



AL-FAROOQ CORPORATION
ENGINEERS PLANNERS & PRODUCT TESTING

April 11, 2006

Mr. Mo Madani
Building Codes and Standards Office
Florida Building Commission
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100

Post-It® Fax Note	7671	Date	4/11/06	# of pages	13
To	Mo Madani	From	Dr. Fareoq		
Co./Dept.	FL Bldg Comm.	Co.	Al-Farooq		
Phone #		Phone #			
Fax #	(850) 414-8436	Fax #			

Ref: DCA 05-DEC219
E 1300-02: Glass Capacity
Legal Report Dated 3/20/06

Dear Mr. Madani,

Regarding item 3 in legal report, we wish to submit:

A. HVHZ

Florida Building Code has adopted glass standard ASTM E 1300-02 or E 1300-98 (HVHZ). For given size of glass 48" x 96" we can compare the results obtained by two standards as follows:

Glass Type	Standard	Capacity psf	Remarks	Reference
$1/16$: $3/16$ HS + Interlayer + $3/16$ HS	E 1300-98	67.1	-----	G1
	E 1300-02	111	65% Higher	G2
$9/16$: $1/4$ HS + Interlayer + $1/4$ HS	E 1300-98	114	-----	G3
	E 1300-02	142	25% Higher	G4

Please note that:

- i. The higher capacity in E 1300-02 is based on 3 second gust and allowable stresses in glass when supporting members deflect less than $L/175$ under design load.
- ii. The above discrepancy can only be bridged if due consideration is given to effect of flexible supports.

B. Effect of Flexible Support

Please note that in the actual test, the 8 ft high sliding glass door stiles may deflect 3" - 4" ($L/45$ - $L/60$). Finite element analysis shows that for 48" x 96" glass, two sided flexible support, we have the following results:

2 Side Flexible Support				
Deflection Ratio	Stress psi	Stress Ratio	Overstress Percentage	Reference
4 SS	3258	-----	-----	G5
L/90	3862	3862 / 3258	119%	G6
L/60	4745	4745 / 3258	146%	G7
L/30	8050	8050 / 3258	247%	G8

C. Use of AAMA Rating

- 1) The Dade County NOAs do not refer to R (residential), C (commercial), HC (heavy commercial), and AR (architectural) ratings nor do testing protocols TAS 201, 202 & 203. All NOAs refer to allowable design pressures only.
- 2) Cladding for most high rise buildings is based on wind tunnel test. Typically, we get wind loads of 130 psf to 170 psf for 40 – 60 stories high buildings. The windows are not specified as R, C, HC or AW. Windows are required to meet the design pressures.
- 3) Item 3 of the report will allow the unrestricted use of E 1300-02 for R and C ratings. Disregard of deflection limit will allow the use of residential products in high rise buildings.

D. Conclusions

From the above, we observe:

- 1) The legal opinion, as adopted by the State Building Commission, has disregarded engineering principles which dictates that a stress increase will occur with flexible supports.
- 2) The above report implies that supporting member deflection will have no bearing on the strength of glass as compared to 4 side fully supported.
- 3) The legal opinion has disregarded ASTM E 06.5.13 committee chairperson's letter dated 1/28/05 (copy attached) which clearly states that:
 - a) ASTM E 1300 does not cover flexible support conditions.

- b) 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.
- 4) The board ruling, as per legal report item 3, will force the engineers to sign and seal design documents ignoring the overstressing in the glass due to flexibility of supporting members.

We request Board Members to revisit this issue from life safety and engineering point of view. Thank you for your considerations.

Very truly yours,



Dr. Humayoun Farooq, P.E.

CC: Mr. Jaime Gascon - (Building Code Compliance Office – Dade County)
Mr. Harry (Rusty) Carroll - (Broward County Board of Rules & Appeals)

Glazing Information

Edge Support: 4 Sides
Glazing Angle: 90°
Lite Dimensions:
Width: 48.0 in.
Height: 96.0 in.

Project Details

Project Name:
Project Location:
Comments:

G-1

Glass Construction

Single Glazed Lite { Heat Strengthened }
Outboard Ply Thickness: 3/16 in.
Interlayer Thickness: 0.060 in.
Inboard Ply Thickness: 3/16 in.
Nominal Lite Thickness: 3/8 in.

Short Load Duration, Resistance, and Deflection Data

Load (~ 60 sec.): 10.0 psf
Load Resistance: 67.1 psf
Approximate center of glass deflection: 0.08 in.

Conclusion

Based on your design information, the load resistance is greater than or equal to the specified loading.

Statement of Compliance

Procedures followed in determining the resistance of this window glass are in accordance with ASTM E1300-98/00.

Disclaimer:

This software can be used to determine the load resistance of specified glass types exposed to uniform lateral loads of short or long duration subject to the following conditions:

- The glass is free of edge and surface damage and has been properly glazed in the opening in conformance with the manufacturer's recommendations.
- The glass is supported on all four sides by a framing system sufficiently stiff to limit lateral deflection of the glass edge (not center-of-glass) less than or equal to 1/175 of the glass edge length. Center of glass deflection in excess of 15-mm (0.75-in.) is a design issue and does not affect glass strength.
- The laminated glass factors for short term loads are representative of room temperature data to which the glass is exposed.

For other limiting conditions that may apply, refer to Section 5 of ASTM E1300 and local building codes.

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Prepared by: _____ on 3/30/2006

Glazing Information

Edge Support: 4 Sides
 Glazing Angle: 90°
 Lite Dimensions:
 Width: 48.0 in.
 Height: 96.0 in.

Project Details

Project Name:
 Project Location:
 Comments:

G-2

Glass Construction

Single Glazed Lite { Heat Strengthened }
 Outboard Ply Thickness: 3/16 in.
 Interlayer Thickness: 0.060 in.
 Inboard Ply Thickness: 3/16 in.
 Nominal Lite Thickness: 3/8 in.

Short Load Duration, Resistance, and Deflection Data

Load (~ 3 sec.): 10.0 psf
 Load Resistance: 111 psf
 Approximate center of glass deflection: 0.2 in.

Conclusion

Based on your design information, the load resistance is greater than or equal to the specified loading.

Statement of Compliance

Procedures followed in determining the resistance of this window glass are in accordance with ASTM E1300-02.

Disclaimer:

This software can be used to determine the load resistance of specified glass types exposed to uniform lateral loads of short or long duration subject to the following conditions:

- The glass is free of edge and surface damage and has been properly glazed in the opening in conformance with the manufacturer's recommendations.
 - Procedures exist to determine load resistance for rectangular glass assemblies that are,
 - a. Continuously supported along all four edges,
 - b. Continuously supported along three edges,
 - c. Continuously supported along two parallel edges, and
 - d. Continuously supported along one edge.
 - The software user has the responsibility of selecting the correct procedure for the required application from the software.
 - The stiffness of members supporting any glass edge shall be sufficient that under design load edge deflections shall not exceed $L/175$, where L denotes the length of the supported edge.
 - The non-factored load values for laminated glass are representative of test data and calculations performed for polyvinyl butyral interlayer at a temperature of 50° C (122° F).
- For other limiting conditions that may apply, refer to Section 5 of ASTM E1300 and local building codes.

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Prepared by: _____ on 3/30/2006

Glazing Information

Edge Support: 4 Sides
Glazing Angle: 90°
Lite Dimensions:
Width: 48.0 in.
Height: 96.0 in.

Project Details

Project Name:
Project Location:
Comments:

G-3

Glass Construction

Single Glazed Lite { Heat Strengthened }
Outboard Ply Thickness: 1/4 in.
Interlayer Thickness: 0.060 in.
Inboard Ply Thickness: 1/4 in.
Nominal Lite Thickness: 1/2 in.

Short Load Duration, Resistance, and Deflection Data

Load (~ 60 sec.): 10.0 psf
Load Resistance: 114 psf
Approximate center of glass deflection: 0.02 in.

Conclusion

Based on your design information, the load resistance is greater than or equal to the specified loading.

Statement of Compliance

Procedures followed in determining the resistance of this window glass are in accordance with ASTM E1300-98/00.

Disclaimer:

This software can be used to determine the load resistance of specified glass types exposed to uniform lateral loads of short or long duration subject to the following conditions:

- The glass is free of edge and surface damage and has been properly glazed in the opening in conformance with the manufacturer's recommendations.
- The glass is supported on all four sides by a framing system sufficiently stiff to limit lateral deflection of the glass edge (not center-of-glass) less than or equal to 1/175 of the glass edge length. Center of glass deflection in excess of 19-mm (0.75-in.) is a design value and does not affect glass strength.
- The laminated glass factors for short term loads are representative of room temperature data in which the glass is exposed.

For other limiting conditions that may apply, refer to Section 5 of ASTM E1300 and local building codes.

Neither SDG nor PGMC guarantees and each disclaims any responsibility for any particular results relating to the use of the Window Glass Design-2002 Software Program. SDG and PGMC disclaim any liability for any personal injury or any loss or damage of any kind, including all indirect, special, or consequential damages and lost profits, arising out of or relating to the use of the Window Glass Design-2002 Software Program.

Prepared by: _____ on 3/30/2006

Glazing Information

Edge Support: 4 Sides
Glazing Angle: 90°
Lite Dimensions:
Width: 48.0 in.
Height: 96.0 in.

Project Details

Project Name:
Project Location:
Comments:

G-4

Glass Construction

Single Glazed Lite { Heat Strengthened }
Outboard Ply Thickness: 1/4 in.
Interlayer Thickness: 0.060 in.
Inboard Ply Thickness: 1/4 in.
Nominal Lite Thickness: 1/2 in.

Short Load Duration, Resistance, and Deflection Data

Load (~ 3 sec.): 10.0 psf
Load Resistance: 142 psf
Approximate center of glass deflection: 0.17 in.

Conclusion

Based on your design information, the load resistance is greater than or equal to the specified loading.

Statement of Compliance

Procedures followed in determining the resistance of this window glass are in accordance with ASTM E1300-02.

Disclaimer:

This software can be used to determine the load resistance of specified glass types exposed to uniform lateral loads of short or long duration subject to the following conditions:

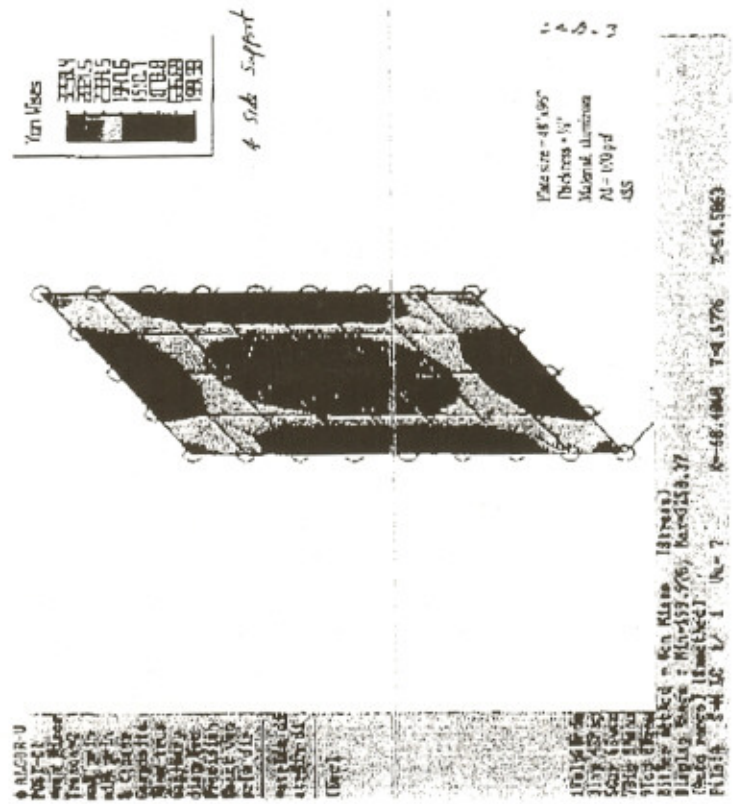
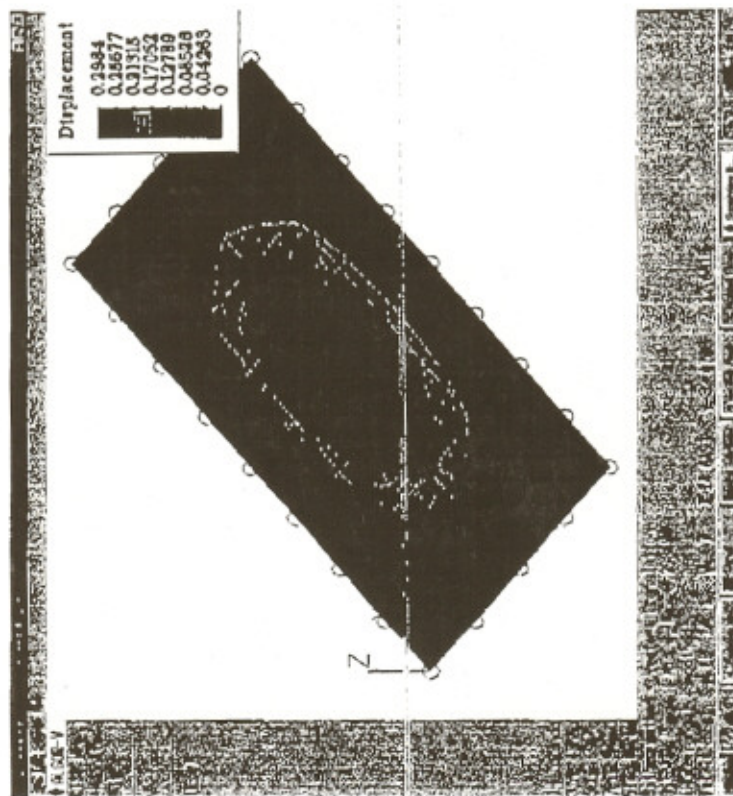
- The glass is free of edge and surface damage and has been properly glazed in the opening in conformance with the manufacturers recommendations.
- Procedures exist to determine load resistance for rectangular glass assemblies that are:
 - a. Continuously supported along all four edges,
 - b. Continuously supported along three edges,
 - c. Continuously supported along two parallel edges, and
 - d. Continuously supported along one edge.
- The software user has the responsibility of selecting the correct procedures for the required application from the software.
- The stiffness of members supporting any glass edge shall be sufficient that under design load, edge deflections shall not exceed $L/175$, where L denotes the length of the supported edge.
- The non-factored load values for laminated glass are representative of test data and calculations performed for polyvinyl butyral interlayer at a temperature of 50° C (122° F).

For other limiting conditions that may apply, refer to Section 5 of ASTM E1300 and local building codes.

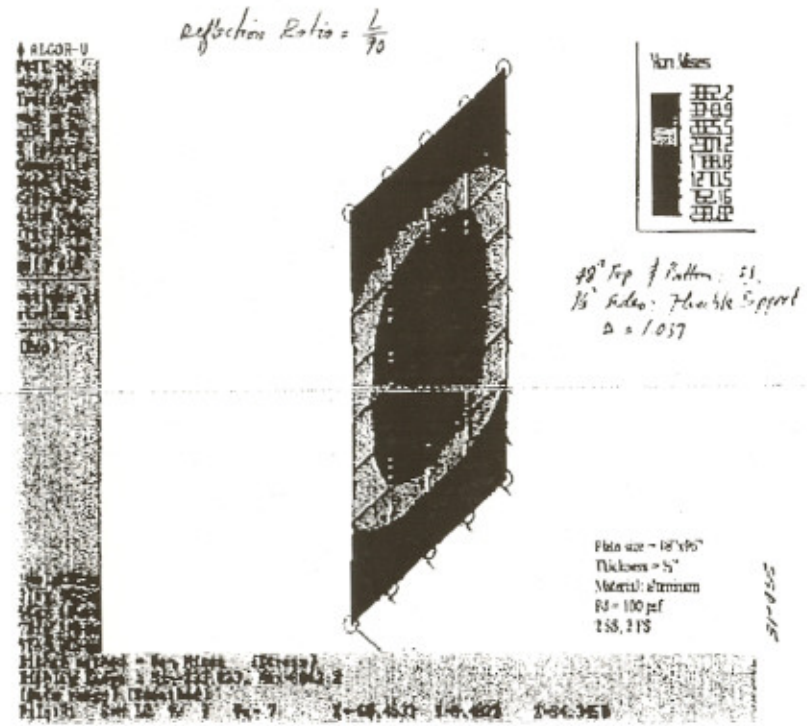
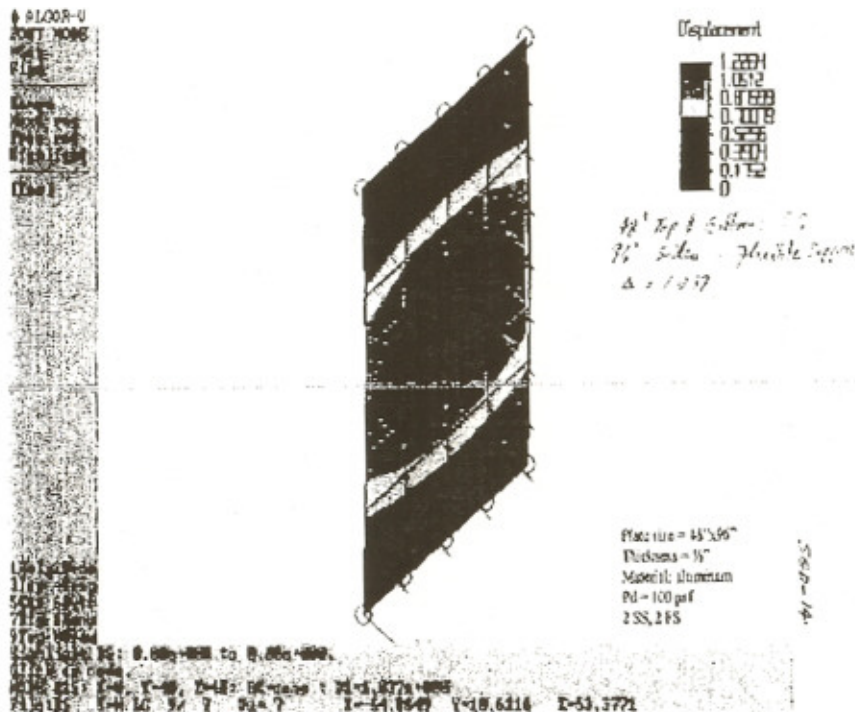
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Prepared by: _____ on 3/30/2006

Four Side Support 48 x 96 x 1/2 Plate



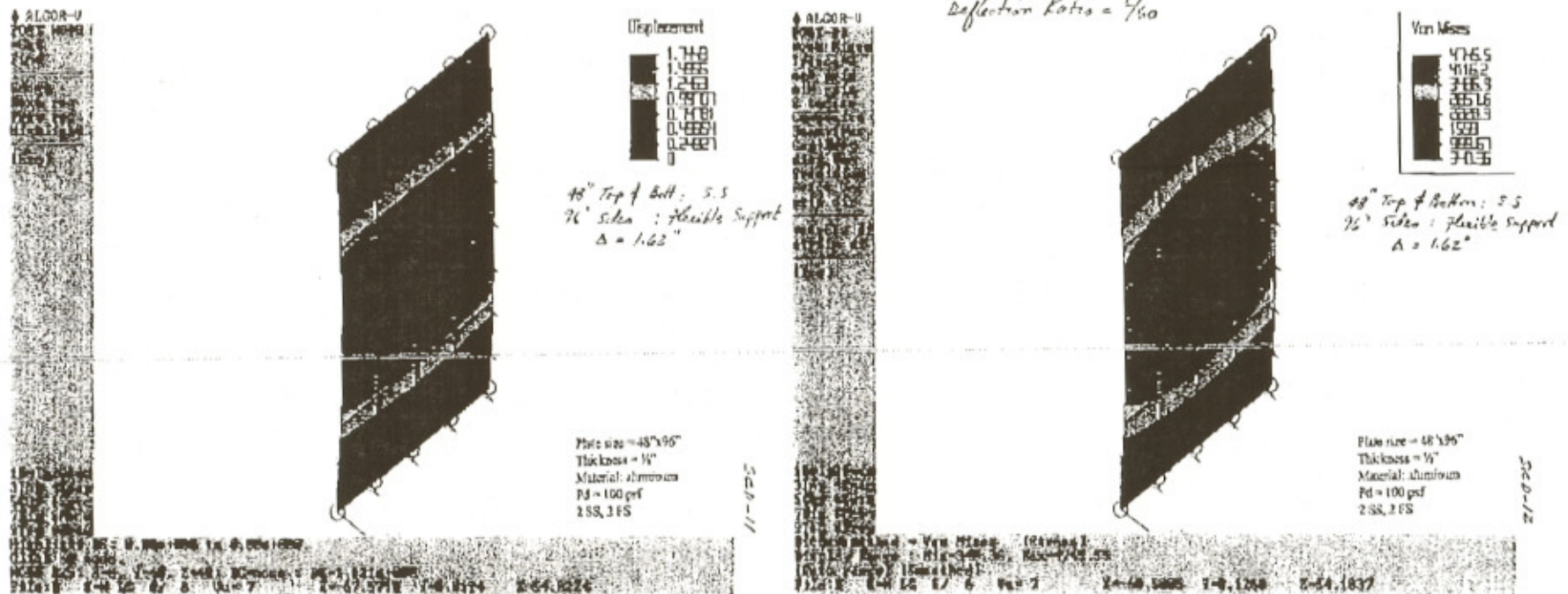
Sliding Glass Door Two Sides Flexible Support Larger Side = 96" Flexible Aspect Ratio = 2



Deflection Ratio = L/90
Overstress = 3862.2 / 3258.4 = 1.1853
Reduction Factor = 1 / Overstress = 0.8437

G-6

Sliding Glass Door Two Sides Flexible Support Larger Side = 96" Flexible Aspect Ratio = 2



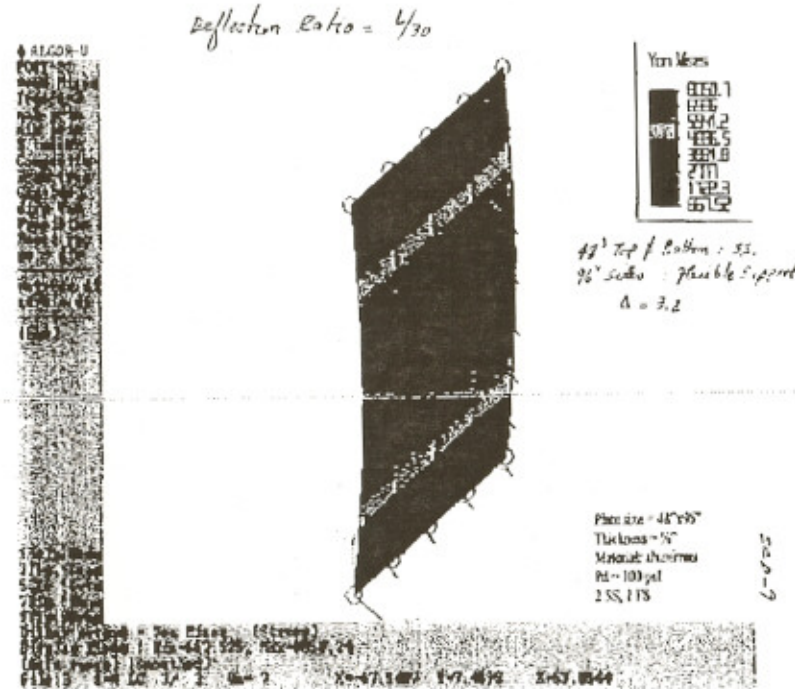
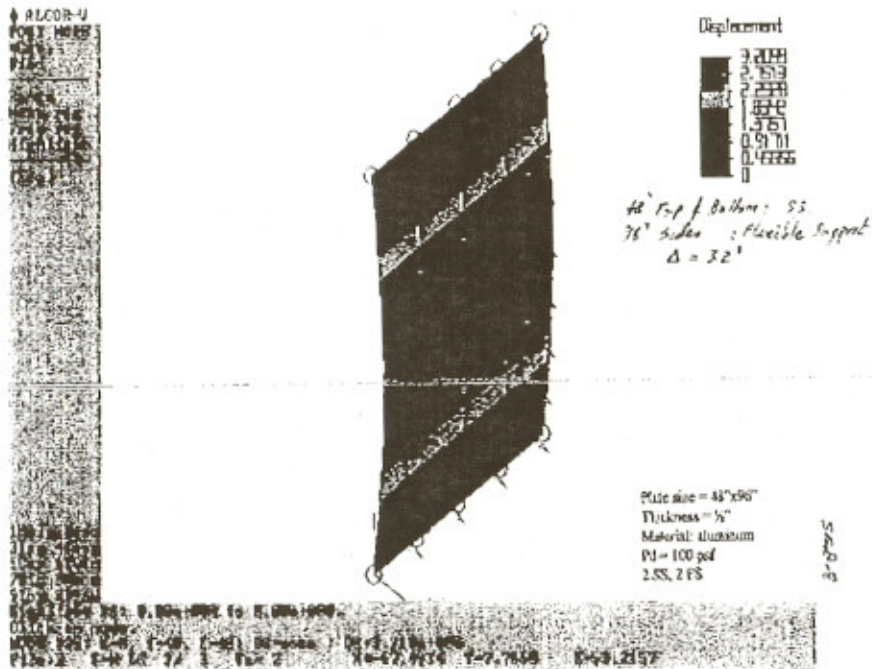
Deflection Ratio = $L/60$
 Overstress = $4745.5 / 3258.4 = 1.4564$
 Reduction Factor = $1 / \text{Overstress} = 0.6866$

Sliding Glass Door

Two Sides Flexible Support

Larger Side = 96" Flexible

Aspect Ratio = 2



Deflection Ratio = L/30
 Overstress = 8050.7 / 3258.4 = 2.4708
 Reduction Factor = 1 / Overstress = 0.4047

9-8

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DuPont Packaging and
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Wilmington, DE 19880-0026

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

Valerie Block
Chair, ASTM E06.51.13
302-892-7508
Valerie.J.block@usa.dupont.com

cc: Jaime Gascon
Mo Madani
Dennis Braddy

Legal Report
March 20, 2006

DCA05-DEC-219 by Dr. Humayoun Farooq, PE, Al-Farooq Corporation:

The Petitioner request that the following statement be confirmed:

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.

Answer: True. However, the ASTM E 1300-02 document assumes firm support of the glass edges ($L/175$ maximum deflection), and there are no procedures given or implied for flexible support conditions. Use of the E 1300-02 charts for interpolation for windows or doors with flexible support(s) is outside the scope of E 1300-02, and therefore if this interpolation is done, it is at the discretion of the engineer.

2. Testing to 1.5 times the design load does not provide a sufficient safety factor for brittle materials like glass. The correct safety factor for the statistical probability of breakage of 8/1000, the basis of the ASTM E 1300-02 charts, requires testing to 2.5 times the design load.

Answer: No. Factor of safety to be used in testing the product in question (Sliding Glass Door with one or two sided flexible support) must be in accordance with the testing criteria of AAMA/WDMA 101/I.S. 2/NAFS and TAS 202 for the HVHZ. The Code does not specify a specific deflection limit for the product in question. Therefore, deflection limit must be as tested.

3. ASTM E 1300-02 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.

Answer: False. The AAMA/WDMA 101/I.S. 2/NAFS standards allow the use of ASTM E 1300 for Residential and Commercial windows and doors without regard to the amount of deflection of the glass supports. The only products that are explicitly required by AAMA/WDMA 101/I.S. 2/NAFS or TAS 202 to meet the $L/175$ maximum deflection criteria are HC (Heavy Commercial) and AR (Architectural) rated products as defined in the AAMA/WDMA 101/I.S. 2/NAFS standards.

DCA06-DEC-003 by Martha A. Heller.

Status: request is not specific to a project and thus staff recommends dismissal.