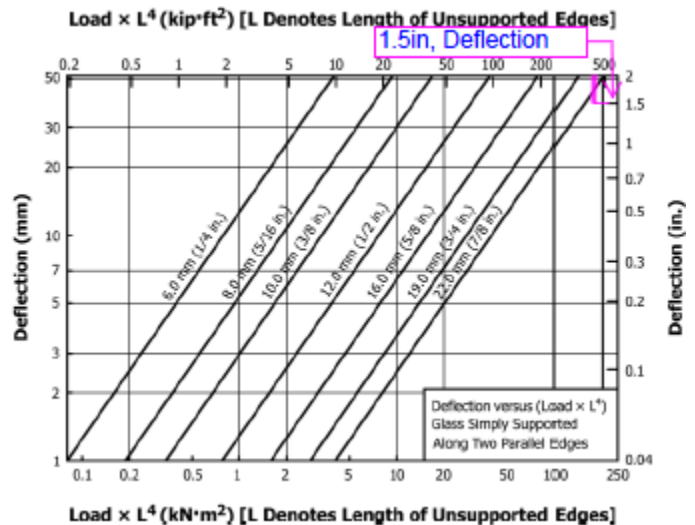
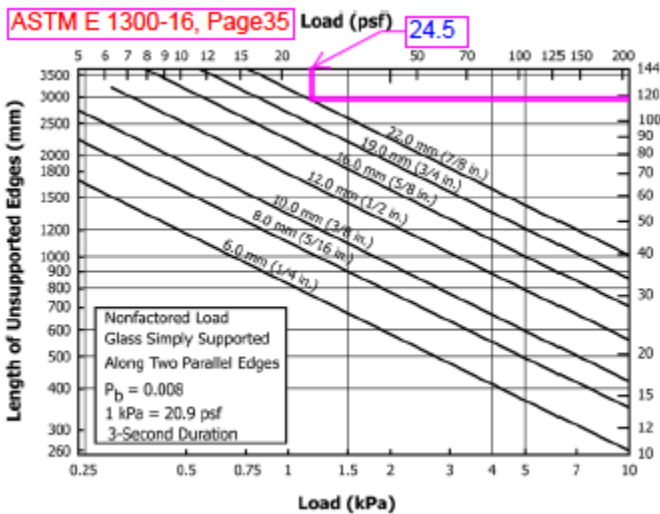


FIG. A1.27 (upper chart) Non-Factored Load Chart for Glass Simply Supported Along Two Parallel Edges
(lower chart) Deflection Chart for Glass Simply Supported Along Two Parallel Edges

6.2.2.4 Determine the approximate maximum lateral (center of unsupported edge) deflection from the appropriate chart in [Annex A1](#) (the lower charts in [Figs. A1.15-A1.26](#)) for the [ASTM E 1300-16, Page 4](#) design load.

6.2.3 *For Monolithic Single Glazing Simply Supported Continuously Along Two Opposite Sides:*

6.2.3.1 Determine the NFL from the upper chart of [Fig. A1.27](#) for the designated glass thickness and length of unsupported edges.

6.2.3.2 Determine the GTF for the appropriate glass type and load duration (short or long) from [Table 1](#).

6.2.3.3 Multiply NFL by GTF to get the LR of the lite.

6.2.3.4 Determine the approximate maximum lateral (center of an unsupported edge) deflection from the lower chart of [Fig. A1.27](#) for the designated glass thickness, length of unsupported edge, and design load.

6.2.4 *For Monolithic Single Glazing Continuously Supported Along One Edge (Cantilever):*

6.2.4.1 Determine the NFL from the upper chart of [Fig. A1.28](#) for the designated glass thickness and length of unsupported edges that are perpendicular to the supported edge.

6.2.4.2 Determine the GTF for the appropriate glass type and load duration (short or long) from [Table 1](#).

6.2.4.3 Multiply NFL by GTF to get the LR of the lite.

6.2.4.4 Determine the approximate maximum lateral (free edge opposite the supported edge) deflection from the lower chart of [Fig. A1.28](#) for the designated glass thickness, length of unsupported edges, and design load.

6.2.5 *For Single-Glazed Laminated Glass (LG) Constructed With a PVB Interlayer Simply Supported Continuously Along Four Sides Where In-Service Laminated Glass (LG) Temperatures At The Design Load Do Not Exceed 50°C (122°F):*

6.2.5.1 Determine the NFL from the appropriate chart (the upper charts of [Figs. A1.29-A1.35](#)) for the designated glass thickness.

6.2.5.2 Determine the GTF for the appropriate glass type, load duration (short or long) from [Table 1](#).

6.2.5.3 Multiply NFL by GTF to get the LR of the laminated lite.

6.2.5.4 Determine the approximate maximum lateral (center of glass) deflection from the appropriate chart (the lower charts of [Figs. A1.29-A1.35](#)) for the designated glass thickness, size, and design load. If the maximum lateral deflection falls outside the charts in [Annex A1](#), then use the procedures outlined in [Appendix X1](#).

6.2.6 *For Laminated Single Glazing Simply Supported Continuously Along Three Sides Where In-Service Laminated Glass (LG) Temperatures At The Design Load Do Not Exceed 50°C (122°F):*

6.2.6.1 Determine the NFL from the appropriate chart (the upper charts of [Figs. A1.36-A1.42](#)) for the designated glass thickness and size equal to the LG thickness.

6.2.6.2 Determine the GTF for the appropriate glass type and load duration (short or long) from [Table 1](#).

6.2.6.3 Multiply NFL by GTF to get the LR of the laminated lite.

6.2.6.4 Determine the approximate maximum lateral (center of unsupported edge) deflection from the appropriate chart (the

lower charts of [Figs. A1.36-A1.42](#)) for the designated glass thickness, size, and design load.

6.2.7 *For Laminated Single Glazing Simply Supported Continuously Along Two Opposite Sides Where In-Service Laminated Glass (LG) Temperatures At The Design Load Do Not Exceed 50°C (122°F):*

6.2.7.1 Determine the NFL from the upper chart of [Fig. A1.43](#) for the designated glass thickness and length of unsupported edges.

6.2.7.2 Determine the GTF for the appropriate glass type and load duration (short or long) from [Table 1](#).

6.2.7.3 Multiply NFL by GTF to get the LR of the laminated lite.

6.2.7.4 Determine the approximate maximum lateral (center of an unsupported edge) deflection from the lower chart of [Fig. A1.43](#) for the designated glass thickness, length of unsupported edge, and design load.

6.2.8 *For Laminated Single Glazing Continuously Supported Along One Edge (Cantilever) Where In-Service Laminated Glass (LG) Temperatures At The Design Load Do Not Exceed 50°C (122°F):*

6.2.8.1 Determine the NFL from the upper chart of [Fig. A1.44](#) for the designated glass thickness and length of unsupported edges that are perpendicular to the supported edge.

6.2.8.2 Determine the GTF for the appropriate glass type and load duration (short or long) from [Table 1](#).

6.2.8.3 Multiply NFL by GTF to get the LR of the laminated lite.

6.2.8.4 Determine the approximate maximum lateral (free edge opposite the supported edge) deflection from the lower chart of [Fig. A1.44](#) for the designated glass thickness, length of unsupported edges, and design load.

6.2.9 *For Double Glazed Insulating Glass (IG) with Monolithic Glass Lites of Equal (Symmetric) or Different (Asymmetric) Glass Type and Thickness Simply Supported Continuously Along Four Sides:*

6.2.9.1 Determine the NFL1 for Lite No. 1 and NFL2 for Lite No. 2 from the upper charts of [Figs. A1.1-A1.14](#) (see [Annex A3](#) for examples).

NOTE 3—Lites No. 1 or No. 2 can represent either the outward or inward facing lite of the IG unit.

6.2.9.2 Determine the GTF1 for Lite No. 1 and GTF2 for Lite No. 2 from [Table 2](#) or [Table 3](#), for the relevant glass type and load duration.

6.2.9.3 Determine the LSF1 for Lite No. 1 and LSF2 for Lite No. 2 from [Table 5](#), for the relevant lite thickness.

6.2.9.4 Multiply NFL by GTF and divide by the LSF for each lite to determine LR1 for Lite No. 1 and LR2 for Lite No. 2 of the IG unit as follows:

$$LR1 = NFL1 \times GTF1 \div LSF1 \text{ and } LR2 = NFL2 \times GTF2 \div LSF2 \quad (1)$$

6.2.9.5 The LR of the IG unit is the lower of the two values, LR1 and LR2.

6.2.10 *For Double Glazed Insulating Glass (IG) with One Monolithic Lite and One Laminated Lite Under Short Duration Load Simply Supported Continuously Along Four Sides:*

6.2.10.1 Determine the NFL for each lite from the upper charts of [Figs. A1.1-A1.14](#) and [Figs. A1.29-A1.35](#).

TABLE 1 Glass Type Factors (GTF) for a Single Lite of Monolithic or Laminated Glass (LG)

Glass Type	GTF	
	Short Duration Load (3 s)	Long Duration Load (30 days)
AN	1.0	0.43
HS	2.0	1.3
FT	4.0	3.0

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TABLE 2 Glass Type Factors (GTF) for Double Glazed Insulating Glass (IG), Short Duration Load

Lite No. 1 Monolithic Glass or Laminated Glass Type	Lite No. 2 Monolithic Glass or Laminated Glass Type					
	AN		HS		FT	
	GTF1	GTF2	GTF1	GTF2	GTF1	GTF2
AN	0.9	0.9	1.0	1.9	1.0	3.8
HS	1.9	1.0	1.8	1.8	1.9	3.8
FT	3.8	1.0	3.8	1.9	3.6	3.6

TABLE 3 Glass Type Factors (GTF) for Double Glazed Insulating Glass (IG), Long Duration Load (30 day)

Lite No. 1 Monolithic Glass or Laminated Glass Type	Lite No. 2 Monolithic Glass or Laminated Glass Type					
	AN		HS		FT	
	GTF1	GTF2	GTF1	GTF2	GTF1	GTF2
AN	0.39	0.39	0.43	1.25	0.43	2.85
HS	1.25	0.43	1.17	1.17	1.25	2.85
FT	2.85	0.43	2.85	1.25	2.71	2.71

length of one of the supported edges perpendicular to the free edge, to the length of the free edge, is equal to or greater than 0.5.

3.2.3 *glass breakage, n*—the fracture of any lite or ply in monolithic, laminated, or insulating glass.

3.2.4 *Glass Thickness:*

3.2.4.1 *thickness designation for laminated glass (LG), n*—a term used to specify a LG construction based on the combined thicknesses of component plies.

(1) Add the minimum thicknesses of the individual glass plies and the nominal interlayer thickness. If the sum of all interlayer thicknesses is greater than 1.52 mm (0.060 in.) use 1.52 mm (0.060 in.) in the calculation.

(2) Select the nominal thickness or designation in **Table 4** having the closest minimum thickness that is equal to or less than the value obtained in 3.2.4.1 (1).

(3) Exceptions—The construction of two 6-mm (1/4-in.) glass plies plus 0.38-mm (0.015-in) or 0.76-mm (0.030-in.) interlayer shall be defined as 12 mm (1/2 in.). The construction of two 2.5-mm (3/32-in.) glass plies plus 1.52-mm (0.060-in.) interlayer shall be defined as 5 mm (3/16 in.). The construction of two 4-mm (5/32-in.) glass plies plus any thickness interlayer shall be defined as 8 mm (5/16 in.).

3.2.4.2 *thickness designation for monolithic glass, n*—a term that defines a designated thickness for monolithic glass as specified in **Table 4** and Specification **C1036**.

3.2.5 *Glass Types:*

TABLE 4 Nominal and Minimum Glass Thicknesses

Nominal Thickness or Designation, mm (in.)	Minimum Thickness, mm (in.)
2.0 (picture)	1.80 (0.071)
2.5 (3/32)	2.16 (0.085)
2.7 (lami)	2.59 (0.102)
3.0 (1/8)	2.92 (0.115)
4.0 (5/32)	3.78 (0.149)
5.0 (3/16)	4.57 (0.180)
6.0 (1/4)	5.56 (0.219)
8.0 (5/16)	7.42 (0.292)
10.0 (3/8)	9.02 (0.355)
12.0 (1/2)	11.91 (0.469)
16.0 (5/8)	15.09 (0.595)
19.0 (3/4)	18.26 (0.719)
22.0 (7/8)	21.44 (0.844)
25.0 (1)	24.61 (0.969)

3.2.5.1 *annealed (AN) glass, n*—a flat, monolithic, glass lite of uniform thickness where the residual surface stresses are nearly zero as defined in Specification **C1036**.

3.2.5.2 *fully tempered (FT) glass, n*—a flat, monolithic, glass lite of uniform thickness that has been subjected to a special heat treatment process where the residual surface compression is not less than 69 MPa (10 000 psi) or the edge compression not less than 67 MPa (9700 psi) as defined in Specification **C1048**.

3.2.5.3 *heat strengthened (HS) glass, n*—a flat, monolithic, glass lite of uniform thickness that has been subjected to a special heat treatment process where the residual surface compression is not less than 24 MPa (3500 psi) or greater than 52 MPa (7500 psi) as defined in Specification **C1048**.

3.2.5.4 *insulating glass (IG) unit, n*—any combination of two or three glass lites that enclose one or two sealed spaces respectively, filled with air or other gas.

3.2.5.5 *laminated glass (LG), n*—a flat lite of uniform thickness consisting of two or more monolithic glass plies bonded together with an interlayer material as defined in Specification **C1172**.

(1) *Discussion*—Many different interlayer materials are used in LG. The information in this practice applies only to polyvinyl butyral (PVB) interlayer or those interlayers that demonstrate equivalency according to **Appendix X8**.

3.2.6 *glass type factor (GTF), n*—a multiplying factor for adjusting the LR of different glass types, that is, AN, HS, or FT in monolithic glass, LG, or IG constructions.

3.2.7 *lateral, adj*—perpendicular to the glass surface.

3.2.8 *load, n*—a uniformly distributed lateral pressure.

3.2.8.1 *glass weight load, n*—the dead load component of the glass weight.

3.2.8.2 *load resistance (LR), n*—the uniform lateral load that a glass construction can sustain based upon a given probability of breakage and load duration.

(1) *Discussion*—Multiplying the non-factored load (NFL) from figures in **Annex A1** by the relevant GTF and load share (LS) factors gives the LR associated with a breakage probability less than or equal to 8 lites per 1000.

3.2.8.3 *long duration load, n*—any load lasting approximately 30 days.

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Load (psf) 24.5

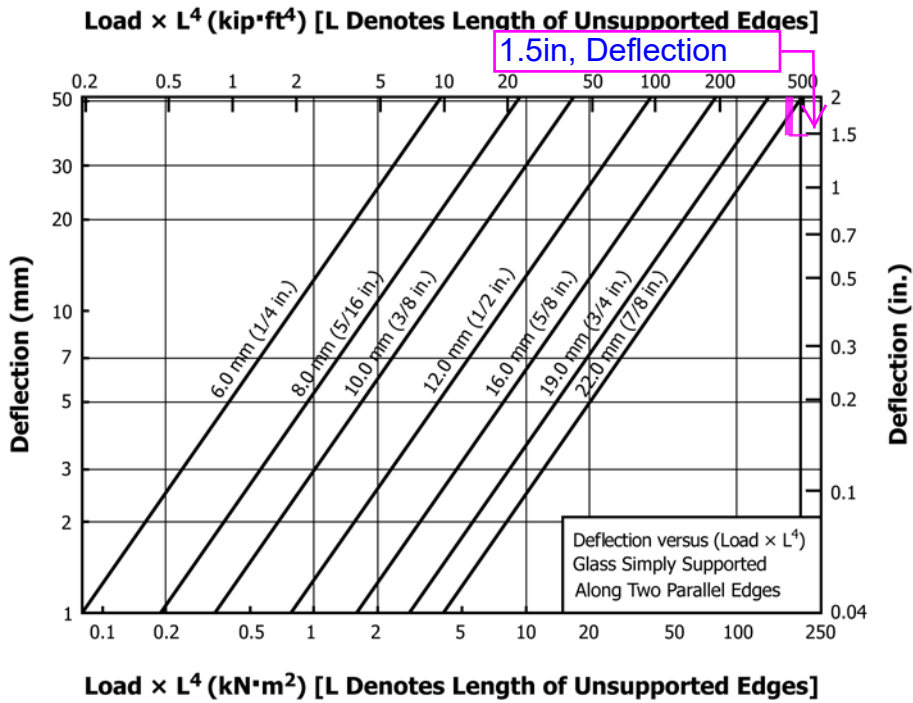
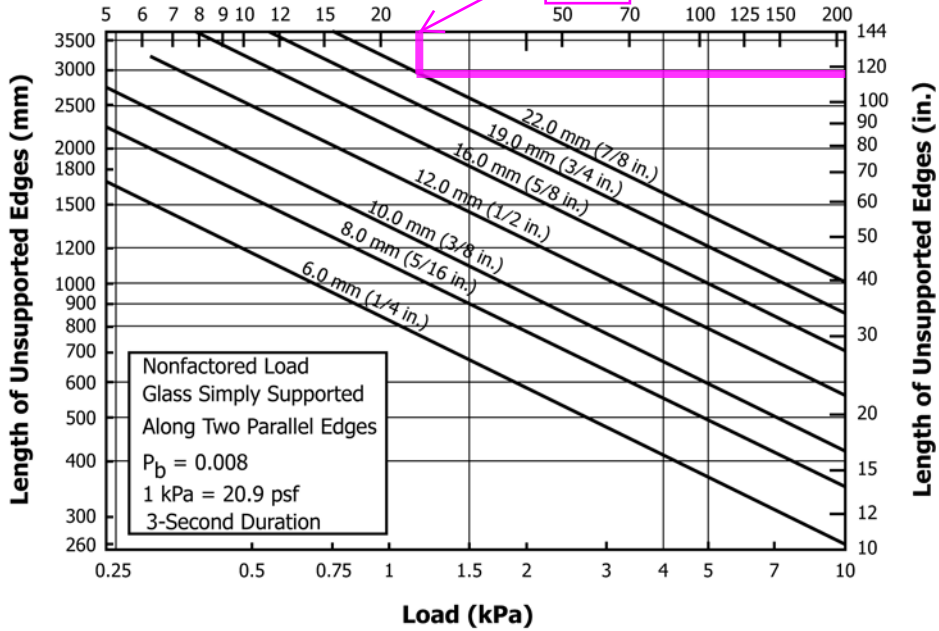


FIG. A1.27 (upper chart) Non-Factored Load Chart for Glass Simply Supported Along Two Parallel Edges
(lower chart) Deflection Chart for Glass Simply Supported Along Two Parallel Edges