AL-FAROOQ CORPORATION
ENGINEERS PLANNERS & PRODUCT TESTING

Petition for Declaratory Statement

Before the Florida Building Commission

Petitioner: Al-Farooq Corporation
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DCA05-DEC-219

Provisions in question: 2004 Florida Building Code, Section 2403.2
ASTM E1300-02, Section 5.2.4

The 2004 Florida Building Code has adopted the ASTM E1300-02 Standard. The charts in this Standard are based on:

a. Four, three or two sided supported glass. Four side support is assumed only if the supporting member deflects less than L/175.
b. A probability of breakage of Pd = 0.008 (sample charts attached).

In reality, glazing products like single hung windows and sliding glass door stiles deflect between L/45 and L/60. Therefore, the products can be considered to have three or two sided firm supports and one or two sided flexible supports, respectively. None of the charts given in the Standard can be used for these conditions directly.

Section 2403.2 of the 2004 Florida Building Code (copy attached) allows engineers to use their judgment and provide test data for conditions not covered by the Standard. The ruling from the ASTM E1300-02 Committee letter dated 1/25/05 (copy attached) also confirms the same assumption.

In order to maintain the required safety factor on glass with a statistical probability of breakage of 8/1000, testing to 2.5 times the design load is required according to Table 6 of the Glazing Manual by the Glass Association of North America (copy attached). The testing procedure described in Section 1714.5.3 of the 2004 Florida Building Code (copy attached), which requires a safety factor of 1.5, pertains to window/door assemblies and the supporting member permanent set only.

We request a declaratory statement to confirm that:

1. The interpolation between three & four sided support charts (single hung windows) and two & four sided support charts (sliding glass doors) in ASTM E1300-02 is permissible for one or two sided flexible support conditions based on engineering analysis and boundary conditions.
2. Testing to 1.5 times the design load does not provide a sufficient safety factor for a brittle material like glass. The correct safety factor for the statistical probability of breakage of 8/1000, the basis of ASTM E1300-02 charts, requires testing to 2.5 times the design load.
3. ASTM E1300-02 charts (Fig. A1.1 thru A1.12 and Fig. A1.27 thru A1.33) for four side support cannot be used for glazing products with one or two sides supported by flexible members/meeting rails without further engineering analysis.

The above statements will:

a. Provide the industry with a method of bridging the gap between the various charts provided by ASTM E1300-02 for practical use.
b. Eliminate the possibility of using an insufficient safety factor of 1.5 for brittle materials, which will assure the safe performance of glass.
c. Remove the ambiguity regarding the proper use of ASTM E1300-02 Charts.

Signed by: _____ Date: 11-10-05

Dr. Humayoun Farooq, PE

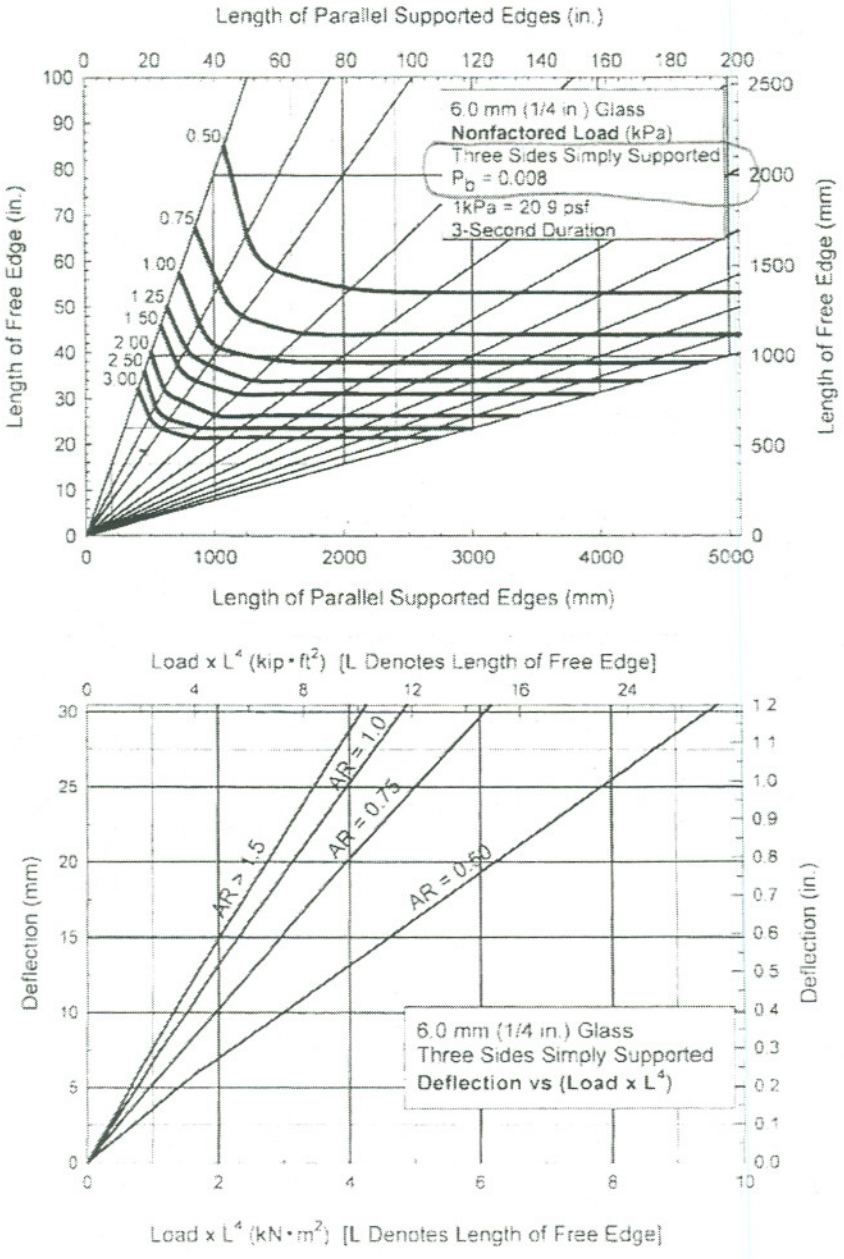

FIG. A1.18 (upper chart) Nonfactored Load Chart for 6.0 mm (¼ in.) Glass with Three Sides Simply Supported
(lower chart) Deflection Chart for 6.0 mm (¼ in.) Glass with Three Sides Simply Supported

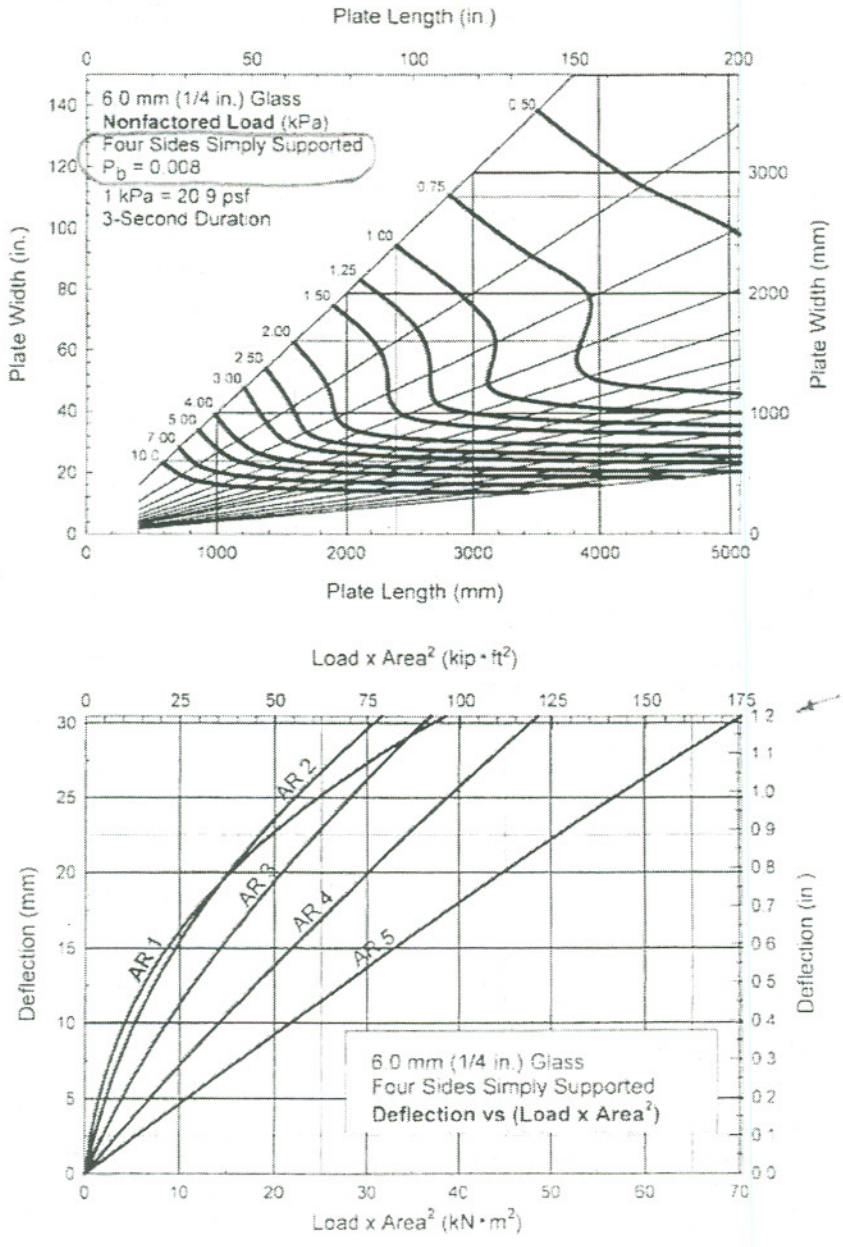

FIG. A1.6 (upper chart) Nonfactored Load Chart for 6.0 mm (¼ in.) Glass with Four Sides Simply Supported
(lower chart) Deflection Chart for 6.0 mm (¼ in.) Glass with Four Sides Simply Supported

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.

Exception: Buildings and structures located within the high-velocity hurricane zone shall comply with the provisions of 2410 through 2415.

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. With the exception of tempered glazing materials or laminated materials, 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 or laminated glass, except tempered or laminated 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 or laminated 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 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 for components and cladding. The load resistance of glass under uniform load shall be determined in accordance with ASTM E 1300. Design of exterior windows and glass doors in accordance with Section 2404.1 shall utilize the same edition of ASTM E 1300 used for testing in accordance with Section 1714.5. The design of vertical glazing shall be based on the following equation:

$$F_{wg} \le F_{sg} \qquad \text{(Equation 24-1)}$$

where:

F_{wg} is the wind load on the glass computed in accordance with Section 1609 and F_{sg} is the short duration load resistance of the glass as determined in accordance with ASTM E 1300.

Table 2404.1 Reserved.

Figure 2404 Reserved.

3.2.10 *specifying authority, n*—the design professional responsible for interpreting applicable regulations of authorities having jurisdiction and considering appropriate site specific factors to determine the appropriate values used to calculate the specified design load, and furnishing other information required to perform this practice.

4. Summary of Practice

4.1 The specifying authority shall provide the design load, the rectangular glass dimensions, the type of glass required, and a statement, or details, showing that the glass edge support system meets the stiffness requirement in 5.2.4.

4.2 The procedure specified in this practice shall be used to determine the uniform lateral load resistance of glass in buildings. If the load resistance is less than the specified load, then other glass types and thicknesses may be evaluated to find a suitable assembly having load resistance equal to or exceeding the specified design load.

4.3 The charts presented in this practice shall be used to determine the approximate maximum lateral glass deflection. Appendix X1 and Appendix X2 present two additional procedures to determine the approximate maximum lateral deflection for a specified load on glass simply supported on four sides.

4.4 An optional procedure for determining the probability of breakage at a given load is presented in Appendix X3.

5. Significance and Use

5.1 This practice is used to determine the load resistance of specified glass types and constructions exposed to uniform lateral loads.

5.2 Use of this practice assumes:

5.2.1 The glass is free of edge damage and is properly glazed,

5.2.2 The glass has not been subjected to abuse,

5.2.3 The surface condition of the glass is typical of glass that has been in service for several years, and is weaker than freshly manufactured glass due to minor abrasions on exposed surfaces,

5.2.4 The glass edge support system is sufficiently stiff to limit the lateral deflections of the supported glass edges to no more than $1/175$ of their lengths. The specified design load shall be used for this calculation.

5.2.5 The center of glass deflection will not result in loss of edge support.

NOTE 1—This practice does not address aesthetic issues caused by glass deflection.

5.3 Many other factors shall be considered in glass type and thickness selection. These factors include but are not limited to: thermal stresses, spontaneous breakage of tempered glass, the effects of windborne debris, excessive deflections, behavior of glass fragments after breakage, seismic effects, heat flow, edge bite, noise abatement, potential post-breakage consequences, etc. In addition, considerations set forth in building codes along with criteria presented in safety glazing standards and site specific concerns may control the ultimate glass type and thickness selection.

5.4 For situations not specifically addressed in this standard, the design professional shall use engineering analysis and judgment to determine the load resistance of glass in buildings.

6. Procedure

6.1 Select a glass type, thickness, and construction for load-resistance evaluation.

6.2 *For Monolithic Single Glazing Simply Supported Continuously Along Four Sides*:

6.2.1 Determine the non-factored load (NFL) from the appropriate chart in Annex A1 (the upper charts of Figs A1.1–A1.12) for the glass thickness and size.

6.2.2 Determine the glass type factor (GTF) for the appropriate glass type and load duration (short or long) from Table 1 or Table 2.

6.2.3 Multiply NFL by GTF to get the load resistance (LR) of the lite.

6.2.4 Determine the approximate maximum lateral (center of glass) deflection from the appropriate chart in Annex A1 (the lower charts of Figs. A1.1–A1.12) 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 and Appendix X2.

6.3 *For Monolithic Single Glazing Simply Supported Continuously Along Three Sides*:

6.3.1 Determine the non-factored load (NFL) from the appropriate chart in Annex A1 (the upper charts of Figs. A1.13–A1.24) for for the designated glass thickness and size.

6.3.2 Determine the GTF for the appropriate glass type and load duration (short or long) from Table 1 or Table 2.

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

6.3.4 Determine the approximate maximum lateral (center of unsupported edge) deflection from the appropriate chart in Annex A1 (the lower charts in Figs A1.13–A1.24) for the designated glass thickness, size, and design load.

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

6.4.1 Determine the NFL from the upper chart of Fig. A1.25 for the designated glass thickness and length of unsupported edges.

6.4.2 Determine the GTF for the appropriate glass type and load duration (short or long) from Table 1 or Table 2.

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

6.4.4 Determine the approximate maximum lateral (center of an unsupported edge) deflection from the lower chart of Fig. A1.25 for the designated glass thickness, length of unsupported edge, and design load.

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

6.5.1 Determine the NFL from the upper chart of Fig. A1.26 for the designated glass thickness and length of unsupported edges that are perpendicular to the supported edge.

6.5.2 Determine the GTF for the appropriate glass type and load duration (short or long) from Table 1 or Table 2.

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

6.5.4 Determine the approximate maximum lateral (free edge opposite the supported edge) deflection from the lower chart of Fig. A1.26 for the designated glass thickness, length of unsupported edges, and design load.

6.6 *For Single-glazed Laminated Glass Constructed with a PVB Interlayer Simply Supported Continuously Along Four*

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January 28, 2005

Dr. Humayoun Farooq
President
Al Farooq Corporation
1235 S.W. 87th Avenue
Miami, FL 33174

Dear Dr. Farooq:

Thank you for attending our meeting in New Orleans last week. As you heard from AAMA's Technical Director Carl Wagus, the issue of L/175 is still under consideration at AAMA and, to this date, formal recommendations have not been issued. The ASTM E1300 standard still references L/175, however, language in Section 5.4 of ASTM E1300 which was added in 2002 (and not found in the 1997 version of the standard) specifically focuses on situations which are not covered, such as, but not limited to, flexible support conditions, patterned and V-grooved glass.

This language is as follows:

5.4 For situations not specifically addressed in this standard, the design professional shall use engineering analysis and judgment to determine the load resistance of glass in buildings.

This means that the **use of engineering analysis and judgment by the design professional** to determine the load resistance of glass in buildings is acceptable, according to the standard. As you know, ASTM E1300 gives the user a lot of information, but it doesn't cover every possible scenario. This language in 5.4 accounts for situations beyond the scope of the standard.

Very truly yours,

Valerie Block

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cc: Jaime Gascon
Mo Madani
Dennis Braddy

3. The maximum load applied divided by 2.5.

1714.3.2 Deflection. The deflection of structural members under the design load shall not exceed the limitations in Section 1604.3. The HVHZ shall comply with Section 1613.1.

1714.4 Wall and partition assemblies. Load-bearing wall and partition assemblies shall sustain the test load both with and without window framing. The test load shall include all design load components. Wall and partition assemblies shall be tested both with and without door and window framing.

1714.5 Exterior window and door assemblies. This section defines performance and construction requirements for exterior window and door assemblies installed in wall systems. Waterproofing, sealing and flashing systems are not included in the scope of this section.

1714.5.1 The design pressure for window and door assemblies shall be calculated in accordance with component and cladding wind loads in 1609.

1714.5.2 Exterior windows, siding and patio glass doors.

1714.5.2.1 Testing and labeling. Exterior windows and glass doors shall be tested by an approved independent testing laboratory, and shall be labeled with an approved label identifying the manufacturer, performance characteristics and approved product certification agency, testing laboratory, evaluation entity or Miami-Dade Product Approal to indicate compliance with the requirements of one of the following specifications:

ANSI/AAMA/NWWDA 101/I.S.2 or 101/I.S. 2/NAFS or TAS 202 (HVHZ shall comply with TAS 202 utilizing ASTME E 1300 or Section 2404.

Glass strength: Determination of load resistance of glass for specified loads of products tested and certified in accordance with Section 1714.5.2.1 shall be designed to comply with ASTM E 1300 in accordance with Section 2404.

1714.5.2.1.1 Test and labeling of skylights. Exterior skylights shall be tested by an approved independent testing laboratory, and shall be labeled with an approved label identifying the manufacturer, performance characteristics and approved product evaluation entity to indicate compliance with the requirements of the following specification:

AAMA/WDMA 1600/IS7, Voluntary Specification for Skylights or TAS 202 (HVHZ shall comply with TAS 202).

1714.5.2.2 Supplemental label. A supplemental temporary label conforming to AAMA 203, *Procedural Guide for the Window Inspection and Notification System*, shall be acceptable for establishing calculated allowable design pressures higher than indicated on the label required by Section 1714.5.2.1 for window sizes smaller than that required by the ANSI/AAMA/NWWDA 101/I.S.2 test requirements. This supplemental label shall remain on the window until final approval by the building official.

1714.5.3 Exterior door assemblies. Exterior door assemblies not covered by Section 1715.4.2 or Section 1714.5.3.1 shall be tested for structural integrity in accordance with ASTM E 330 Procedure A, at a load of 1.5 times the required design pressure load. The load shall be sustained for 10 seconds with no permanent deformation of any main frame or panel member in excess of 0.4 percent of its span after the load is removed. High-velocity hurricane zones shall comply with TAS 202. After each specified loading, there shall be no glass breakage, permanent damage to fasteners, hardware parts, or any other damage which causes the door to be inoperable.

The minimum test sizes and minimum design pressures shall be as indicated in Table 1714.5.3.

The unit size tested shall qualify all units smaller in width and/or height of the same operation type and be limited to cases where frame, panels and structural members maintain the same profile as tested.

1714.5.3.1 Sectional garage doors shall be tested for determination of structural performance under uniform static air pressure difference in accordance with ANSI/DASMA 108 or TAS 202 HVHZ shall comply with TAS 202).

1714.5.3.2 Custom doors. Custom (one of a kind) exterior door assemblies shall be tested by an approved testing laboratory or be engineered in accordance with accepted engineering practices.

1714.5.3.3 Door components evaluated by an approved product evaluation entity, certification agency, testing laboratory or engineer may be interchangeable in exte-

TABLE 1714.5.3
MINIMUM TEST SIZES, INCLUDING FRAMING

Performance Class[1]	Width × Height (mm)	Width × Height (in.)	Minimum Performance Grade (Design Pressure)
Residential (R)	900 × 2000	(36 × 79)	720 Pa (15 psf)
Light Commercial (LC)	900 × 2100	(36 × 83)	1200 Pa (25 psf)
Commercial (C)	1000 × 2100	(40 × 83)	1440 Pa (30 psf)
Heavy Commercial (HC)	1200 × 2400	(48 × 95)	1920 Pa (40 psf)
Architectural (AW)	1200 × 2400	(48 × 95)	1920 Pa (40 psf)

1. Performance Class and Performance Grade per ANSI/AAMA/NWWDA 101/I.S.2.

The architect or glass specifier may elect to use desig[illegible]han 2.5 for vertical glass and 5.0 for sloped glass. A modified design load for use with the ASTM E 1300 stand[illegible]ermined as follows for any design factor:

For vertical glass and glass sloped 15° or less from ver[illegible]

$$\text{Modified Design Load, psf} = \text{Specified Design Loa[illegible]} \times \frac{\text{Selected Design Factor}}{2.5}$$

For glass sloped more than 15° from vertical:

$$\text{Modified Design Load, psf} = \text{Specified Design Load, psf} \times \frac{\text{Selected Design Factor,}}{5.0}$$

Design factors less than those used in ASTM E 1300 are not recommended for glass types incorporating one or more lites or plies of annealed glass.

The statistical probability of breakage for various design factors is as follows:

TABLE 6
Statistical Probability of Breakage at Design Load (breaks per 1000 lites)

Design Factor	Annealed	Heat-Strengthened	Fully Tempered
1.5	(a)	13.0	0.5
2.0	(a)	0.1	(b)
2.5	8.0	(b)	(b)
3.0	4.0	(b)	(b)
3.5	2.0	(b)	(b)
4.0	1.5	(b)	(b)
4.5	1.0	(b)	(b)
5.0	0.8	(b)	(b)
5.5	0.6	(b)	(b)
6.0 (c)	0.4	(b)	(b)

(a) A design factor less than 2.5 is not recommended for annealed glass.
(b) Statistical probability of breakage less than 1 in 10,000; for glass in windows, curtain walls and skylights, a specified probability of breakage less than 1 in 10,000 is not likely.
(c) Glass in applications requiring a design factor greater than 6.0 should be specially engineered for the specified application.

The chart listing probabilities of breakage might suggest that heat-strengthened and fully tempered glass can be safely used with a design factor substantially lower than 2.5. With this approach, the glass may be structurally adequate, but may have excessive deflection under load. In this case, thicker glass may be preferable.

For selection of relatively thick glass as used in viewing windows for large aquariums and animal enclosures, conventional engineering equations can be used. Design factors generally range from 5 to 10, depending on the type of glass and risks that may be encountered should the glass fail. In these cases the glass acts as a plate simplifying the determination of its resistance to loads. The accepted moduli of rupture for this condition are as follows:

Annealed Glass	6,000 psi
Heat-Strengthened Glass	12,000 psi
Fully Tempered Glass	24,000 psi

IN-SERVICE EXPOSURES OF GLASS

Various service conditions justify special considerations. These conditions may increase glass stresses and probability of breakage. If they are not considered, glass may be selected which may not be adequate for the conditions. These conditions include the following:

1. Screens, eyebrows, louvers, shutters, etc., may increase or decrease wind loads and thermal stresses.
2. Windborne roof gravel, hail and windborne debris may lead to surface damage, reduced strength and increased breakage under subsequent impact, wind load or thermal load.
3. Severe temperature exposures, uneven temperature exposures, glazing stresses, sonic boom, seismic action, mechanical stresses from door or window operation, pressure effects of air conditioning system operation, stack effects of ventilating systems and impact load such as that caused by window washing ladders or equipment, hose streams, etc., may impose significant stresses.

When the effect of service conditions cannot be accurately predicted for the life span of the building, it is generally prudent to specify a larger design factor and therefore a lower probability of breakage, e.g., 4, 2, or 1 lite per 1000.

AL-FAROOQ CORPORATION
ENGINEERS PLANNERS & PRODUCT TESTING

November 9, 2005

Mr. Mo Modani
Codes & Standards Section
Department of Community Affairs
2555 Shummard Oak Boulevard
Tallahassee, FL 32399-2100

Re: E1300-02 Standard

Dear Mr. Modani,

A. Use of E1300-02 with Flexible Support

The 2004 Florida Building Code has adopted ASTM E1300-02 to determine glass capacities. However, we note that the charts provided by the Standard pertain only to the following boundary conditions:

1. Simply supported on all four sides.
2. Simply supported on three sides and one free side.
3. Simply supported on two sides and two free sides.

ASTM E1300-02, Section 5.2.4 has stipulated that:

> "The glass edge support system is sufficiently stiff to limit the lateral deflections of the supported glass edges to no more that L/175 of their lengths"

Obviously, the above design criteria can be used for fixed windows and storefront/curtain wall panels, but operable window and door stiles do not fit into this category.

B. Window/Door Design

We note that:

1. According to the Florida Building Code and AAMA there is no deflection requirement for glass supporting elements for testing of operable windows and doors.
2. The meeting rail of single hung and sliding window stiles of entrance doors and sliding glass doors deflect under design loads between L/45 and L/90. Yet they pass the testing criteria of a permanent set at 1.5 times the design load.

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3. Use of 3 or 2 sided support charts for single hung windows or sliding glass doors yields a glass capacity, which is a fraction of the actual tested specimen.
4. The E1300 Committee's letter dated 1/28/05 (copy attached) has acknowledged that the situations like flexible supports of operable windows and doors are not covered by the Standard.
5. The E1300-02 Standard does not address the glass capacity of:
   a. Three sided simply supported with one flexible support in single hung & sliding windows and OX sliding glass doors.
   b. Two sided simply supported and two flexible supports in an OXXO sliding glass door.

According to Section 5.4 of ASTM E1300-02, the design engineer can use engineering analysis and judgment to determine the load resistance of glass for the conditions not covered by the Standard.

C. Requirements of the Florida Building Code

Section 2403.2 states that:

> "Where one or more sides of any panel 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."

The above section of the Code allows:

1. Analysis

   An analysis which could be based on the behavior of flexible support with respect to the number of flexible supports and section properties vs. design load. This can be accomplished using the finite element method with a given boundary condition compared to four sided support and thus establishing a proper reduction factor to be applied to capacity obtained using ASTM E1300-02 four sided support charts. Our office has conducted extensive research for overstressing of design capacity using various boundary conditions. Based on the boundary conditions we have experienced 10% to 40% increase in stresses as compared to four sided or firm supports. We will be glad to supply the data upon request.

2. Test Data

Please note that:

a. Typically all the window products are tested to 1.5 times the design load to establish the performance of window elements i.e. wood or aluminum. Glass is a brittle material without resilience and therefore requires a higher safety factor than metal or wood.

b. Charts shown in ASTM E1300-02 are based on a glass breakage capacity criteria of 8/1000 lites tested as shown on Figures A1.1 thru A1.42, A2.1 thru A2.3 (pages 7-50).

c. According to Table 6, page 20 of the Glazing Manual by the Glass Association of North America, 1997 Edition, the statistical probability of breakage of 8/1000 lites is equivalent to a safety factor of 2.5.

d. Therefore, in our opinion testing of a small number of window products to 1.5 times the design load will not comply with Section 2403.2 of the Florida Building Code regarding test data assuring safe performance.

We enclose a copy of our petition to the Florida Building Commission to issue a Declaratory Statement stating that:

1. Four sided support charts provided in ASTM E1300-02 cannot be used in their entirety without complying with the deflection requirements of firm support of Section 2403.2 of the Florida Building Code and Section 5.2.4 of ASTM E1300-02.
2. Empirical data without testing to 2.5 times the design load for establishing a statistical probability of breakage of 8/1000 lites in flexible support is not sufficient to justify higher design capacities specified by ASTM E1300-02.

Thank you for your cooperation. If you have any questions, please feel free to call our office.

Very truly yours,

Dr. Humayoun Farooq, PE
President

cc: Mr. Jaime Gascon (BCCO)