



NATIONAL CERTIFIED TESTING LABORATORIES

FIVE LEIGH DRIVE • YORK, PENNSYLVANIA 17406 • TELEPHONE (717) 846-1200
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www.nctlinc.com

GLASS FLOORING SYSTEMS INC. NFRC THERMAL TEST SUMMARY REPORT

Report No: NCTL-110-19937-1S

Test Specimen

Manufacturer:	Glass Flooring Systems Inc.	
Series/Model:	Series "FA-TB 4x4"	
Window Type:	Skylight - Fixed	SKFX
Frame Composition:	Aluminum w/ Thermal Breaks- All Members	AT
Sash/Vent/Panel Composition:	Not Applicable	N
Thermal Break Mat'l:	Urethane	U
Overall Size:	1216 mm (47.875") wide by 1216 mm (47.875") high	

NFRC Code

Glazing Description

No. of Glazing Layers (including films):	1.995" Overall w/ Low E and Krypton	8
Primary Glazing:	Double Glazed	DG
Spacer Type:	Silicone Foam	ZF-D
Gap Fill 1:	Krypton (90% Single Probe)	KRY
Gap Fill 2:	Not Applicable	
Glass/Film Thicknesses (ext to int):	0.375"/ 0.060"/ 0.375"/ 0.060"/ 0.375", 0.125"/ 0.030"/ 0.125"	
Air Gap 1:	0.500"	
Air Gap 2:	Not Applicable	
Secondary Glazing:	Not Applicable	
Low Emissivity Coatings:		
Surface 3:	0.022	

Procedure: Standardized Thermal Transmittance (U_{st}) was determined using the NFRC 102-2014 procedure with a temperature of $69.8 \pm 0.5^\circ\text{F}$ on the room side of the specimen and $-0.4 \pm 0.5^\circ\text{F}$ on the weather side of specimen. The net air leakage across the test specimen was 0.0 cfm.

Test Results: Results of the test period 0857-1257 on 04/21/17 using the Equivalent CTS Method:

Thermal transmittance at test conditions (U_s):	0.51 BTU/hr/ft ² /°F
Standardized thermal transmittance of test specimen (U_{st}):	0.48 BTU/hr/ft²/°F

Reference should be made to Thermal Performance Test Report Number NCTL-110-19937-1 for complete specimen description and test data.

National Certified Testing Laboratories

Performed By:

John W. Gordon
Simulation/ Thermal Manager

Reviewed By:

Raymond W. Lamb, PE
Person In Responsible Charge



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Report Number NCTL-110-19937-1

Report Date 05/04/2017

Report To Glass Flooring Systems Inc.
10 Leslie Court
Whippany, NJ 07981

Test Start Date 04/20/2017
Test End Date 04/21/2017

Specification NFRC 102-2014 "Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems"

Description of Sample Tested

Note: All dimensions are in the order (Width x Height x Thickness) unless otherwise noted.

Model/ Series SkyFloor™ Walkable Skylight FA-TB 4x4

Configuration Fixed Skylight

Flange Size 1365 mm x 1365 mm (53.75" x 53.75")

Frame Size 1216 mm x 1216 mm (47.875" x 47.875")

Viewing Area 1054 mm x 1054 mm (41.5" x 41.5")

Frame Type Extruded aluminum with poured urethane thermal breaks

Joint Construction Frame
Mitered, welded

Glazing Components

Overall 50.67 mm (1.995") nominal

Glass Thickness (1) Lite of 31.62 mm (1.245") nominal laminated glass to the exterior and (1) lite of 7.87 mm (0.310") laminated glass to the interior

Laminated Glass Exterior
(3) Lites of 9.53 mm (0.375") nominal tempered glass and each lite was separated by (1) 1.52 mm (0.060") PVB interlayer

Laminated Glass (cont'd.) Interior
(2) Lites of 3 mm (0.125") nominal tempered glass separated by a 0.76 mm (0.030") PVB interlayer

Coating A Guardian "SN70-37" sputter-type low emissivity coating (e=0.022 per client) was applied to glazing surface no. 3.

Spacer Type/Size 12.7 mm (0.50") Silicone foam spacer (Type ZF-D)
Fill Krypton 90% single probe per client

Glazing System Exterior glazed with a structural silicone back-fill

Weatherstrip No weatherseals employed

Operating Hardware No operating hardware employed

Auxiliary

Type	Extruded aluminum adjustable cap
Location	Exterior frame perimeter
Type	Aluminum block
Location	Glazing channel perimeter

Reinforcement No reinforcement employed

Weep Description No apparent weeps employed

Interior/ Exterior Surface Finish Painted aluminum

Sealant No apparent sealant applied

Insect Screen No screen employed

Nail Fin Not applicable/ No nail fin

SPECIMEN PREPARATION PRIOR TO TEST

The test specimen was pre-conditioned at ambient laboratory conditions prior to the test. The surround panel-to-specimen interfaces were sealed with a non-reflective tape. The specimen was sealed on the interior with a caulk sealant resulting in a measured net air leakage of 0.0 cfm per square foot.

TEST PARAMETERS

Tests to determine the Standardized Thermal Transmittance (U_{st}) of the specimen were performed in the guarded hot box apparatus located at the York, PA facility. The most recent calibration of the hot box apparatus was in April 02, 2017. The thermal performance evaluations were completed in accordance with the NFRC 102 procedure using a dynamic wind perpendicular to the specimen on the weather side and simulated natural convection on the room side. A zero static pressure differential ($0.00" \pm 0.04" \text{ H}_2\text{O}$) was maintained across the specimen during the test by pressurizing the metering box on the room side. Data was collected over (2) successive (2) hour periods after (4) hours of steady state conditions as defined in section 6.1.2 of the NFRC 102 procedure were achieved. The test was considered completed when the data of the successive (2) hour periods also satisfied the criteria defined in section 6.1.2 of the NFRC 102 procedure.

GLASS THICKNESS AND GLAZING DEFLECTION:

	<u>Glass Thickness</u>	<u>Glazing Deflection Before Test</u>	<u>Glazing Deflection After Test</u>
Fixed Lite:	1.995"	<0.01	<0.01"

PROJECTED FRAME DIMENSIONS OF MEMBERS:

Member:	Head	Left Jamb	Right Jamb	Sill
Dimension:	6"	6"	6"	6"

TEST DURATION:

The test chamber environmental systems were initiated at 1427 on 04/20/17. The test conditions were considered stable for (2) consecutive (2) hour test periods from 0857-1057 and 1057-1257 on 04/21/17. The thermal performance test results were derived from the 0857-1257 test period.

Areas:

Test Specimen Projected Area (A_s):	15.67 ft ²
Test Specimen Interior Exposed (Wetted) Surface Area (A_{int}):	28.25 ft ²

Areas: (continued)

Test Specimen Exterior Exposed (Wetted) Surface Area (A_{ext}):	13.97	ft ²
Metering Box Opening Area (A_{mb}):	54.39	ft ²
Metering Box Baffle Area (A_{b1}):	46.44	ft ²
Surround Panel Interior Exposed Area (A_{sp}):	38.72	ft ²

Test Conditions:

Average Room Side Air Temperature (t_h):	69.8	°F
Average Weather Side Air Temperature (t_c):	-0.3	°F
Average Guard Box Air Temperature:	75.2	°F
Area-Weighted Warm Side Surround Panel Surface Temperature (sp_1):	68.3	°F
Area-Weighted Cold Side Surround Panel Surface Temperature (sp_2):	0.7	°F
Metering Box Average Relative Humidity:	23.9	%
Test Specimen Surface Average Temperature - Left Sill	11.4	°F
Test Specimen Surface Average Temperature - Center Sill	9.5	°F
Test Specimen Surface Average Temperature - Right Sill	5.0	°F
Note: No condensation or frost was present		
Measured Weather Side Wind Velocity:	14.3	mph
Static Pressure Difference Across Specimen:	0.01	psf

Heat Flows:

Heat Input Rate to Metering Box (Q_{total}):	656.2	BTU/hr
Surround Panel Heat Flow (Q_{sp}):	109.0	BTU/hr
Surround Panel Thickness:	5.449	Inches
Surround Panel Conductance (C_{sp}):	0.04160	BTU/hr/ft ² /°F
Metering Box Heat Flow (Q_{mb}):	-10.3	BTU/hr
Flanking Loss Heat Flow (Q_{fl}):	1.0	BTU/hr
Net Test Specimen Heat Flow (Q_s):	556.6	BTU/hr
EMF vs Heat Flow Equation:	-9420*EMF + (-0.9729)	

Test Results & Calculated Test Data:

Emittance of Glass (e_1):	0.84	
Warm Side Baffle Emittance (e_{b1}):	0.96	
Equivalent Room Side Surface Temperature (T_1):	44.7	°F
Equivalent Weather Side Surface Temperature (T_2):	5.9	°F
Room Side Baffle Surface Temperature (T_{b1}):	69.5	°F
Measured Room Side Surface Conductance (h_h):	1.41	BTU/hr/ft ² /°F
Measured Weather Side Surface Conductance (h_c):	5.77	BTU/hr/ft ² /°F
Test Specimen Thermal Conductance (C_s):	0.92	BTU/hr/ft ² /°F
Convection Coefficient (K):	0.292	
Radiative Test Specimen Heat Flow (Q_{r1}):	298.7	BTU/hr
Convective Test Specimen Heat Flow (Q_{c1}):	257.8	BTU/hr
Radiative Heat Flux of Test Specimen (q_{r1}):	19.06	BTU/hr/ft ²
Convective Heat Flux of Test Specimen (q_{c1}):	16.46	BTU/hr/ft ²
Standardized Room Side Surface Conductance (h_{STh}):	1.27	BTU/hr/ft ² /°F
Standardized Weather Side Surface Conductance (h_{STc}):	5.28	BTU/hr/ft ² /°F
Test Specimen Thermal Transmittance (U_s):	0.51	BTU/hr/ft²/°F
Test Specimen Standardized Thermal Transmittance (U_{ST}):	0.48	BTU/hr/ft²/°F

No apparent condensation was observed on the test specimen at test conditions. This test method does not include procedures to determine the heat flow due to either air movement through the specimen or solar radiation effects. As a consequence, the thermal transmittance results obtained do not reflect performances which may be expected from field installations due to not accounting for solar radiation, air leakage effects, and the thermal bridge effects that may occur due to the specific design and construction of the fenestration system opening. Therefore, it should be recognized that the thermal transmittance results obtained from this test method are for ideal laboratory conditions and should only be used for fenestration product comparisons and as input to thermal performance analyses which also include solar, air leakage, and thermal bridge effects. An estimate of the experimental uncertainty for these results is available upon request.

Per the client, the test specimen described in this report was a production line unit submitted for initial certification and plant qualification and is described 'as tested'. Detailed drawings were available for laboratory records and compared to the test specimen at the time of this report. A copy of this report along with representative sections of the test specimen will be retained by NCTL for a period of four (4) years. The results obtained apply only to the specimen tested. This report may not be reproduced, except in full, without the written approval of National Certified Testing Laboratories. NCTL is a testing lab accredited by A2LA to ISO/IEC 17025 and assumes that all information provided by the client is accurate and does not guarantee or warranty any product tested or installed. Testing described in this report was conducted in full compliance with NFRC requirements; any deviations are noted. ASTM C1363 and C1199 testing was performed with published NFRC deviations. Ratings included in this report are for submittal to an NFRC licensed IA for certification purposes and are not meant to be used for labeling purposes. Only those values identified on a valid Certification Authorization Report (CAR) are to be used for labeling purposes.

National Certified Testing Laboratories

Performed By:

A handwritten signature in black ink that reads "John W. Gordon". A small, circular logo with the letters "NCTL" is visible in the background of the signature.

John W. Gordon
Simulation/ Thermal Manager

Reviewed By:

A handwritten signature in black ink that reads "Raymond W. Lamb". A small, circular logo with the letters "NCTL" is visible in the background of the signature.

Raymond W. Lamb, PE
Person In Responsible Charge

JWG/ mk

ATTACHMENT 1

Section 1:

Component Drawings, with Applicable Part Numbers, Manufacturing and Modeling Details, were Reviewed (as submitted) for Product Verification
(Reference: NCTL-110-19937-1)

See Attached Documentation;
any deviations noted.

Note: The above referenced component drawings along with representative sections of the test specimen will be retained per procedure by NCTL. This testing facility assumes that all information provided by the client is accurate.

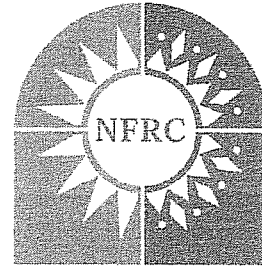
Section 2:

<u>Identification</u>	<u>Date</u>	<u>Page & Revision</u>
Original Issue	05/04/17	Not Applicable

NFRC PRODUCT CERTIFICATION PROGRAM

Submittal Form for Test Samples

For use by manufacturers, lineal suppliers and fabricators



National Fenestration
Rating Council®

1. Information on Production of the Test Sample (complete ALL fields):

Manufacturer: Glass Flooring Systems, Inc. Date of sample manufacture: 2-7-17

Plant Address where manufactured: 10 Leslie Court

City: Whippany State: NJ Zip Code: 07981

Name of IA: KCI Phone: 862-701-5320 Fax: _____

2. Product Information (complete ALL fields):

Product Line ID No.: _____ Operator Type
(Table 4-3 of NFRC 100): non-operating (o)

Series/Model: SkyFloor™ walkable skylight FA-TB 4x4

3. Test sample is being submitted for (select ONE):

- a. ☒ Validation for Initial Certification (prototype only; Section 2.2.1.C of PCP), no plant qualification
- b. ☐ Validation for Initial Certification (production line unit; Section 2.2.1.B.ii of PCP) & plant qualification
- c. ☐ Validation for Recertification (production line unit; Section 2.2.1.B.ii of PCP) & plant qualification
- d. ☐ Plant Qualification Only (production line unit; Section 2.2.1.B.ii of PCP)

[Note: If the only test option is to be used, include a copy of the NFRC-certified simulator's statement and NFRC approval as required in NFRC 100 (1997) Sections 6.1 and 6.1.1.]

I, Wayne Conklin, as the designated agent for Glass Flooring Systems, Inc.
do hereby attest that the foregoing information is true to the best of my information, knowledge, and belief. Further, if the unit is identified in Section 3 as a production line unit, I hereby authorize the NFRC-accredited testing laboratory to send a copy of the test report to the IA identified above for plant qualification purposes pursuant to the NFRC Product Certification Program.

Signature: _____ Date: 2-27-17

FOR LABORATORY USE ONLY

1. Laboratory: National Certified Testing Laboratories

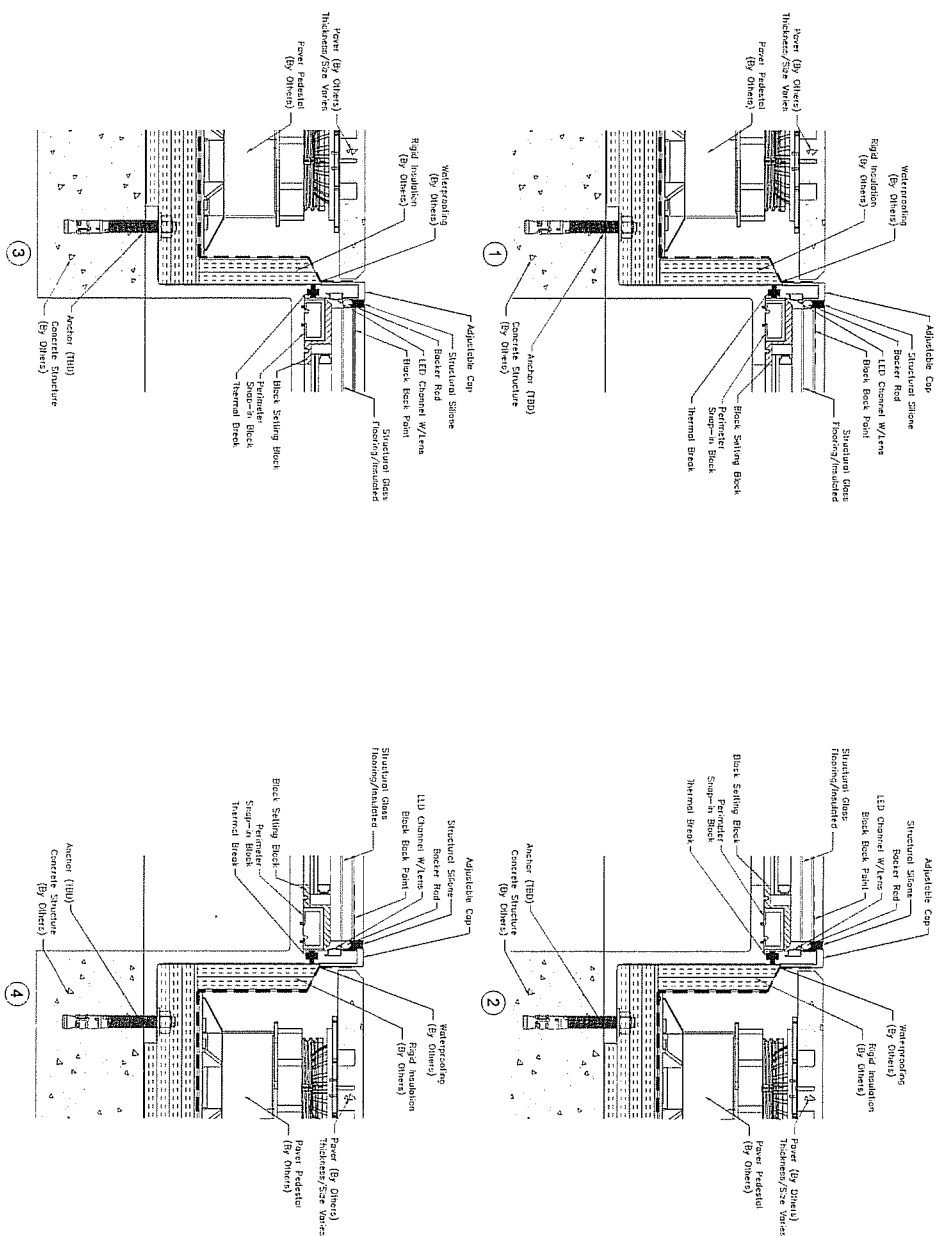
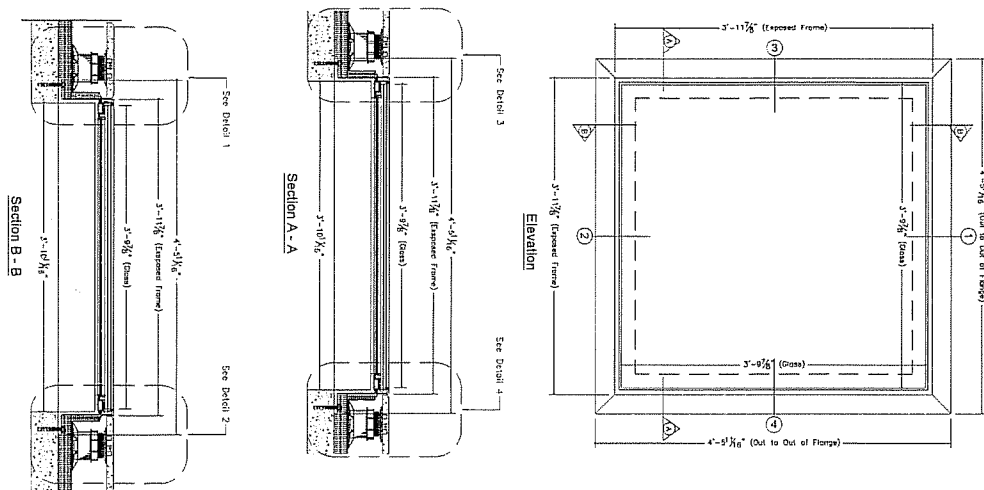
2. Date Sample Received: 4/11/17 File number ID: 110-19937-1

3. Date Sample Tested: 4/21/17 By: John W. Gordon

4. Modifications made: _____

5. Reason for non-testing of sample unit: _____

[Note: If the sample submitted can not be tested due to damage prior to testing, a new sample and new form shall be submitted to the testing laboratory. Both forms shall be submitted to the IA when the testing is completed.]



TEST SPECIMEN COMPLETES
WITH THESE DETAILS.

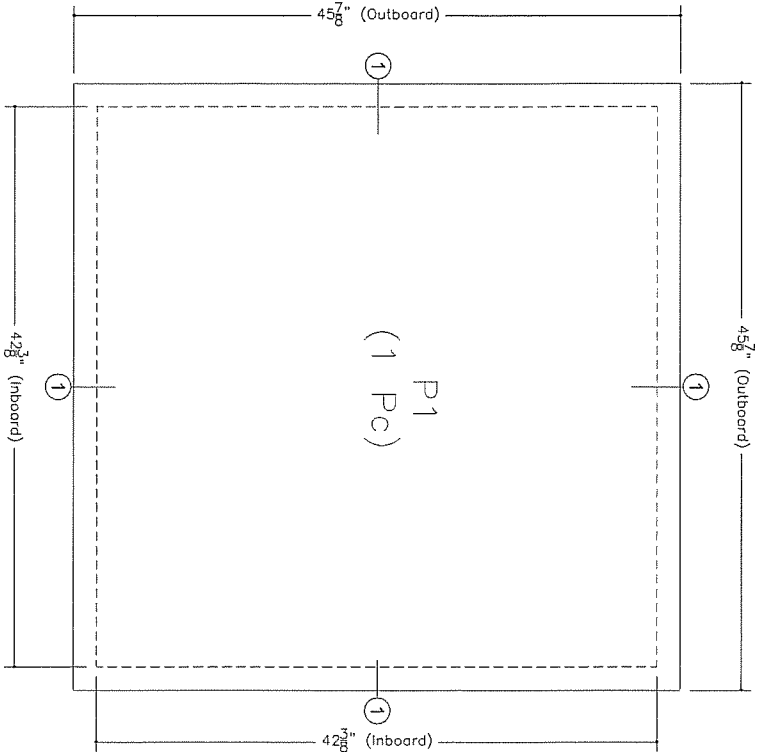
ANY DEVIATION IS NOTED.

REPORT NO. NCTL-110- 19877-1

TEST DATE: 4-26-17

[illegible]

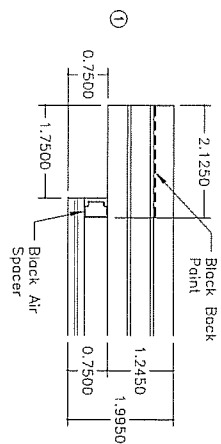
Glass Size (Outside View)



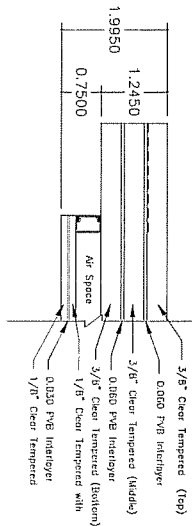
* Outboard Glass Sizes
P1 = 45 7/8" x 45 7/8"

* Inboard Glass Sizes
P1 = 42 3/8" x 42 3/8"

Glass Assembly Details



Glass Make-up Detail



**TEST SPECIMEN COMPLIES
WITH THESE DETAILS.**

ANY DEVIATION IS NOTED.

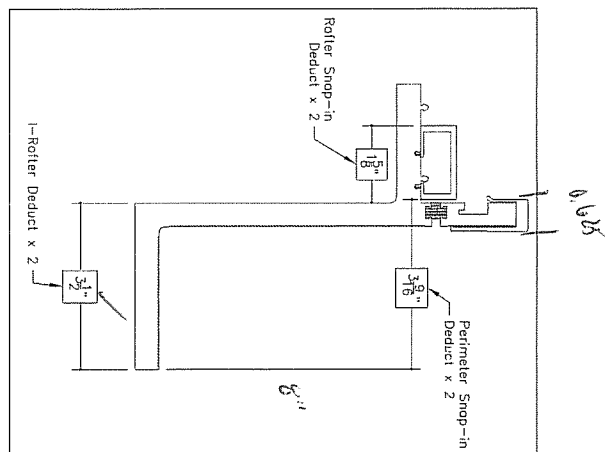
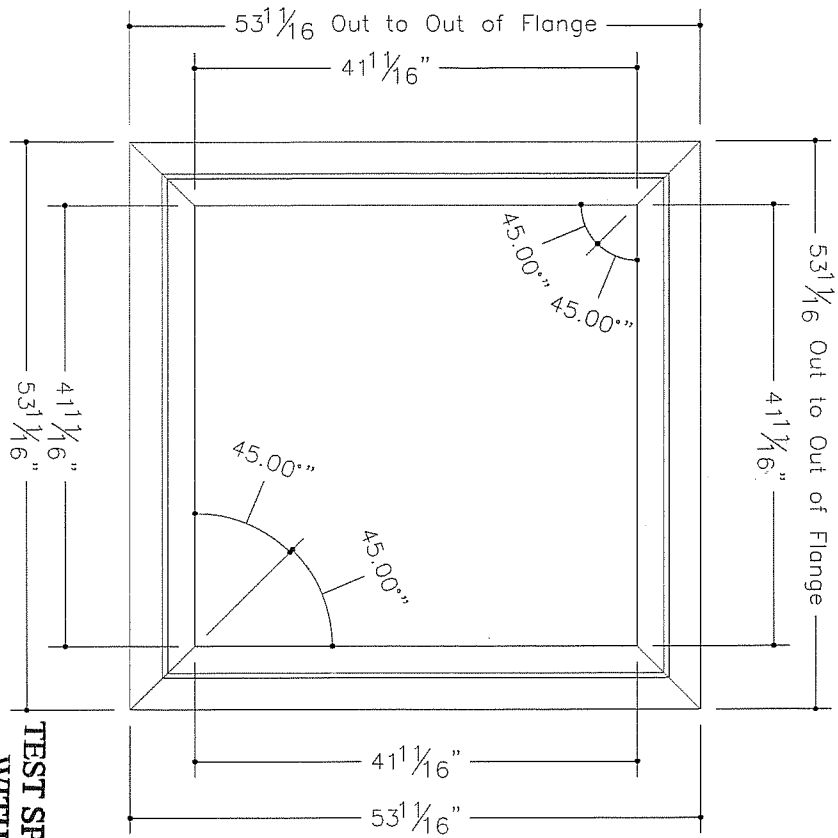
REPORT NO. NCTL-110-1877-1

TEST DATE: 4-21-17

**GLASS FLOORING
SYSTEMS INC**

MULTIPLE PATENTS PENDING

Rev.	No.	Date	Description	Assembled
1	1			
Specifications				
Frame: Painted Aluminum 6063-T5				
Glassing: 3/8" Two Layer - Clear Tempered				
0.000 PVB Interlayer				
3/8" Wedge Spacers - Clear Tempered				
0.000 PVB Interlayer				
1/8" Clear Tempered with				
1/8" Clear Tempered with				
1/8" Clear Tempered				
Labels: NCTL Testing of the Glass Flooring Systems (Shybor) 1/4" x 4" VHM				
Labels: Air & Water Infiltration Test				
Labels: No. 100000, 100, 1000, 10000, 100000				
Drawn: JAC	Scale: 1/4" = 1'-0"	Check: JAC	Date: 4/21/17	Sheet: 01



**TEST SPECIMEN COMPLIES
WITH THESE DETAILS.**

ANY DEVIATION IS NOTED.

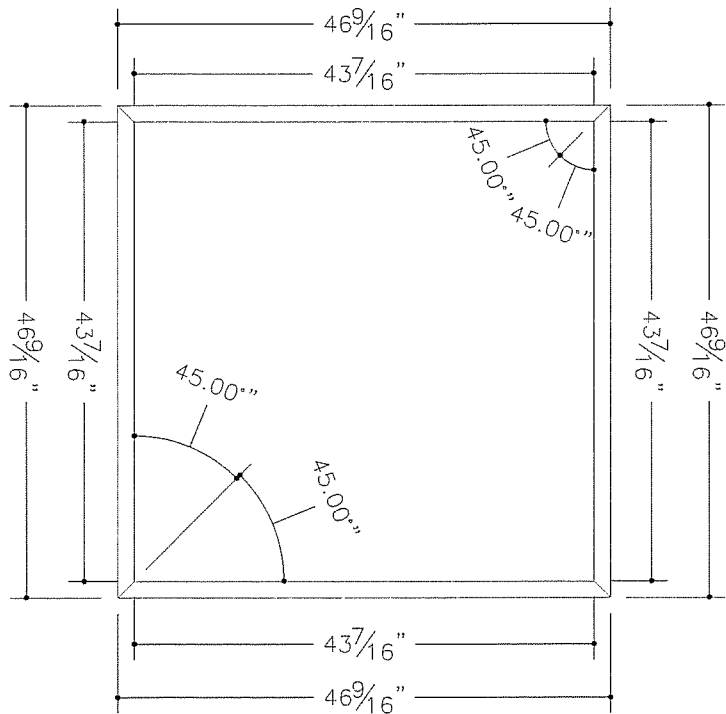
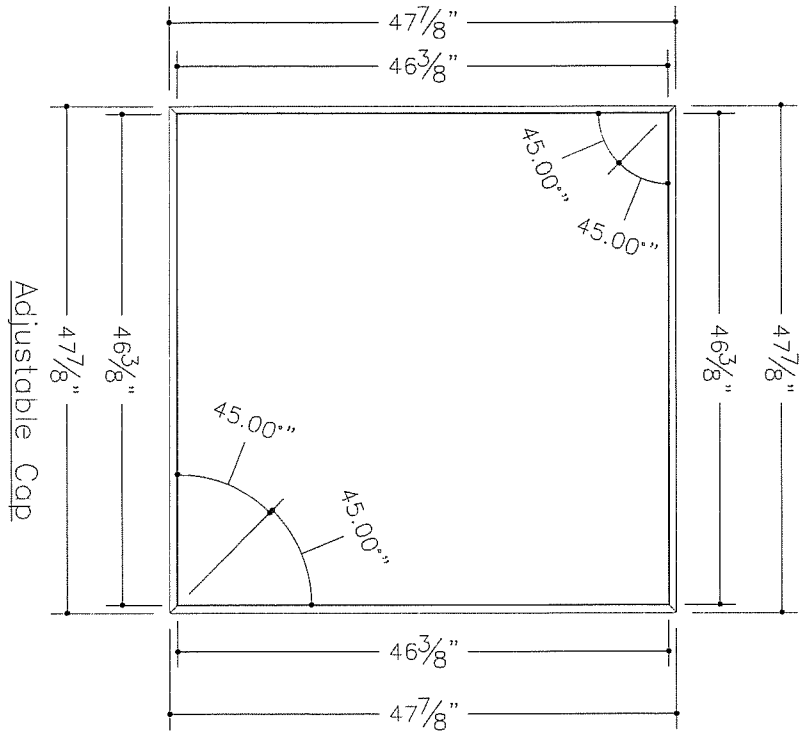
REPORT NO. NCTE-110-19932-1

TEST DATE: 4-21-17

GLASS FLOORING
SYSTEMS INC

MULTIPLE PATENTS PENDING

DATE	NO.	REVISED	APPROVED												
<p>DESCRIPTION</p> <p>Frame: Powder Aluminum 6063-T5</p> <p>Glass: 3/8" top layer - Clear Tempered 3/8" Middle layer - Clear Tempered 0.006 PVB Interlayer 1/8" Clear Tempered with 0.020 PVB Interlayer 1/8" Clear Tempered</p>															
<p>CONSTRUCTION</p> <p>MANUFACTURER: Glass Filing Systems, Inc. 10 Leslie Court Whippany, NJ 07981</p> <p>PROJECT</p> <p>HCI, Training of the Glass Filing Systems (S/School) - 14th Floor Unit At a Water Filtration Plant</p> <p>DATE OF SUBMITTALS 12/18/2010 DATE OF REVISION 12/18/2010</p> <table border="1"> <tr> <td>ISSUED FOR</td> <td>DATE</td> <td>BY</td> <td>DESCRIPTION</td> </tr> <tr> <td>1</td> <td>12/18/10</td> <td>SPC/DAK</td> <td>NEW L&S</td> </tr> <tr> <td>2</td> <td>12/18/10</td> <td>SPC/DAK</td> <td>REV L&S</td> </tr> </table>				ISSUED FOR	DATE	BY	DESCRIPTION	1	12/18/10	SPC/DAK	NEW L&S	2	12/18/10	SPC/DAK	REV L&S
ISSUED FOR	DATE	BY	DESCRIPTION												
1	12/18/10	SPC/DAK	NEW L&S												
2	12/18/10	SPC/DAK	REV L&S												



Proof Of Size:
 (Perimeter O.A. Flange - 3.5625 - 3.5625 = Perimeter Snap-In)
 (4) Long - 53.6875 - 3.5625 - 3.5625 = 46 9/16" (3 - 10 9/16")

TEST SPECIMEN COMPLIES
 WITH THESE DETAILS.
 ANY DEVIATION IS NOTED.

REPORT NO. NCTL-110-19977-1

TEST DATE: 4-21-17

GLASS FLOORING
 SYSTEMS INC

MULTIPLE PATENTS PENDING

Rev.	No.	Date	Description
Specifications			
Frame: Painted Aluminum 6063-T5			
Glazing: 3/8" Top Layer - Clear Tempered			
0.060 PVB Interlayer			
3/8" Middle Layer - Clear Tempered			
3/8" Bottom Layer - Clear Tempered			
1/8" Clear Tempered with			
0.020 PVB Interlayer			
1/8" Clear Tempered			
COMPLETION			
UNIVERSITY: Glass Flooring Systems, Inc.			
10 Lehigh Court			
Whippany, NJ 07981			
PROJECT			
NCTL Testing at the Glass Flooring Systems's			
(SBH) 48" x 48" Unit			
1/8" Water Infiltration Test			
Drawn By	Reviewed By	QC	TEST
4/21/17	4/21/17	4/21/17	4/21/17

DUAL AND TRIPLE GLAZED SPACER INFORMATION

SPACER MANUFACTURER: Quanex

SPACER NAME OR ID: ZF-D

SPACER MATERIAL: S2 Silicone

PRIMARY SEALANT: Silicone

SECONDARY (BACKING) SEALANT: NA

SPACER WIDTH: 0.500"

Gas Fill: Krypton

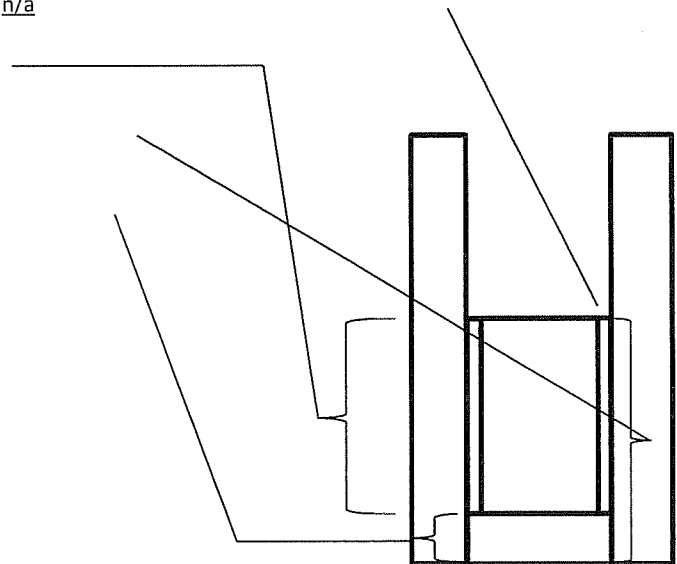
Gas Fill percentage: 90%

Thickness of sealant between glass and spacer (if applicable): n/a

Spacer height: 0.188"

Setback/Bite from edge of glass: 0.376"

Secondary sealant height: 0.188"



TEST SPECIMEN COMPLIES
WITH THESE DETAILS

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REPORT NO. NCTL-110- 19937-1

TEST DATE: 4/21/17