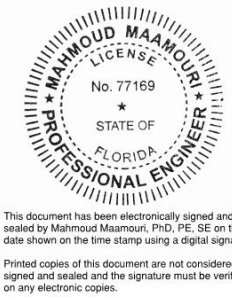
Evaluation Report

Florida Product Approval

Novum 21.5 mm & 17.5 mm Point Supported Glass Systems (HG0A)

Prepared for:

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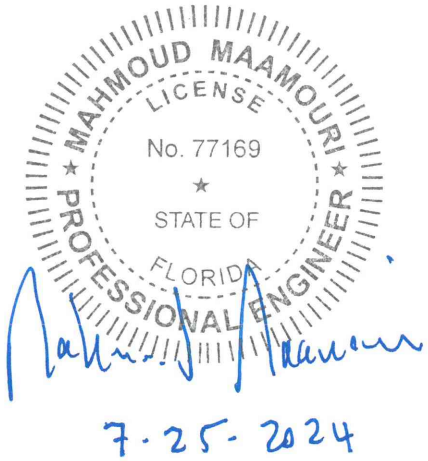
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Revision Number	Date	Description
00	07/25/24	Initial Release

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2 Scope

This evaluation report pertains to the Novum Point Support Glass system illustrated on Drawing 100 (See Appendix A). The structural elements of the system consist of either 21.52 mm or 17.52 mm laminated glass and its glass fitting ("rotule") connections. The 21.52 mm laminated glass option is made up of two 10 mm lites of fully-tempered glass with a 1.52 mm PVB interlayer. The 17.52 mm laminated glass option is made up of two 8 mm lites of fully-tempered glass with a 1.52 mm PVB interlayer. An optional dot or line frit of up to 50% is permitted on the surface adjacent to the interlayer for the outer lite (surface #2). The rotules consist of Novum Part No. RB22-16 which is illustrated on drawing PS-601 (See Appendix G).

This evaluation report is based on the 2023 Florida Building Code and is subject to the product restrictions contained in Section 4.2 of this report.

3 Evaluation and Product History

The following items outline this product's Florida Product Approval History:

1. FL 3885 – Approved on January 26, 2005, for use under the 2001 Florida Building Code.
2. DS 2015-22 was issued by the State of Florida Building Commission on May 6, 2015, confirming that this product falls within the State of Florida Product Approval Program when used within its limitations where the product is "…directly attached or applied to the building envelope." Stand-alone open structure applications of the product "…fall outside the scope of the state approval program. However, standalone open structure applications must meet the requirements of the Florida Building Code and are subject to approval by the local authority having jurisdiction." See Appendix O.
3. FL 17478-R1 – Approved on June 23, 2015
    a. This update reflected changes from the 2001 Florida Building Code to the 2014 Florida Building Code.
    b. The design wind limits were updated to reflect the LFRD level wind loads associated with ASCE 7-10 in lieu of service level wind loads associated with prior versions of ASCE 7.
    c. The name of the product manufacturer was revised from MERO Structures, Inc. to Novum Structures, LLC.
    d. The ATI TAS 202 testing was rereviewed to confirm that there were no changes that would affect the results of the testing considering the 2014 Florida Building Code.
4. FL 17478-R2 – Revised on January 30, 2019
    a. This update reflected changes from the 2014 Florida Building Code to the 2017 Florida Building Code.
    b. The revised approval included updates to the Quality Assurance entity.
    c. The revised approval included expansions to the installation instructions.
    d. The NOA number for the PVB interlayer was updated to reflect the most recent approval in place at the time.
5. FL 17478-R3 – Reaffirmed on October 01, 2020
    a. This update reflected the changes from the 2017 Florida Building Code to the 2020 Florida Building Code.
    b. The NOA number for the PVB interlayer was updated to reflect the most recent approval in place at the time.

6. Current revision
    a. This update reflects changes from the 2020 Florida Building Code to the 2023 Florida Building Code.
    b. This product evaluation report includes updates to support the use of optional dot or line frit up to 50% coverage.
    c. This product evaluation report includes updates to support the use of an increased rotule rod diameter.
    d. This product evaluation report includes an updated NOA number for the PVB interlayer to reflect the most recent approval in place at the time.
    e. This version of the product evaluation report clarifies the allowable stresses to be used when performing a finite element analysis of a panel. Such stresses determined from a finite element analysis may not exceed those derived from ASTM E1300 as referenced in the Florida Building Code.

4 Product Evaluation

4.1 Basis for Product Code Compliance

4.1.1 Design Pressure Testing

Similar to previous evaluation reports for this product, this evaluation report is submitted under 2023 Florida Building Code Section 1625.1 and Section 1625.2 where testing is utilized "…in order to substantiate claims for alternate materials or methods of construction…" and that "Such testing shall follow a nationally recognized standard test…" For this product, although rational engineering approaches are available based on ASTM E1300 as adopted by the Florida Building Code, testing in accordance with TAS 202 is used to further substantiate the use and strength of this product.

Based on the test report dated July 2, 2004, and issued by Architectural Testing, the ASD design pressure of 90 psf (150 psf LRFD) for the 21.52 mm laminate and ASD design pressure of 75 psf (125 psf factored LRFD) for the 17.52 mm laminate were able to be resisted considering a factor of safety of 2. The product is limited to applications which do not enclose the building envelope. Therefore, the unsuccessful water infiltration test on the 21.52 mm laminate is not applicable. The test procedure utilized was TAS 202-94. No substantive changes were observed between the TAS 202-94 edition included with the 2020 Florida Building Code and the 2023 Florida Building Code. The strength of the rotules is also confirmed by the TAS 202 testing. Since both the 21.52 mm and the 17.52 mm Point Supported Glass Systems were successfully tested per the structural requirements of TAS 202-94 as evidenced by the ATI Test Report (49758.01-120-18, see Appendix B) and there have been no substantive changes to the test procedure, this product remains in conformance with Sections 1625.1 and 1625.2 of the 2023 Florida Building Code. See also Appendix C for drawings illustrating the makeup of the tested components.

4.1.2 Rotule Component Testing

The strength of the rotules was confirmed with the TAS 202 testing above and also from testing of the rotules. See Appendix D for the configuration of the RB2 rotule (with 14 mm rod) that was utilized in the TAS 202 testing. See Appendix E for additional rotule-specific testing performed for the RB2 rotule (with 14 mm rod).

Included with this Florida Product Approval is an update of the RB2 rotules (with 14 mm rods) to RB22-16 rotules (with 16 mm rods). See Appendix G for the configuration of the updated rotule size. Additional rotule-specific testing was performed confirming the strength of the 16 mm rotules as shown in Appendix H.

For each project, rotule capacities shall be compared to forces determined by structural analysis to confirm that the rotule strength is not exceeded. The strength of the rotules is determined from a minimum of 3 tests. The 5% fractile value of the testing is used as an expected minimum value. A factor of safety of 2 is applied for Allowable Strength Design and an additional 1.1 safety factor to account for material variability. Ongoing destructive testing of the rotules is used to confirm that the strength of supplied rotules is consistent with the expected strength.

4.1.3 Additional Testing to Permit up to 50% Frit Coverage

In 2023, additional testing was performed justifying that it would be structurally acceptable to add an optional dot frit or line frit on the inside surface of the outside glass layer (surface #2) of up to a maximum of 50% coverage. See Appendix I, Appendix J, Appendix K, Appendix L, Appendix M, and Appendix N. This testing was done simultaneously with testing to update one of Novum's two NOAs.

The rationale for this testing stems from ASTM E1996 Section A1.7.2:

> "Substitution or adding of glass coating (reflective, coated, low-e, ***frit***, and so forth) shall be allowed when supported by engineering analysis of the durability and compatibility of the treatment with glazing infill, interlayer, and sealant, adhesives or back-bedding materials." (***emphasis added).***

The support for proving the adhesion, durability, and compatibility of the frit with the interlayer was provided by bake testing per ANSI Z97.1-2015 (2020), Section 5.3 and impact testing per ANSI Z97.1-2015 (2020), Section 5.1. Testing considering samples including frit were compared to testing of samples not containing frit. Since each of the tests passed, it is concluded that this testing provided an acceptable "…engineering analysis of the durability and compatibility of the [frit] with glazing…interlayer…"

Additionally, since it is possible that ceramic frit would reduce the strength of the glass itself, reduction factors as shown in Figure 2 are applied. Since frit is not applied on any edge of the glass, these reduction factors are only applied to the allowable surface stresses and not to the allowable edge stresses. It can be observed that in all cases relevant to this Florida Product Approval for point supported glass, that the allowable edge stresses will still govern the capacity of the panel over the allowable surface stress with the frit reduction. This provides further rationale that the capacity of the panel is not expected to be affected by the application of the frit.

4.1.4 Structural Analysis of Glass Panels

Structural analysis shall be performed for each project that confirms the surface and edge stresses of the panels subjected to the project specific loading are less than allowable stresses derived from ASTM E1300 and adjusted for load duration as shown below:

Allowable Surface Stress				
		Allowable Principle Tensile Stress psi (MPa)		
Glass Type	Loading	Overhead Glazing (Slope < 75°) 1/1000	Vertical Glazing (Slope > 75°) 8/1000	Glass Fin Structural Glass Railing 1/1000 or less
Fully Tempered (FT)	Wind[1] (60 sec)	10200 (70.33)	11200 (77.22)	6000 (41.37)
	Seismic Load (10 min)	8833 (60.90)	9699 (66.87)	6000 (41.37)
	Maintenance Load (1 hour)	7897 (54.45)	-	6000 (41.37)
	Live Load and Roof Live Load (1 day)	6474 (44.64)	7109 (49.02)	6000 (41.37)
	Snow Load (30 days)	5235 (36.09)	-	5235 (36.09)
	Dead Load (beyond 1 year)	3810 (26.27)	4183 28.84)	3810 (26.27)

Figure 1 – Allowable Surface Stress of Glass. The highlighted values above are from Table 11 of the GANA Glazing Manual 50th Anniversary Edition (Chapter VI), which is based on calculations per ASTM E1300 Appendix X6.

Allowable Surface Stress Reduction Factor for Surfaces with Ceramic Frit in Tension		
Glass Type	Overhead Glazing (1/1000) Fin or Railing (Slope < 75°)	Vertical Glazing (8/1000) (Slope > 75°)
FT	0.84	0.79
HS	0.73	0.64

Figure 2 -Allowable Surface Stress Reduction Factors for Surfaces with Ceramic Frit in Tension. The highlighted values above are based on a research paper presented by Chris Barry at the IGMA Winter Conference, Florida, February 5, 2015. The paper is called “Unexpected Breakage in Ceramic Enameled (Frit) HS IG Spandrels.”

Allowable Edge Stress				
		Allowable Principle Tensile psi (MPa)		
		Overhead Glazing (Slope < 75°) 1/1000	Vertical Glazing (Slope > 75°) 8/1000	Glass Fin Structural Glass Railing 1/1000 or less
Glass Type	Loading	Ground Smooth & Polished Edges	Ground Smooth & Polished Edges	Ground Smooth & Polished Edges
Fully Tempered (FT)	Wind[1] (60 sec)	8002 (55.17)	8790 (60.61)	6000 (41.37)
	Seismic Load (10 min)	6929 (47.78)	7612 (52.48)	6000 (41.37)
	Maintenance Load (1 hour)	6195 (42.71)	6805 (46.92)	6000 (41.37)
	Live Load and Roof Live Load (1 day)	5079 (35.02)	5580 (38.47)	5079 (35.02)
	Snow Load (30 days)	4107 (28.31)	4511 (31.10)	4107 (28.31)
	Dead Load (beyond 1 year)	2989 (20.61)	3283 (22.64)	2989 (20.61)

Figure 3 -The highlighted values above are based on calculations derived from ASTM E1300 Appendix X4, X6, and X7, AAMA 7-87.

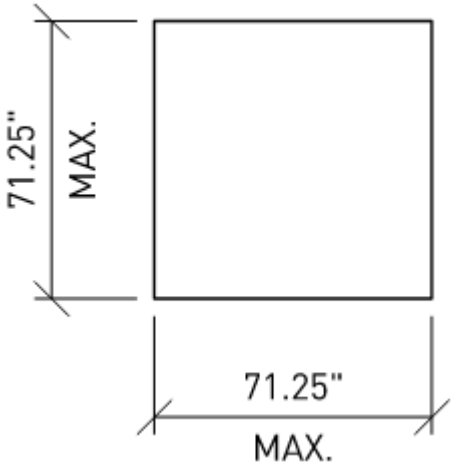
4.2 Limitations (See Drawing 100 Rev. 0)

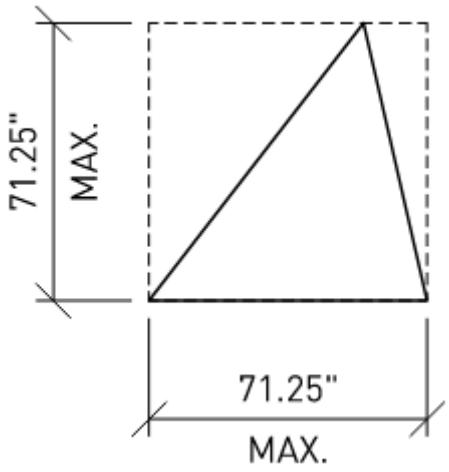
The limitations listed below were developed within the previous evaluation reports and are carried forward into this update with expansions. See product evaluation reports for FL 3885 and FL 17478 for additional information.

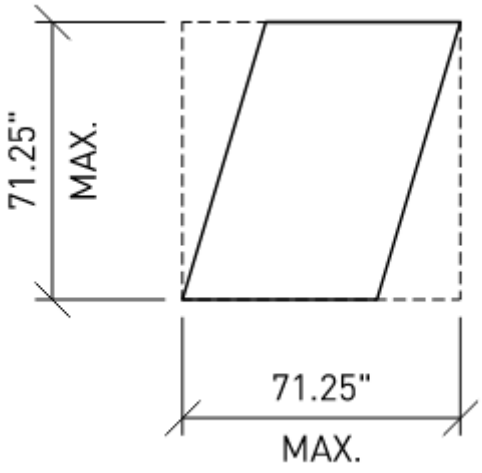
Number	Limitation	Notes
1.1	The systems contained within this approval are limited to applications such as canopies, decorative walls, etc., that are attached to the building's structural frame or applied to the building envelope; however, the system may not be a part of the building envelope.	It is the intent that this product be used only in applications where the product is not part of the building envelope or other applications where large or small missile impact testing are required. This limitation is enforced because these systems have not been subjected to the large or small missile impact testing criteria from the Florida Building Code required for elements that form a part of the building envelope.
1.2	Stand-alone, open structure applications of this system fall outside of the state product approval program; however, stand-alone applications may still be used subject to approval by the local authority having jurisdiction and provided such applications meet the requirements of the Florida Building Code.	See Declaratory Statement 2015-022 included in Appendix O.

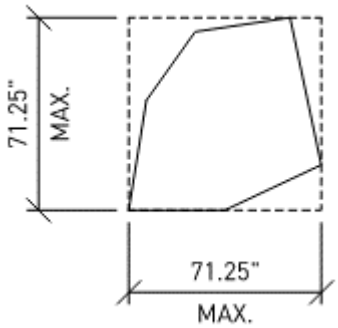
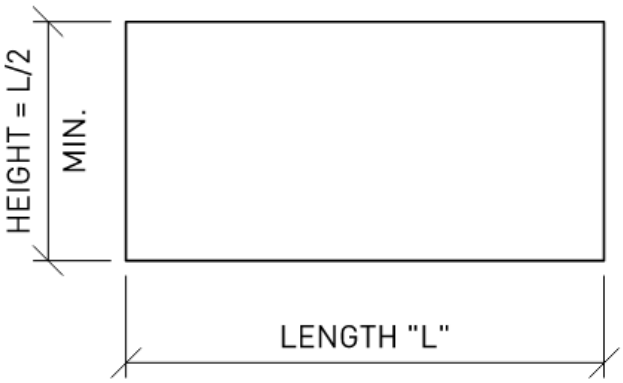
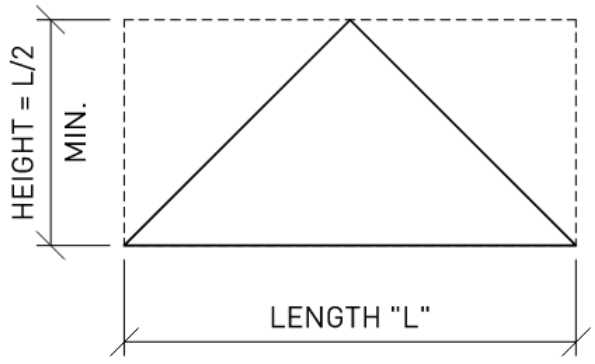
Number	Limitation	Notes
2	The 21.52 mm system is limited to areas where the LRFD (factored) design wind load does not exceed 150 psf.	As noted in Section 4.1 of this report, the system was tested to 180 psf which permits, with a factor of safety of 2, an LRFD design wind load of 180 psf / 2 / 0.6 = 150 psf. The previous evaluation report also notes that the 180 psf reflects limitations of the test chamber and that failure of the specimen did not occur at that pressure. This limit is an upper bound limit derived from the test and the capacity may be governed by limitation number 10.
3	The 17.52 mm system is limited to areas where the LRFD (factored) design wind load does not exceed 125 psf.	As noted in Section 4.1 of this report, the system was tested beyond 150 psf which permits, with a factor of safety of 2, an LRFD design wind load of 150 psf / 2 / 0.6 = 125 psf. The previous evaluation report also notes that the failure of the test specimen occurred at a pressure within a few psf of 180 psf, but that 150 psf was chosen as a conservative limit. This limit is an upper bound limit derived from the test and the capacity may be governed by limitation number 10.
4	The maximum overall glass dimensions are 71.25-inch by 71.25-inch. This results in a 6-foot-square grid when using a 3/4-inch silicone joint between adjacent panels. Shapes other than squares are acceptable as long as they meet the aspect ratio of limitation number 5 and fit within the footprint of a 71.25-inch by 71.25-inch square.	TAS 202-94 Section 5.4 permits “Specimens successfully tested shall qualify assemblies of a smaller size and of the same type of construction, provided the anchorage of the product remains the same.” The previous evaluation report also notes that “several glass sizes and rotule spacings were used to confirm [the] predetermined assumptions that the largest panel would break first.” This limitation is to be worked in combination with limitation 10, which requires an analysis to confirm that the rotule forces and stresses of any proposed configuration are less than predicted capacities.

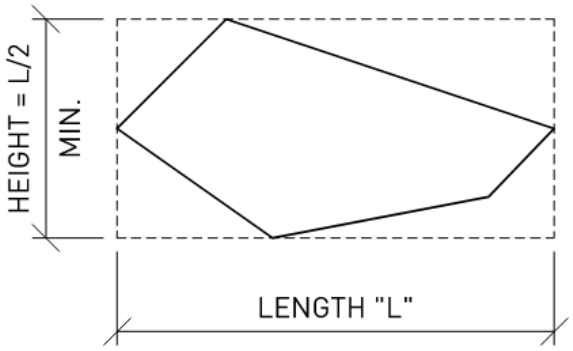
Number	Limitation	Notes

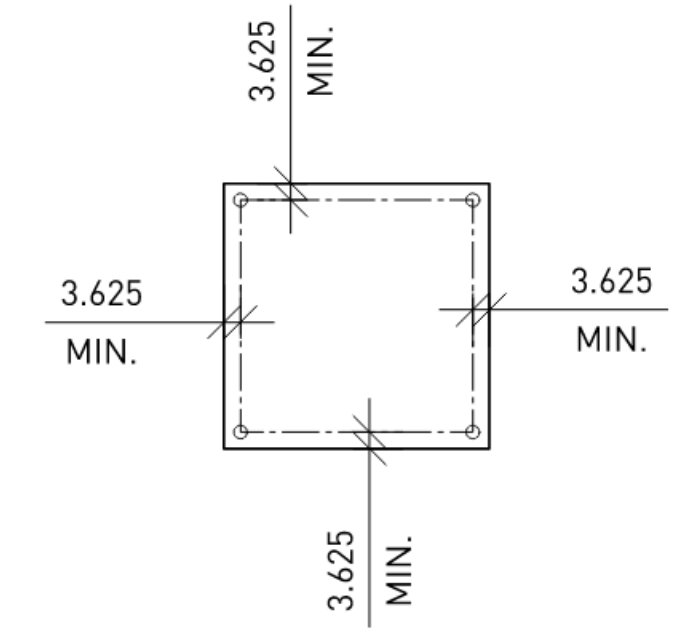
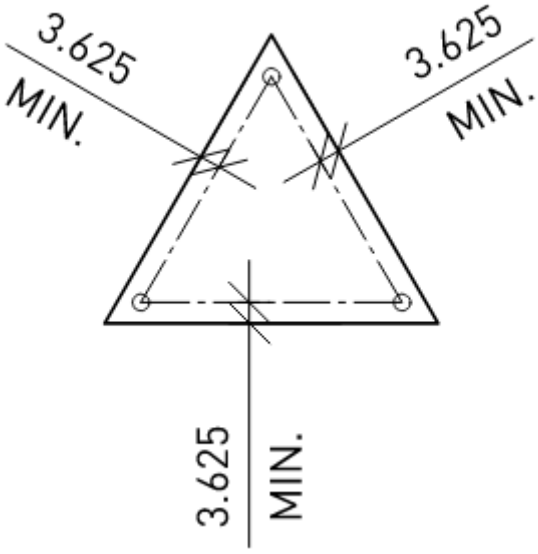


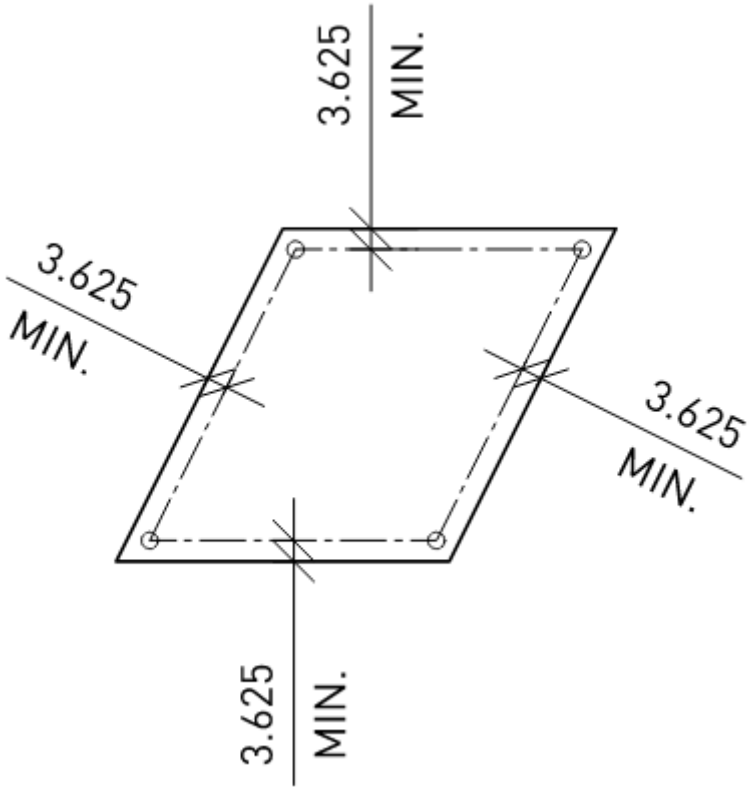




Number	Limitation	Notes
		
5	Proposed configurations shall not exceed a maximum aspect ratio of 2:1.  	This limitation is to be worked with limitation 4 above. The basis for this limitation is engineering judgment based on the non-factored load charts provided in E1300. These charts show that there is a change in behavior in the glass as the aspect ratio shifts from those that are less than 2:1 to those that are greater than 2:1. As a rational engineering analysis, the 2:1 limitation is expected to maintain behavior that is in line with the tested panels. It was noted in the previous evaluation reports that this change occurs as a result of the panel experiencing bi-axial bending stresses versus mono-axial bending stresses. Additionally, this rational engineering analysis is supported by the requirement that each proposed configuration be analyzed and confirmed that the panel stresses are less than the allowable stresses.

Number	Limitation	Notes
		
6	Each panel will be corner supported by a RB22-16 stainless steel rotule. If triangular panels are used, only three point supports near each of the three corners will be required if the placement of the point supports and stress in the panels meet the requirements of limitation number 7 and limitation number 10.	The original TAS 202 testing and previous product evaluation reports were based on the RB2 M14 stainless steel rotules. This current report is updated to the RB22-16 stainless steel rotule. TAS 202-94 Section 5.3 permits that “Specimens successfully tested shall qualify assemblies with material thicker and of the same type and construction, provided the anchorage of the product is proportionally changed according to the wind pressure test.” The RB22-16 stainless steel rotule utilizes a larger diameter rod of 16 mm whereas the original test considered a smaller, 14 mm rod. The average ultimate tested tensile load for the three RB22-16 rotules is 7,180 lbs which equals or exceeds the 4,700 lbs without a tightening ring (nut) confining the rotule base and 6,920 lbs with a tightening ring (nut) confining the rotule base for the RB2 rotule. Please see the appendices for the applicable test reports. As such, substituting the larger diameter and thus stronger rod for the tested rod is deemed acceptable.

Number	Limitation	Notes
7.1	The rotules may not be closer to the edge of glass than 3-5/8-inch (92.1 mm).  	This limitation is derived from ASTM C1048-18 Section 7.7.3.1 which requires that the minimum distance from the rim of a hole to the edge of glass be at least ¼" and two times the thickness of the glass (2 * 10 mm) = 20 mm. Considering a maximum 44 mm diameter hole, the provided edge distance is 92.1 mm – 44 mm / 2 = 70.1 mm > 20 mm. A secondary limitation is given in ASTM C1048-18 Section 7.7.3.3 which requires the clear distance from the edge of the hole to a corner (with angle greater than or equal to 90 degrees) be at least 6.5 times the glass thickness (6.5 * 10 mm) = 65 mm. The actual distance provided is 92.1 mm * $2^{0.5}$ – 44 mm / 2 = 108 mm > 65 mm. The provided 3-5/8-inch is therefore a conservative value which allows for an even 4 inch dimension from the center of silicone joint to center of rotule when a 3/4-inch wide joint is used (typical).

Number	Limitation	Notes
		
7.2	Rotule position may vary in any manner that does not increase the stress level in the glass beyond the requirements of item 10.	This item permits any rotule configuration to be used as long as the stress in the glass and rotule forces are acceptable per limitation item 10.
8	The movement of the supporting steel at each rotule in the direction perpendicular to the glass surface should not exceed ¼-inch relative to any other rotule of that particular glass panel.	This limitation is based upon the measured deflections from the test (see previous evaluation report for additional information). In the test, the deflection at one rotule was recorded to be approximately ¼-inch whereas none of the other supports had appreciable deflection. Therefore, limiting the warping deflection to the ¼-inch value is in line with the boundaries of the test.
9	Rotule capacity is determined using a factor of safety of 2 against tested 5% fractile values, considering unknown coefficient of variation prior to testing, and an additional material strength safety factor of 1.1. The ongoing test values	As discussed above, the original TAS 202 testing utilized 14 mm rotules. This current application proposes to use 16 mm rotules. The maximum rotule load in

Number	Limitation	Notes
	are monitored by an independent inspection program. An example test is attached.	tension from the design ASD wind load of 90 psf for a 6-foot by 6-foot panel is calculated to be (90 psf)(6 ft)(6 ft) / 4 = 810 lbs per rotule. The lowest tested value for the three RB22-16 rotules (see appendix) was determined to be 27.9 kN = 6.28 kips. The predicted 5% fractile value based upon the three tests is calculated to be 4.05 kips yielding a factor of safety of 5 against failure. For glass oriented in a vertical plane, the rotules may also be subjected to bending from the self-weight of the glass panels. In this case, the dead load is typically resisted by two rotules and the resulting force is given by (11 psf)(6 ft)(6 ft) / 2 = 198 lbs per rotule. The predicted 5% fractile value based upon the three tests is calculated to be 3.41 kips yielding a factor of safety of 17 against failure. In the case where a panel is oriented vertically and the rotule is subjected to combined tension from wind load and bending from the self-weight of the panel, a linear interaction is used to consider both loading components. Considering the values given above and a minimum factor of safety of two, the calculated interaction ratio is given as (810 lbs) / (4.05 kips / 2) + (198 lbs) / (3.41 kips / 2) = 0.52 < 1.00.
10	A structural analysis of the project glass shall be performed confirming that the panel stresses and rotule forces under the project design load do not exceed the allowable panel stresses and rotule allowable capacity. The allowable glass edge and surface stresses shall be limited to those shown in Figures 1-3 of this report (Tables 1-3 on Drawing 100). The allowable rotule capacity shall be determined per the requirements of item 9.	Even within the bounds of the testing, there are many possible geometrical configurations. As such, a stress analysis is performed for each project to confirm that the allowable stresses are less than the allowable stresses shown above in Section

Number	Limitation	Notes
		4.1.4 which have been derived from ASTM E1300, the GANA Glazing Manual, and other references. Additionally, the rotule forces from this analysis are confirmed to be less than the allowable rotule capacities.

4.3 Revision to PVB NOA Number

The covered systems utilize the Safelex® PVB interlayer produced by Eastman Chemical Company. The applicable NOA number is updated from #20-0622.01 to 23-0713.18.

5 End of Report

Appendix A

System Summary Drawing (100-0, 15 JUL 2024)

NOVUM'S POINT SUPPORTED GLASS SYSTEM: HG0A

SYSTEM DESCRIPTION:

THE NOVUM POINT SUPPORTED (HURRICANE) GLASS SYSTEM "HG0A" CONSISTS PRIMARILY OF LAMINATED GLASS AND ROTULES. SILICONE SEALANTS, SILICONE EXTRUSIONS, ALUMINUM FLASHING, AND 2-SIDED TAPE MAY BE ADDED, IF A WEATHER SEAL IS REQUIRED BY THE PROJECT. SEE FIG. 1.

THE SYSTEM HAS BEEN TESTED PER FLORIDA BUILDING CODE PROTOCOL TAS 202-94 (CRITERIA FOR TESTING IMPACT AND NON-IMPACT RESISTANT BUILDING ENVELOPE COMPONENTS USING UNIFORM STATIC AIR PRESSURE LOADING).

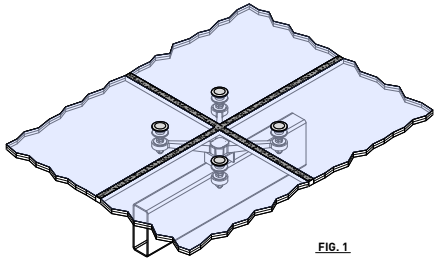


FIG. 1

TWO LAMINATED GLASS OPTIONS ARE AVAILABLE WITHIN HG0A, BASED ON LOAD LIMITATIONS DESCRIBED HEREIN.

1. 21.52mm THICK LAMINATED GLASS CONSISTING OF TWO LAYERS OF 10mm THICK FULLY TEMPERED GLASS LITES AND A 1.52mm THICK PVB INTERLAYER (CLEAR OR COLORED), WITH AN OPTIONAL DOT FRIT OR LINE FRIT ON SURFACE #2, UP TO A MAXIMUM 50% COVERAGE.

2. 17.52mm THICK LAMINATED GLASS CONSISTING OF TWO LAYERS OF 8mm THICK FULLY TEMPERED GLASS LITES AND A 1.52mm THICK PVB INTERLAYER (CLEAR OR COLORED), WITH AN OPTIONAL DOT FRIT OR LINE FRIT ON SURFACE #2, UP TO A MAXIMUM 50% COVERAGE.

THE LAMINATED GLASS IS CONNECTED TO THE SUPPORTING STRUCTURE WITH NOVUM'S RB22-16 "ROTULE". THE RB22-16 ROTULE CONSISTS PRIMARILY OF AN ARTICULATING STAINLESS STEEL HEAD AND STAINLESS STEEL M16 THREADED ROD. THE ROTULE HEAD PASSES THROUGH A HOLE IN THE GLASS AND A TIGHTENING RING ON THE HEAD CLAMPS THE ROTULE TO THE GLASS SURFACES. THE M16 THREADED ROD IS FASTENED TO HOLES IN THE SUPPORTING STRUCTURE USING STAINLESS STEEL NUTS AND WASHERS.

FOR PROJECTS REQUIRING A WEATHER SEAL, THE GLASS JOINTS CONSIST OF AN EXTRUDED SILICONE PROFILE AND SILICONE SEALANT. THE SILICONE PROFILE IS PUSHED INTO THE ¾" WIDE JOINT FROM BENEATH/INSIDE. THE SILICONE PROFILE OCCUPIES APPROXIMATELY 60% OF THE DEPTH OF THE JOINT AND ACTS AS A BACKER FOR THE SILICONE SEALANT INSTALLED FROM THE TOP/OUTSIDE. THE SILICONE SEALANT OCCUPIES APPROXIMATELY 40% OF THE DEPTH OF THE JOINT AND PROVIDES A WEATHER TIGHT SEAL.

THE STEEL GLAZING ARMS AND SUPPORT HSS FRAMEWORK USED IN THE TAS 202 TEST ARE NOT A PART OF THE "SYSTEM". ON FUTURE PROJECTS USING HG0A, THE GLAZING ARMS AND SUPPORT FRAMEWORK WILL BE DESIGNED USING CONVENTIONAL ANALYSIS, MATERIAL DESIGN, AND THE APPLICABLE BUILDING CODES. IT WILL NOT BE SUBJECT TO ADDITIONAL TESTING OR APPROVAL.

NOTE 1: LEGACY DOCUMENTS WITHIN THE HG0A SUPPORTING MATERIALS (I.E. ATI REPORT 49758.01-120-18) REFER TO "MERO STRUCTURES, INC." MERO STRUCTURES INC. WAS REBRANDED AS NOVUM STRUCTURES, LLC IN 2006. ALL LEGACY DOCUMENTS CONTAINING "MERO STRUCTURES, INC." ARE NOT REVISED, AS THAT WAS THE COMPANY NAME AT THE TIME OF THE ORIGINAL TAS 202 TESTING AND PRODUCT EVALUATION. REFER TO FLORIDA PRODUCT APPROVAL NUMBER FL3885 FOR FURTHER INFORMATION.

NOTE 2: LEGACY DOCUMENTS WITHIN THE SUPPORTING MATERIALS REFER TO THE "RB2-ROTULE, BUTTONHEAD". THE RB2 ROTULE HAD A M14 THREADED ROD. IT WAS REPLACED BY THE RB22-16 ROTULE WITH A LARGER DIAMETER M16 THREADED ROD.

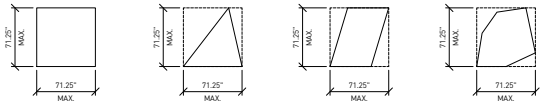
LIMITATIONS FOR USE:

1. SYSTEM IS LIMITED TO APPLICATIONS SUCH AS CANOPIES, DECORATIVE WALLS, ETC. THAT ARE ATTACHED TO THE BUILDING'S STRUCTURAL FRAME OR APPLIED TO THE BUILDING'S ENVELOPE, BUT SYSTEM MAY NOT BE PART OF THE BUILDING ENVELOPE. STAND-ALONE, OPEN STRUCTURE APPLICATIONS OF THIS SYSTEM FALL OUTSIDE THE SCOPE OF THE STATE PRODUCT APPROVAL PROGRAM. HOWEVER, STAND-ALONE APPLICATIONS MAY STILL BE USED SUBJECT TO APPROVAL BY THE LOCAL AUTHORITY HAVING JURISDICTION AND PROVIDED SUCH APPLICATIONS MEET THE REQUIREMENTS OF THE FLORIDA BUILDING CODE.

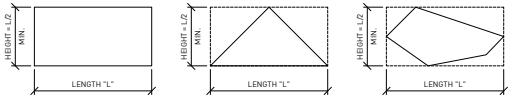
2. THE 21.52mm SYSTEM IS LIMITED TO AREAS WHERE THE LRFD (FACTORED) DESIGN WIND LOAD DOES NOT EXCEED 150psf.

3. THE 17.52mm SYSTEM IS LIMITED TO AREAS WHERE THE LRFD (FACTORED) DESIGN WIND LOAD DOES NOT EXCEED 125psf.

4. MAXIMUM OVERALL GLASS DIMENSIONS ARE 71.25" x 71.25". THIS RESULTS IN A 6'-0" SQUARE GRID WHEN USING A ¾" SILICONE JOINT BETWEEN ADJACENT PANELS. SHAPES OTHER THAN SQUARES ARE ACCEPTABLE AS LONG AS THEY MEET THE ASPECT RATIO OF ITEM 5 AND FIT WITHIN THE FOOTPRINT OF A 71.25" x 71.25" SQUARE.

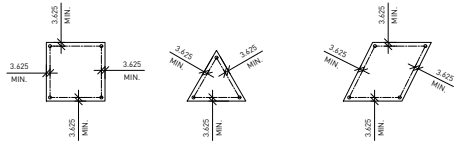


5. A MAXIMUM ASPECT RATIO OF 2:1.



6. EACH PANEL WILL BE CORNER SUPPORTED BY A RB22-16 STAINLESS STEEL ROTULE. IF TRIANGULAR PANELS ARE USED, ONLY (3) POINT SUPPORTS NEAR EACH OF THE (3) CORNERS WILL BE REQUIRED IF THE PLACEMENT OF THE POINT SUPPORTS AND STRESS IN THE PANELS MEET THE REQUIREMENTS OF ITEM 7 AND ITEM 10.

7. THE ROTULES MAY NOT BE CLOSER TO THE EDGE OF GLASS THAN 3.625". ROTULE POSITION MAY VARY IN ANY MANNER THAT DOES NOT INCREASE THE STRESS LEVEL IN THE GLASS BEYOND THE REQUIREMENTS OF ITEM 10.



8. THE MOVEMENT OF THE SUPPORTING STEEL AT EACH ROTULE IN THE DIRECTION PERPENDICULAR TO THE GLASS SURFACE SHOULD NOT EXCEED ¼" RELATIVE TO ANY OTHER ROTULE OF THAT PARTICULAR GLASS PANEL.

9. ROTULE CAPACITY IS DETERMINED USING A SAFETY FACTOR OF 2 AGAINST TESTED 5% FRACTILE VALUES, CONSIDERING UNKNOWN COEFFICIENT OF VARIATION PRIOR TO TESTING, AND AN ADDITIONAL MATERIAL STRENGTH SAFETY FACTOR OF 1.1. THE ONGOING TEST VALUES ARE MONITORED BY AN INDEPENDENT INSPECTION PROGRAM. AN EXAMPLE TEST IS ATTACHED.

10. A STRUCTURAL ANALYSIS OF THE PROJECT GLASS SHALL BE PERFORMED CONFIRMING THAT THE PANEL STRESSES AND ROTULE FORCES UNDER THE PROJECT DESIGN LOAD DO NOT EXCEED THE ALLOWABLE PANEL STRESSES AND ROTULE ALLOWABLE CAPACITY. THE ALLOWABLE GLASS EDGE AND SURFACE STRESSES SHALL BE LIMITED TO THOSE SHOWN IN TABLES 1-3 ON THIS SHEET. THE ALLOWABLE ROTULE CAPACITY SHALL BE DETERMINED PER THE REQUIREMENTS OF ITEM 9.

DESIGN PARAMETERS:

FLORIDA BUILDING CODE 2023

ARCHITECTURAL TESTING INC. (ATI) REPORT 49758.01-120-18 FOR TAS 202-94 (CRITERIA FOR TESTING IMPACT AND NON-IMPACT RESISTANT BUILDING ENVELOPE COMPONENTS USING UNIFORM STATIC AIR PRESSURE LOADING) LIMITS GLASS LOADING AS FOLLOWS:

1. TEST DESIGN LOAD (21.52mm LAMINATE) = 90psf ASD, OR 150psf LFRD (FACTORED)
2. TEST DESIGN LOAD (17.52mm LAMINATE) = 75psf ASD, OR 125psf LFRD (FACTORED)

Allowable Surface Stress				
		Allowable Principle Tensile Stress psi [MPa]		
Glass Type	Loading	Overhead Glazing (Slope < 75°) 1/1000	Vertical Glazing (Slope > 75°) 8/1000	Glass Fin Structural Glass Railing 1/1000 or less
Fully Tempered (FT)	Wind[1] (60 sec)	10200 (70.33)	11200 (77.22)	6000 (41.37)
	Seismic Load (10 min)	8833 (60.93)	9699 (66.87)	6000 (41.37)
	Maintenance Load (1 hour)	7897 (54.45)	-	6000 (41.37)
	Live Load and Roof Live Load (1 day)	6474 (44.64)	7109 (49.02)	6000 (41.37)
	Snow Load (30 days)	5235 (36.09)	-	5235 (36.09)
	Dead Load (beyond 1 year)	3810 (26.27)	4183 (28.84)	3810 (26.27)

TABLE 1 - ALLOWABLE SURFACE STRESS OF GLASS.
THE HIGHLIGHTED VALUES ABOVE ARE FROM TABLE 11 OF THE GANA GLAZING MANUAL 50TH ANNIVERSARY EDITION (CHAPTER VI), WHICH IS BASED ON CALCULATIONS PER ASTM E1300 APPENDIX X6.

Allowable Surface Stress Reduction Factor for Surfaces with Ceramic Frit in Tension		
Glass Type	Overhead Glazing (1/1000) Fin or Railing (Slope < 75°)	Vertical Glazing (8/1000) (Slope > 75°)
FT	0.84	0.79
HS	0.73	0.64

TABLE 2 - ALLOWABLE SURFACE STRESS REDUCTION FACTORS FOR SURFACES WITH CERAMIC FRIT IN TENSION.
THE HIGHLIGHTED VALUES ABOVE ARE BASED ON A RESEARCH PAPER PRESENTED BY CHRIS BARRY AT THE IGMA WINTER CONFERENCE, FLORIDA, FEBRUARY 5, 2015. THE PAPER IS CALLED "UNEXPECTED BREAKAGE IN CERAMIC ENAMELED (FRIT) HS IG SPANDRELS."

Allowable Edge Stress				
		Allowable Principle Tensile psi [MPa]		
Glass Type	Loading	Overhead Glazing (Slope < 75°) 1/1000 Ground Smooth & Polished Edges	Vertical Glazing (Slope > 75°) 8/1000 Ground Smooth & Polished Edges	Glass Fin Structural Glass Railing 1/1000 or less Ground Smooth & Polished Edges
Fully Tempered (FT)	Wind[1] (60 sec)	8002 (55.17)	8790 (60.61)	6000 (41.37)
	Seismic Load (10 min)	6929 (47.78)	7612 (52.48)	6000 (41.37)
	Maintenance Load (1 hour)	6195 (42.71)	6805 (46.92)	6000 (41.37)
	Live Load and Roof Live Load (1 day)	5079 (35.02)	5580 (38.47)	5079 (35.02)
	Snow Load (30 days)	4107 (28.31)	4511 (31.10)	4107 (28.31)
	Dead Load (beyond 1 year)	2989 (20.61)	3283 (22.64)	2989 (20.61)

TABLE 3 - ALLOWABLE EDGE STRESS.
THE HIGHLIGHTED VALUES ABOVE ARE BASED ON CALCULATIONS DERIVED FROM ASTM E1300 APPENDIX X4, X6, AND X7, AAMA 7-87.

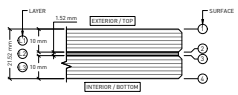
MATERIALS:

GLASS MAKEUP #1 - 21.52mm LAMINATED

L1) 10mm [CLEAR, LOW IRON OR TINTED] FULLY TEMPERED W/ OPTIONAL DOT FRIT OR LINE FRIT ON SURFACE #2, UP TO MAXIMUM 50% COVERAGE

L2) 1.52mm [CLEAR OR COLORED] PVB INTERLAYER BY EASTMAN SAFLEX (NOA 23-0713.18)

L3) 10mm [CLEAR, LOW IRON OR TINTED] FULLY TEMPERED

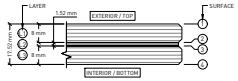


GLASS MAKEUP #2 - 17.52mm LAMINATED

L1) 8mm [CLEAR, LOW IRON OR TINTED] FULLY TEMPERED W/ OPTIONAL DOT FRIT OR LINE FRIT ON SURFACE #2, UP TO MAXIMUM 50% COVERAGE

L2) 1.52mm [CLEAR OR COLORED] PVB INTERLAYER BY EASTMAN SAFLEX (NOA 23-0713.18)

L3) 8mm [CLEAR, LOW IRON OR TINTED] FULLY TEMPERED



GLASS FITTINGS:

NOVUM'S RB22-16 ROTULE, PRIMARILY CONSISTING OF TYPE 316 SST

SILICONE SEALANTS:

DOWSIL 795 SILICONE BUILDING SEALANT, OR EQUIVALENT.
COLOR AS SPECIFIED BY PROJECT ARCHITECT.

PROJECT NUMBER REFERENCES		
PROJECT NUMBER	PROJECT NAME	COMMENTS
2022-6003	FLPA TESTING - FRIT ADDITION	PROJECT NUMBER FOR ADDING FRIT TO FLPA
23-166	CONSOLIDATED RENTAL CAR FACILITY	PROJECT FOR ORIGINAL FLPA TESTING UNDER MERO STRUCTURES IN 2003

ALL RIGHTS RESERVED. THIS DRAWING OR ANY PART THEREOF MUST NOT BE REPRODUCED WITHOUT PERMISSION OF NOVUM STRUCTURES LLC.

ENGINEER STAMP:

APPROVAL STAMP:

NOVUM STAMP:

REV.NO.	DATE	DWG.BY	CHK.BY

Novum Structures LLC
W126 N8585 Westbrook Crossing
Menomonee Falls, WI 53051 USA
T 262.255.5561
www.novumstructures.com
info@novumstructures.com

NOVUM

PROJECT:
NOVUM'S HURRICANE PSG GLASS SYSTEM: HG0A

DRAWING DESCRIPTION:
SYSTEM SUMMARY DRAWING

DRAWN BY:	DATE:
JFV	15JUL24
CHECKED BY:	APPROVED BY:
FP	TPE
SCALE:	PROJECT MANAGER:
NONE	NONE

PROJECT NUMBER:
2022-6003

SHEET NUMBER	REV
100	0

A1

15 JUL 2024 - 5:16 PM P:\PROJECTS\2022\2022-6003 FLPA TESTING - FRIT ADDITION\2103 DRAWINGS\AUTOCAD DWGS\100.DWG

Appendix B

ATI Test Report for TAS 202-94

(Report Date July 2, 2004)

Architectural Testing

METRO-DADE COUNTY
PERFORMANCE TEST REPORT

Rendered to:

MERO STRUCTURES, INC.

SERIES/MODEL: Point Supported Glass (PSG) System
PRODUCT TYPE: Canopy

Report No:	**49758.01-120-18**
Test Date:	**05/07/04**
And:	**05/25/04**
Report Date:	**07/02/04**
Expiration Date:	**05/25/14**
Metro-Dade County Notification No.:	**ATI 04032**

130 Derry Court
York, PA 17402-9405
phone: 717-764-7700
fax: 717-764-4129
www.archtest.com

Architectural Testing

METRO-DADE COUNTY PERFORMANCE TEST REPORT

Rendered to:

MERO STRUCTURES, INC.
W126 N8585 Westbrook Crossing
Menomonee Falls, Wisconsin 53051

ATI Report Identification:	49758.01-120-18
Test Date:	05/07/04
And:	05/25/04
Report Date:	07/02/04
Expiration Date:	05/25/14
Metro-Dade County Notification No.:	ATI 04032

Project Summary: Architectural Testing, Inc. (ATI) was contracted by MERO Structures, Inc. to perform testing per Florida Building Code Protocol TAS 202-94 on two Point Supported Glass (PSG) systems. Test Specimen #1 utilized 10mm laminated glass and Test Specimen #2 utilized 8mm laminated glass. Test Specimen #1 met the structural performance requirements set forth in the protocol for a ±90.0 psf *Design Pressure* rating. Test Specimen #2 met all the performance requirements set forth in the protocol for a ±75.0 psf *Design Pressure* rating. Test specimen descriptions and results are reported herein.

Test Procedure: The test specimens were evaluated in accordance with the following Florida Building Code Protocols:

TAS 202-94, *Criteria for Testing Impact and Non Impact Resistant Building Envelope Components Using Uniform Static Air Pressure Loading*.

Drawing Reference: The following drawings have been checked by ATI, and are representative of the samples tested: MERO No. 901.

Test Specimen Description:

Rough Opening Size: 11' 0-3/8" wide by 11' 1" long

Panels: 4 (2 x 2)

Panel Dimensions: One (1) 5' 11-1/4" wide by 5' 11-1/4" long
Two (2) 5' 11-1/4" wide by 4' 11-1/4" long
One (1) 4' 11-14/" wide by 4' 11-1/4" long

130 Derry Court
York, PA 17402-9405
phone: 717-764-7700
fax: 717-764-4129
www.archtest.com

Test Specimen Description: (Continued)

General Description of Mock-up: The mock-up perimeter was framed with 3" by 6" steel tubing with an average wall thickness of 0.250". The frame cross member was a 4" by 8" steel tube with an average wall thickness of 0.250". All frame connections were welded with a continuous bead with the exception of the interior frame corners. The Rotule anchor clips were fabricated from 3/4" thick steel plate and were welded to the frame members with a continuous bead.

Glazing panels were point supported in each corner with a Rotule anchor. A 3/4" joint between glazing panels was filled with a black silicone extrusion and sealed with from the exterior with a silicone sealant.

Reference MERO Drawing No. 901 (attached) for complete mock-up assembly details.

Glazing: The test specimens were glazed as follows

Test Unit #1 21.5mm laminated glass comprised of two sheets of 10mm tempered glass and a 1.52mm thick PVB interlayer.

Test Unit #2 17.5mm laminated glass comprised of two sheets of 8mm tempered glass and a 1.52mm thick PVB interlayer.

Test Results: The following results have been recorded:

Protocol TAS 202-94 *Static Air Pressure Tests*

Test Unit #1: (21.5mm laminated glass)
Design Pressure: ±90.0 psf

Title of Test	Results					
Air Infiltration						
1.57 psf (25 mph)	<0.01 cfm/ft^2					
6.24 psf (50 mph)	<0.01 cfm/ft^2					
	Indicator Readings (inch)					
	#1	#2	#3	#4	#5	#6
Structural Loads						
75% of Design Pressure (+67.50 psf)						
Maximum Deflection	0.09	0.09	0.10	0.42	0.52	0.15
Permanent Set	0.00	-0.01	-0.01	0.02	0.02	0.02
Design Pressure (+90.0 psf)						
Maximum Deflection	0.12	0.12	0.13	0.59	0.71	0.16
Permanent Set	-0.01	-0.01	-0.01	0.05	0.05	0.05
75% of Design Pressure (-67.50 psf)						
Maximum Deflection	0.10	0.10	0.10	0.46	0.60	0.30
Permanent Set	0.01	0.00	0.00	0.05	0.06	0.03
Design Pressure (-90.0 psf)						
Maximum Deflection	0.13	0.13	0.13	0.61	0.60	0.40
Permanent Set	0.01	0.00	0.00	0.06	0.08	0.05
Water Infiltration						
15% Positive Design Pressure (+13.50 psf)	Failed - Perimeter and Rotule leaks					
Structural Test Load (+180.0 psf)						
Maximum Deflection	0.23	0.36	0.23	1.00	1.52	1.00
Permanent Set	-0.02	-0.03	-0.03	0.09	0.06	0.01
Structural Test Load (-180.0 psf)						
Maximum Deflection	0.24	0.26	0.26	0.98	1.51	1.09
Permanent Set	0.00	0.00	0.00	0.05	0.04	0.08

***Note**: See ATI Sketch #1 for indicator locations.*

Test Results: (Continued)

Protocol TAS 202-94 *Static Air Pressure Tests*

Test Unit #2: (17.5mm laminated glass)
Design Pressure: ±75.0 psf

Title of Test	Results					
Air Infiltration						
1.57 psf (25 mph)	<0.01 cfm/ft^2					
6.24 psf (50 mph)	<0.01 cfm/ft^2					
	Indicator Readings (inch)					
	#1	#2	#3	#4	#5	#6
Structural Loads						
75% of Design Pressure (+56.25 psf)						
Maximum Deflection	0.07	0.07	0.07	0.37	0.68	0.55
Permanent Set	0.00	0.00	0.00	0.04	0.06	0.04
Design Pressure (+75.0 psf)						
Maximum Deflection	0.09	0.10	0.09	0.48	0.89	0.73
Permanent Set	0.00	0.00	0.00	0.05	0.08	0.06
75% of Design Pressure (-56.25 psf)						
Maximum Deflection	0.07	0.08	0.08	0.36	0.77	0.54
Permanent Set	0.00	0.00	0.00	0.03	0.07	0.05
Design Pressure (-75.0 psf)						
Maximum Deflection	0.10	0.13	0.11	0.66	0.98	0.71
Permanent Set	0.00	0.00	0.00	0.04	0.08	0.06
Water Infiltration						
15% Positive Design Pressure (+13.50 psf)	No Penetration					
Structural Test Load (+150.0 psf)						
Maximum Deflection	0.18	0.18	0.18	0.96	1.43	1.00
Permanent Set	0.00	0.00	0.00	0.10	0.10	0.05
Structural Test Load (-150.0 psf)						
Maximum Deflection	0.21	0.22	0.22	0.93	1.18	0.97
Permanent Set	0.00	0.00	0.00	0.07	0.10	0.06

***Note**: The flashing detail was not used in the assembly of Test Specimen #2. The glazing perimeter was structurally sealed. See ATI Sketch #1 for indicator locations.*

Test Equipment:

Deflection Measuring Device: 1" dial indicators, and 6" dial calipers.

Tape and film were used to seal against air leakage during structural testing. In our opinion, the tape and film did not influence the results of the test.

List of Official Observers:

Name	Company
Scott Knoblock	MERO Structures, Inc.
Thomas Dega	MERO Structures, Inc.
Mark Antonelli	MERO Structures, Inc.
Christopher Qualle	MERO Structures, Inc.
Eric Rock	Architectural Testing, Inc.
Kyle Pitts	Architectural Testing, Inc.
Joseph A. Reed, P.E.	Architectural Testing, Inc.
Scott D. Kramer	Architectural Testing, Inc.

Representative samples of the test specimen and a copy of this report will be retained by ATI for a period of ten years from the original test date. This report is the exclusive property of the client so named herein and is applicable to the sample tested. Results obtained are tested values and do not constitute an opinion or endorsement by this laboratory. This report may not be reproduced, except in full, without the approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.

Scott D. Kramer
Digitally Signed by: Scott D. Kramer

Scott D. Kramer
Technician

Joseph A. Reed
Digitally Signed by: Joseph A. Reed

Joseph A. Reed, P.E.
Director - Engineering and Product Testing

SDK:vlm

Attachments (pages):
Appendix-A: Sketch (1)
Appendix-B: Drawings (1)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	07/02/04	All	Original report issue

APPENDIX-A

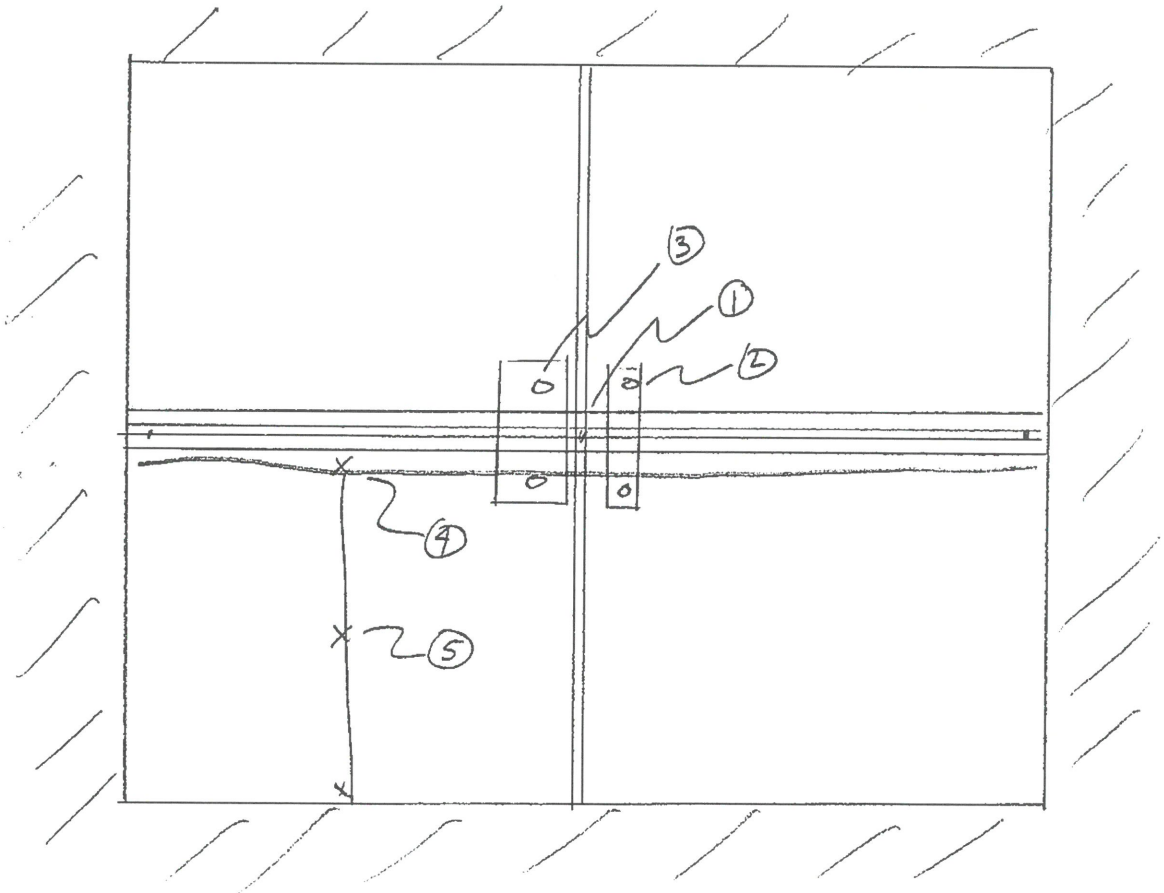
Sketch

Architectural Testing	DATE:_____ BY:_____	PROJECT NO._____ SHEET_____ OF_____ PROJECT NAME:_____

MERO DADE TEST

DADE # ATI 04032

DIAL INDICATOR LOCATIONS



① CENTER OF STEEL TUBE
② POINT SUPPORT NARROW BLOCK
③ POINT SUPPORT WIDE BLOCK
④ EDGE OF GLASS
⑤ CENTER OF GLASS

SKETCH 1

Architectural Testing

APPENDIX-B

Drawing

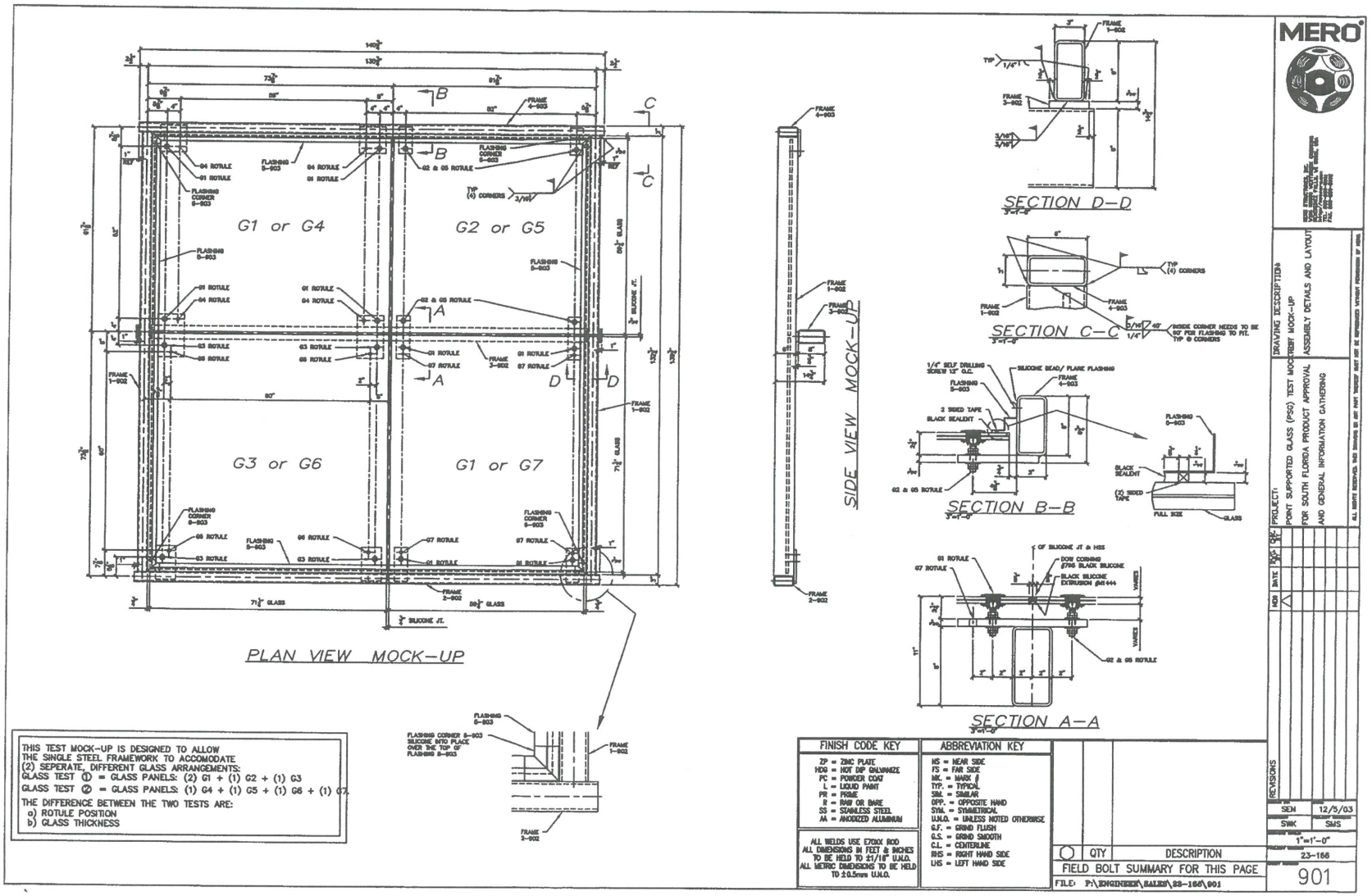
B11

Architectural Testing

Test sample complies with these details.
Deviations are noted.

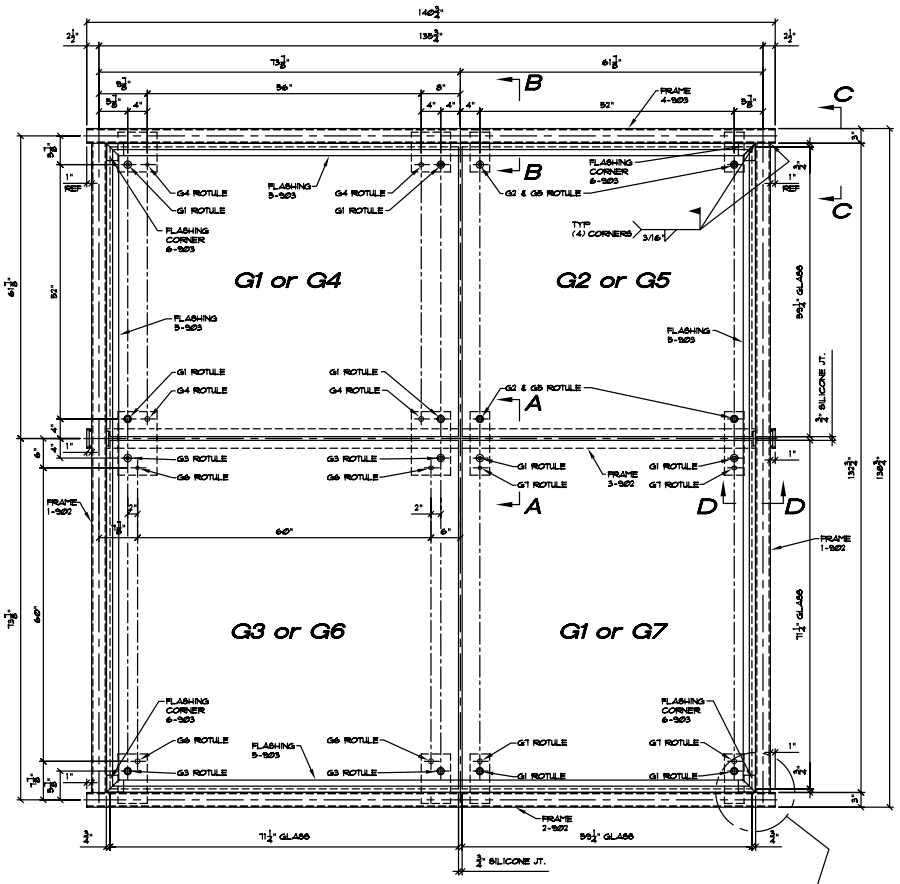
Report# 01-49758.01

Date 6-28-04 Tech SDK

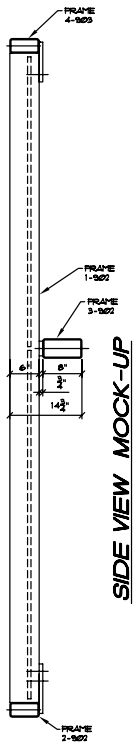


Appendix C

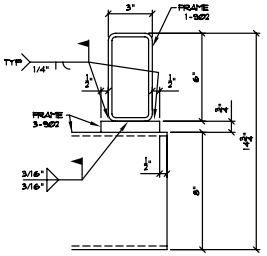
Test Mock-up Drawings for TAS 202-94



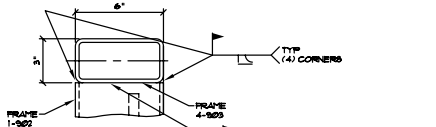
PLAN VIEW MOCK-UP



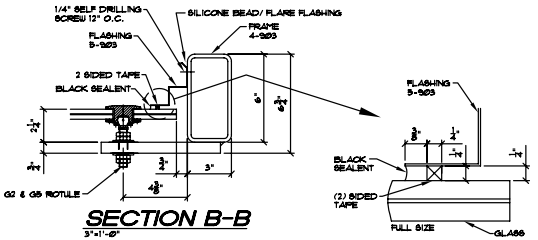
SIDE VIEW MOCK-UP



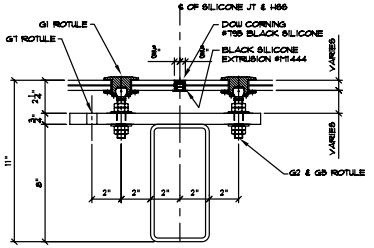
SECTION D-D
3"=1'-0"



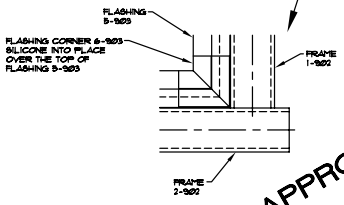
SECTION C-C
3"=1'-0"



SECTION B-B
3"=1'-0"



SECTION A-A
3"=1'-0"



THIS TEST MOCK-UP IS DESIGNED TO ALLOW THE SINGLE STEEL FRAMEWORK TO ACCOMODATE (2) SEPERATE, DIFFERENT GLASS ARRANGEMENTS:

GLASS TEST ① = GLASS PANELS: (2) G1 + (1) G2 + (1) G3

GLASS TEST ② = GLASS PANELS: (1) G4 + (1) G5 + (1) G6 + (1) G7.

THE DIFFERENCE BETWEEN THE TWO TESTS ARE:

a) ROTULE POSITION

b) GLASS THICKNESS

APPROVED FOR FABRICATION

FINISH CODE KEY	ABBREVIATION KEY
ZP = ZINC PLATE HDG = HOT DIP GALVANIZE PC = POWDER COAT L = LIQUID PAINT PR = PRIME R = RAW OR BARE SS = STAINLESS STEEL AA = ANODIZED ALUMINUM	NS = NEAR SIDE FS = FAR SIDE MK. = MARK # TYP. = TYPICAL SIM. = SIMILAR OPP. = OPPOSITE HAND SYM. = SYMMETRICAL U.N.O. = UNLESS NOTED OTHERWISE G.F. = GRIND FLUSH G.S. = GRIND SMOOTH C.L. = CENTERLINE RHS = RIGHT HAND SIDE LHS = LEFT HAND SIDE
ALL WELDS USE E70XX ROD ALL DIMENSIONS IN FEET & INCHES TO BE HELD TO ±1/16" U.N.O. ALL METRIC DIMENSIONS TO BE HELD TO ±0.5mm U.N.O.	

⬡	QTY	DESCRIPTION
FIELD BOLT SUMMARY FOR THIS PAGE		

FILE: P:\ENGINEER\SALES\23-166\901

MERO®

MERO STRUCTURES, INC.
NORTH AMERICAN OFFICE
MERO-RAUMTRAGWERKE GMBH
TEL: 757-873-2000
FAX: 800-253-3092

DRAWING DESCRIPTION: TEST MOCK-UP
ASSEMBLY DETAILS AND LAYOUT

PROJECT: POINT SUPPORTED GLASS (9902) TEST MOCK-UP
FOR SOUTH FLORIDA PRODUCT APPROVAL AND GENERAL INFORMATION GATHERING

ALL RIGHTS RESERVED. THIS DRAWING OR ANY PART THEREOF MUST NOT BE REPRODUCED WITHOUT PERMISSION OF MERO.

NUM	DATE	DWG. BY	CHK. BY

REVISIONS

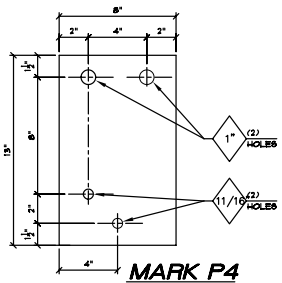
DRAWN BY:	DATE:
SEN	12/5/03
ENGINEER:	PROJECT MANAGER:
SWK	SMS

DRAWING SCALE: 1"=1'-0"

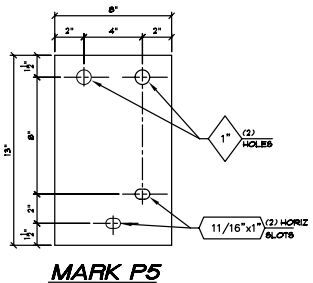
PROJECT NUMBER: 23-166

SHEET NUMBER: 901

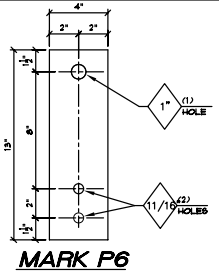
C1



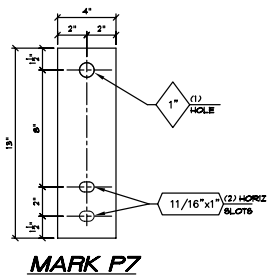
MARK P4



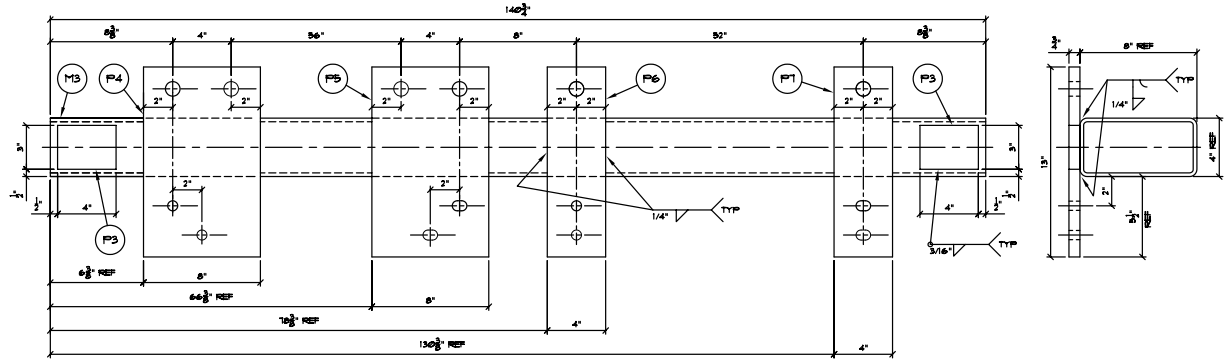
MARK P5



MARK P6



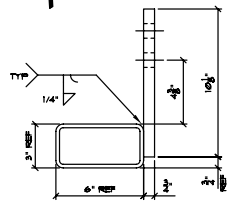
MARK P7

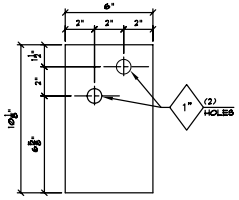


1 REQ'D - FRAME - #3-902

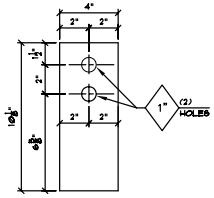
1 REQ'D - FRAME - #2-902

2 REQ'D - FRAME - #1-902





MARK P2



MARK P1

BILL OF MATERIAL				PHASE: U.N.O. MATERIAL ASTM A36		
FAB.	MK.	QTY	DESCRIPTION	LENGTH	PC WT	TOTAL WT	REMARKS
1		2	FRAME		155	310	FR
	M1	2	HSS 6 X 3 X 1/4	11'-0 3/4"			IN STOCK
2		1	FRAME		210	210	FR
	P1	2	3/4" PL X 4"	0'-10 1/8"			
	P2	2	3/4" PL X 6"	0'-10 1/8"			
	M2	1	HSS 6 X 3 X 1/4	11'-8 3/4"			IN STOCK
3		1	FRAME		295	295	FR
	P3	2	3/4" PL X 3"	0'-4"			
	P4	1	3/4" PL X 8"	1'-1"			
	P5	1	3/4" PL X 8"	1'-1"			
	P6	1	3/4" PL X 4"	1'-1"			
	P7	1	3/4" PL X 4"	1'-1"			
	M3	1	HSS 8 X 4 X 1/4	11'-8 3/4"			IN STOCK

APPROVED FOR FABRICATION

FINISH CODE KEY
ZP = ZINC PLATE HDG = HOT DIP GALVANIZE PC = POWDER COAT L = LIQUID PAINT PR = PRIME R = RAW OR BARE SS = STAINLESS STEEL AA = ANODIZED ALUMINUM
ALL WELDS USE E70XX ROD ALL DIMENSIONS IN FEET & INCHES TO BE HELD TO ±1/16" U.N.O. ALL METRIC DIMENSIONS TO BE HELD TO ±0.5mm U.N.O.

ABBREVIATION KEY
NS = NEAR SIDE FS = FAR SIDE MK. = MARK # TYP. = TYPICAL SIM. = SIMILAR OPP. = OPPOSITE HAND SYM. = SYMMETRICAL U.N.O. = UNLESS NOTED OTHERWISE G.F. = GRIND FLUSH G.S. = GRIND SMOOTH C.L. = CENTERLINE RHS = RIGHT HAND SIDE LHS = LEFT HAND SIDE

QTY	DESCRIPTION
	FIELD BOLT SUMMARY FOR THIS PAGE

FILE: P:\ENGINEER\SALES\23-166\902

MERO

MERO STRUCTURES, INC.
NORTHRIDGE OFFICE
NORTHRIDGE, CALIFORNIA
TEL: 818-886-2562
FAX: 818-886-3992

DRAWING DESCRIPTION: TEST MOCK-UP STEEL FABRICATION DRAWING

PROJECT: POINT SUPPORTED GLASS (PSG) TEST MOCK-UP FOR SOUTH FLORIDA PRODUCT APPROVAL AND GENERAL INFORMATION GATHERING

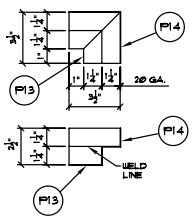
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NO#	DATE	DWG BY	CHK BY

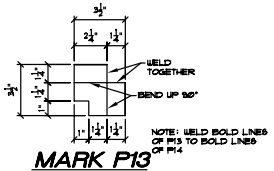
REVISIONS

DRAWN BY:	DATE:
SEN	12/5/03
ENGINEER:	PROJECT MANAGER:
SMS	SMS
DRAWING SCALE:	
3"=1'-0"	
PROJECT NUMBER:	
23-166	
SHEET NUMBER:	
902	

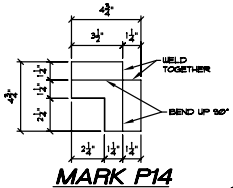
C2



4 REQ'D - FLASHING CORNER - #6-903

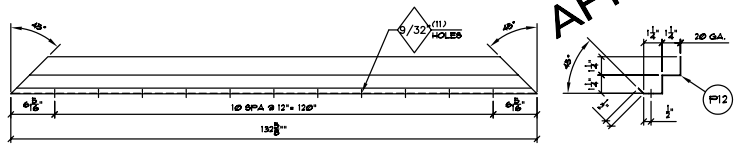


MARK P13



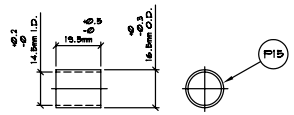
MARK P14

APPROVED FOR FABRICATION



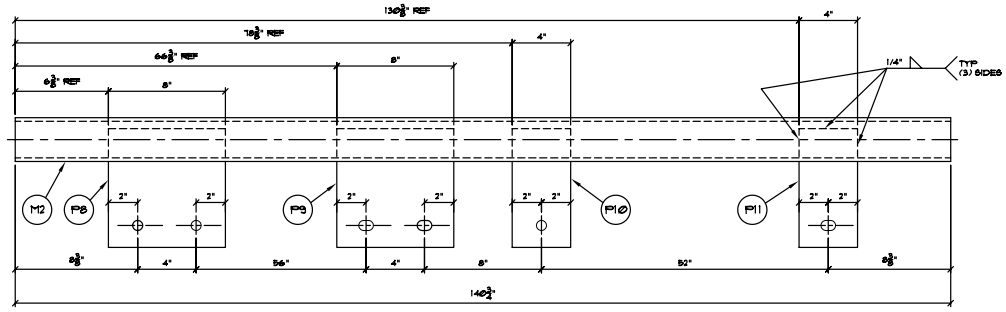
4 REQ'D - FLASHING - #5-903

Ø0 (44)

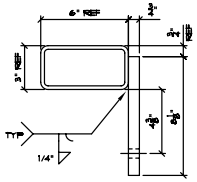


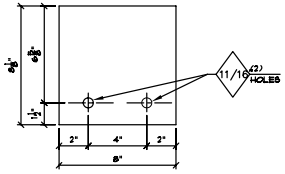
16 REQ'D - ROTULE RING INSERT - #7-903

1:1

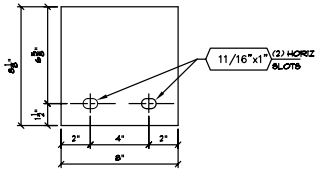


1 REQ'D - FRAME - #4-903

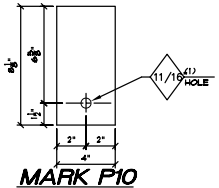




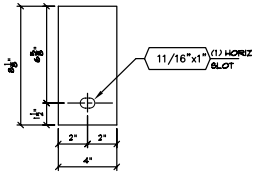
MARK P8



MARK P9



MARK P10



MARK P11

BILL OF MATERIAL					PHASE: U.N.O. MATERIAL ASTM A36		
FAB.	MK.	QTY	DESCRIPTION	LENGTH	PC WT	TOTAL WT	REMARKS
4		1	FRAME		205	205	FR
	P8	1	3/4" PL X 8"	0'-8 1/8"			
	P9	1	3/4" PL X 8"	0'-8 1/8"			
	P10	1	3/4" PL X 4"	0'-8 1/8"			
	P11	1	3/4" PL X 4"	0'-8 1/8"			
	M2	1	HSS 6 X 3 X 1/4	11'-8 3/4"			IN STOCK
5		4	FLASHING		2	8	R
	P12	4	20 GA SHT X T.B.D.	11'-0 5/8"			ALUM.
6		4	FLASHING CORNER		.1	.4	R
	P13	4	20 GA SHT X 3 1/2"	0'-3 1/2"			ALUM.
	P14	4	20 GA SHT X 4 3/4"	0'-4 3/4"			ALUM.
7		16	ROTULE RING INSERT		.1	1.6	R
	P15	16	14.5mm I.D. / 16.5mm O.D.	19.5 mm			S.S.

FINISH CODE KEY
ZP = ZINC PLATE HDG = HOT DIP GALVANIZE PC = POWDER COAT L = LIQUID PAINT PR = PRIME R = RAW OR BARE SS = STAINLESS STEEL AA = ANODIZED ALUMINUM
ALL WELDS USE E70XX ROD ALL DIMENSIONS IN FEET & INCHES TO BE HELD TO ±1/16" U.N.O. ALL METRIC DIMENSIONS TO BE HELD TO ±0.5mm U.N.O.

ABBREVIATION KEY
NS = NEAR SIDE FS = FAR SIDE MK. = MARK # TYP. = TYPICAL SIM. = SIMILAR OPP. = OPPOSITE HAND SYM. = SYMMETRICAL U.N.O. = UNLESS NOTED OTHERWISE G.F. = GRIND FLUSH G.S. = GRIND SMOOTH C.L. = CENTERLINE RHS = RIGHT HAND SIDE LHS = LEFT HAND SIDE

	QTY	DESCRIPTION
100	44	1/4"Ø SELF DRILLING SCREW 3/4" LG

FIELD BOLT SUMMARY FOR THIS PAGE

FILE: P:\ENGINEER\SALES\23-166\903

MERO

MERO STRUCTURES, INC.
1359 HIGHWAY 25/70 BYPASS
MORGANTOWN, KY 42261, USA
TEL: 502-526-5566
FAX: 502-526-5992

DRAWING DESCRIPTION: TEST MOCK-UP FABRICATION DRAWING

PROJECT: POINT SUPPORTED GLASS (PSG) TEST MOCK-UP FOR SOUTH FLORIDA PRODUCT APPROVAL AND GENERAL INFORMATION GATHERING

ALL RIGHTS RESERVED. THIS DRAWING OR ANY PART THEREOF MUST NOT BE REPRODUCED WITHOUT PERMISSION OF MERO.

NO.	DATE	DWG. BY	CHK. BY

REVISIONS

DRAWN BY: SEN — DATE: 12/5/03
ENGINEER: SWK — PROJECT MANAGER: SMG
DRAWING SCALE: 3"=1'-0"
PROJECT NUMBER: 23-166
SHEET NUMBER: 903

C3

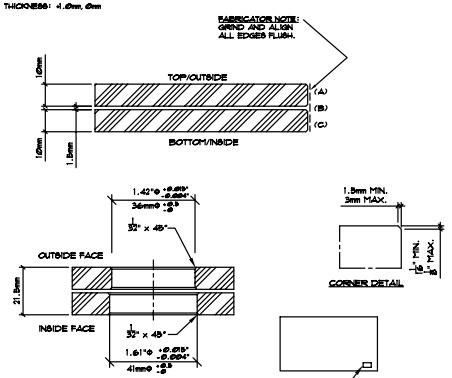
MERO	SOUTH FLORIDA TEST MOCK-UP	SHEET NO.: G0-A	BY: SEN
		PROJ. NO. 23-166	DATE: 12/5/03

GLASS SPECIFICATION:

(A:) 10mm CLEAR OUTER LITE - FULLY TEMPERED
(B:) 1.5mm CLEAR PVB INTER LAYER
(C:) 10mm CLEAR INNER LITE - FULLY TEMPERED

ALL GLASS PANELS WITH CHAMFERED AND GROUND AND (4) FOUR DRILLED HOLES NO POLISHED EDGES

TOLERANCES:
±1.0mm, -1.0mm FOR WIDTH, LENGTH AND DIAGONALS.
LOCATION OF HOLES: ±1.0mm, -1.0mm IN BOTH DIRECTIONS.
ALIGNMENT OF LAMINATION: ±1.0mm, -1.0mm
THICKNESS: ±1.0mm, 0mm

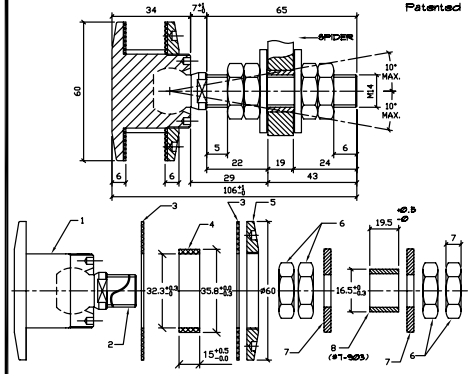


HOLE DETAIL

L:\ENGINEER\PSG HANDBOOK\5\GLASS FABS\5B\LAMINATED\13-16 LAM-BUTTON

MERO	SOUTH FLORIDA TEST MOCK-UP	SHEET NO.: 904	BY: SEN
		PROJ. NO. 23-166	DATE: 12/5/03

Patented



RB2-ROTULE,BUTTONHEAD, 34mm/M14 x 65

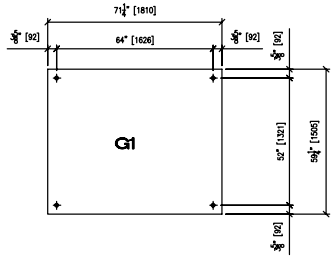
USED WITH GLASS THICKNESS OF: 20mm (13/16")
TOLERANCE ± 1mm IF NOT SHOWN

PART #	QTY	DESIGNATION	MATERIAL
1	1	BALL JOINT HOUSING	STAINLESS STEEL AISI 316L
2	1	BALL JOINT/THRD ROD M14 x 65	STAINLESS STEEL EN 10088-3 X 4 CNIMO 16-5-1
3	2	CONTACT WASHER	NYLON (BLACK)
4	1	ROTULE SLEEVE	ALUMINUM
5	1	TIGHTENING RING (60mm)	STAINLESS STEEL AISI 316L
6	4	M14 JAM NUT	STAINLESS STEEL A4
7	2	36mm OD x 15ID x 3mm WASHERS	STAINLESS STEEL AISI 316L
8	1	SEE FAB #1-905	STAINLESS STEEL AISI 303 19.5mm LG

16-REQ'D MERO PART# 161-102

L:\ENGINEER\PSG HANDBOOK\6\ROTULE FABS\RB2 BUTTONHEAD

MERO	SOUTH FLORIDA TEST MOCK-UP	SHEET NO.: G1	BY: SEN
		PROJ. NO. 23-166	DATE: 12/5/03

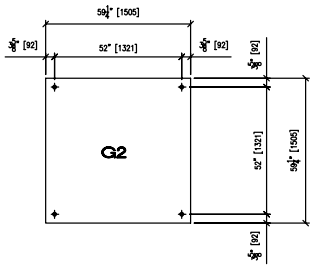


QUANTITY REQ'D= 2

GLASS PANELS SEEN FROM OUTSIDE.
FOR GLASS MAKE-UP SEE SHEET G0-A

TOLERANCES:
±1.0mm, -1.0mm FOR WIDTH, LENGTH AND DIAGONALS.
LOCATION OF HOLES: ±1.0mm, -1.0mm IN BOTH DIRECTIONS.
ALIGNMENT OF LAMINATION: ±1.0mm, -1.0mm
THICKNESS: ±1.0mm, 0mm
BOW : < 0.1%

MERO	SOUTH FLORIDA TEST MOCK-UP	SHEET NO.: G2	BY: SEN
		PROJ. NO. 23-166	DATE: 12/5/03

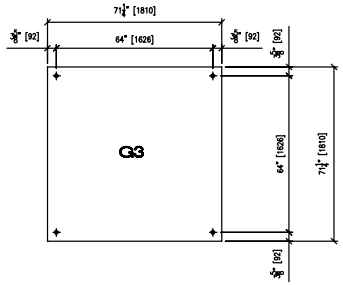


QUANTITY REQ'D= 1

GLASS PANELS SEEN FROM OUTSIDE.
FOR GLASS MAKE-UP SEE SHEET G0-A

TOLERANCES:
±1.0mm, -1.0mm FOR WIDTH, LENGTH AND DIAGONALS.
LOCATION OF HOLES: ±1.0mm, -1.0mm IN BOTH DIRECTIONS.
ALIGNMENT OF LAMINATION: ±1.0mm, -1.0mm
THICKNESS: ±1.0mm, 0mm
BOW : < 0.1%

MERO	SOUTH FLORIDA TEST MOCK-UP	SHEET NO.: G3	BY: SEN
		PROJ. NO. 23-166	DATE: 12/5/03



QUANTITY REQ'D= 1

GLASS PANELS SEEN FROM OUTSIDE.
FOR GLASS MAKE-UP SEE SHEET G0-A

TOLERANCES:
±1.0mm, -1.0mm FOR WIDTH, LENGTH AND DIAGONALS.
LOCATION OF HOLES: ±1.0mm, -1.0mm IN BOTH DIRECTIONS.
ALIGNMENT OF LAMINATION: ±1.0mm, -1.0mm
THICKNESS: ±1.0mm, 0mm
BOW : < 0.1%

APPROVED FOR FABRICATION

INSTALLER NOTE

INSPECTION OF GLASS PANELS ON SITE

* WHILE OPENING THE PACKING CRATES, VISUAL INSPECTION FOR BREAKAGE MUST BE MADE.

* WHILE THE PANELS ARE LIFTED FROM THE PACKING CRATES, THEY MUST BE CHECKED FOR DAMAGES TO THE EDGES (SCALLOPS, CHIPPING) AND SCRATCHES.

* DIMENSIONS OF PANELS MUST BE CHECKED.

* THE PANELS MUST BE MARKED.

* WHILE OPENING EACH PACKING CRATE, THE CONDITION OF EVERY SINGLE PANEL MUST BE NOTED SEPARATELY IN A WRITTEN INSPECTION REPORT.

* PANELS WITH SCALLOPS IN THE AREAS OF THE DRILLED HOLES MUST NOT BE INSTALLED.

* SCALLOPS OF UP TO 2mm ARE ADMISSABLE NEAR THE OUTER EDGES.

* USE A SAMPLE ROTULE WITH INNER ALUMINUM RING AS A TEMPLATE AND INSERT IT INTO ALL HOLES TO MAKE SURE THE HOLES IN THE TWO GLASS PLATES OF THE LAMINATED GLASS ARE CORRECTLY CENTERED ON TOP OF EACH OTHER, AND THE ROTULE FITS INTO EACH HOLE.

INSPECTION REPORT (EXAMPLE)

Delivered on mm/dd/yy , packing crate no. XX

Pos.	Nos.	Remarks
1	2	Scallops Scratches Breakage, etc.
2	15	o.k.

FILE: P:\ENGINEER\SALES\23-166\904

MERO

MERO STRUCTURES, INC.
8700 CORPORATE CENTER DRIVE
MIAMI, FLORIDA 33126
TEL: 305-477-6406
FAX: 305-253-3592

DRAWING DESCRIPTION:
TEST MOCK-UP
GLASS FABRICATION

PROJECT:
POINT SUPPORTED GLASS (PSG) TEST MOCK-UP
FOR SOUTH FLORIDA PRODUCT APPROVAL
AND GENERAL INFORMATION GATHERING

ALL RIGHTS RESERVED. THIS DRAWING OR ANY PART THEREOF MUST NOT BE REPRODUCED WITHOUT PERMISSION OF MERO.

NO.	REVISIONS	DATE	DWG. BY	CHK. BY
1				

DRAWN BY: SEN
DATE: 12/5/03
ENGINEER: SWK
PROJECT MANAGER: SMS
DRAWING SCALE: 1/2"=1'-0"
PROJECT NUMBER: 23-166
SHEET NUMBER: 904

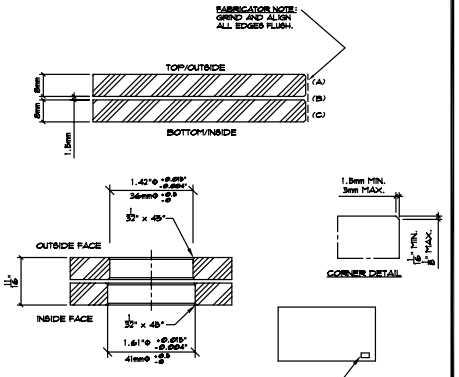
MERO	SOUTH FLORIDA TEST MOCK-UP	SHEET NO.: G0-B	BY: SEN
		PROJ. NO. 23-166	DATE: 12/5/03

GLASS SPECIFICATION:

(A) 8mm CLEAR OUTER LITE - FULLY TEMPERED
(B) 1.5mm CLEAR PVB INTER LAYER
(C) 8mm CLEAR INNER LITE - FULLY TEMPERED

ALL GLASS PANELS WITH CHAMFERED AND GROUND AND (4) FOUR DRILLED HOLES NO POLISHED EDGES

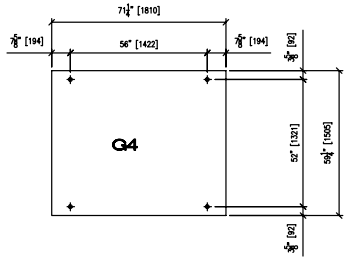
TOLERANCES:
+1.0mm, -1.0mm FOR WIDTH, LENGTH AND DIAGONALS.
LOCATION OF HOLES: +1.0mm, -1.0mm IN BOTH DIRECTIONS.
ALIGNMENT OF LAMINATION: +1.0mm, -1.0mm
THICKNESS: +1.0mm, 0mm



HOLE DETAIL

L:\ENGINEER\PSG HANDBOOK\5\GLASS FABS\2B LAMINATED\13-16 TAM BUTTON

MERO	SOUTH FLORIDA TEST MOCK-UP	SHEET NO.: G4	BY: SEN
		PROJ. NO. 23-166	DATE: 12/5/03

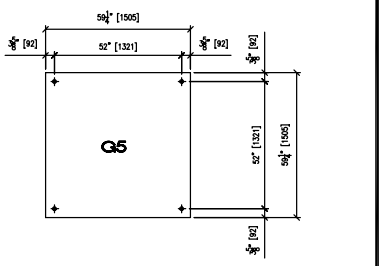


QUANTITY REQ'D= 1

GLASS PANELS SEEN FROM OUTSIDE.
FOR GLASS MAKE-UP SEE SHEET G0-B

TOLERANCES:
+1.0mm, -1.0mm FOR WIDTH, LENGTH AND DIAGONALS.
LOCATION OF HOLES: +1.0mm, -1.0mm IN BOTH DIRECTIONS.
ALIGNMENT OF LAMINATION: +1.0mm, -1.0mm
THICKNESS: +1.0mm, 0mm
BOW : < Ø.1%

MERO	SOUTH FLORIDA TEST MOCK-UP	SHEET NO.: G5	BY: SEN
		PROJ. NO. 23-166	DATE: 12/5/03

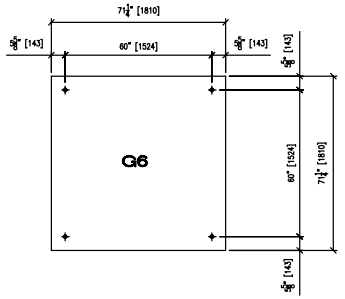


QUANTITY REQ'D= 1

GLASS PANELS SEEN FROM OUTSIDE.
FOR GLASS MAKE-UP SEE SHEET G0-B

TOLERANCES:
+1.0mm, -1.0mm FOR WIDTH, LENGTH AND DIAGONALS.
LOCATION OF HOLES: +1.0mm, -1.0mm IN BOTH DIRECTIONS.
ALIGNMENT OF LAMINATION: +1.0mm, -1.0mm
THICKNESS: +1.0mm, 0mm
BOW : < Ø.1%

MERO	SOUTH FLORIDA TEST MOCK-UP	SHEET NO.: G6	BY: SEN
		PROJ. NO. 23-166	DATE: 12/5/03

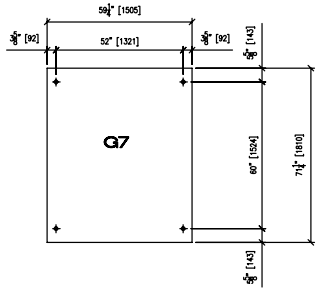


QUANTITY REQ'D= 1

GLASS PANELS SEEN FROM OUTSIDE.
FOR GLASS MAKE-UP SEE SHEET G0-B

TOLERANCES:
+1.0mm, -1.0mm FOR WIDTH, LENGTH AND DIAGONALS.
LOCATION OF HOLES: +1.0mm, -1.0mm IN BOTH DIRECTIONS.
ALIGNMENT OF LAMINATION: +1.0mm, -1.0mm
THICKNESS: +1.0mm, 0mm
BOW : < Ø.1%

MERO	SOUTH FLORIDA TEST MOCK-UP	SHEET NO.: G7	BY: SEN
		PROJ. NO. 23-166	DATE: 12/5/03



QUANTITY REQ'D= 1

GLASS PANELS SEEN FROM OUTSIDE.
FOR GLASS MAKE-UP SEE SHEET G0-B

TOLERANCES:
+1.0mm, -1.0mm FOR WIDTH, LENGTH AND DIAGONALS.
LOCATION OF HOLES: +1.0mm, -1.0mm IN BOTH DIRECTIONS.
ALIGNMENT OF LAMINATION: +1.0mm, -1.0mm
THICKNESS: +1.0mm, 0mm
BOW : < Ø.1%

APPROVED FOR FABRICATION

INSTALLER NOTE

INSPECTION OF GLASS PANELS ON SITE

* WHILE OPENING THE PACKING CRATES, VISUAL INSPECTION FOR BREAKAGE MUST BE MADE.

* WHILE THE PANELS ARE LIFTED FROM THE PACKING CRATES, THEY MUST BE CHECKED FOR DAMAGES TO THE EDGES (SCALLOPS, CHIPPING) AND SCRATCHES.

* DIMENSIONS OF PANELS MUST BE CHECKED.

* THE PANELS MUST BE MARKED.

* WHILE OPENING EACH PACKING CRATE, THE CONDITION OF EVERY SINGLE PANEL MUST BE NOTED SEPARATELY IN A WRITTEN INSPECTION REPORT.

* PANELS WITH SCALLOPS IN THE AREAS OF THE DRILLED HOLES MUST NOT BE INSTALLED.

* SCALLOPS OF UP TO 2mm ARE ADMISSABLE NEAR THE OUTER EDGES.

* USE A SAMPLE ROTULE WITH INNER ALUMINUM RING AS A TEMPLATE AND INSERT IT INTO ALL HOLES TO MAKE SURE THE HOLES IN THE TWO GLASS PLATES OF THE LAMINATED GLASS ARE CORRECTLY CENTERED ON TOP OF EACH OTHER, AND THE ROTULE FITS INTO EACH HOLE.

INSPECTION REPORT (EXAMPLE)

Delivered on mm/dd/yy , packing crate no. XX

Pos.	Nos.	Remarks
1	2	Scallops Scratches Breakage, etc.
2	15	o.k.

FILE: P:\ENGINEER\SALES\23-166\905

MERO

MERO STRUCTURES, INC.
NORTH AMERICAN HEADQUARTERS
8614 WESTWAY PARK BLVD.
HOUSTON, TEXAS 77063
TEL: 713-783-7600
FAX: 832-253-3092

DRAWING DESCRIPTION:
TEST MOCK-UP
GLASS FABRICATION

PROJECT:
POINT SUPPORTED GLASS (PSG) TEST MOCK-UP
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NOM	DATE	DWG. BY	CHK. BY

REVISIONS

DRAWN BY:	DATE:
SEN	12/5/03
ENGINEER:	PROJECT MANAGER:
SWK	SMS

DRAWING SCALE: 1/2"=1'-0"

PROJECT NUMBER: 23-166

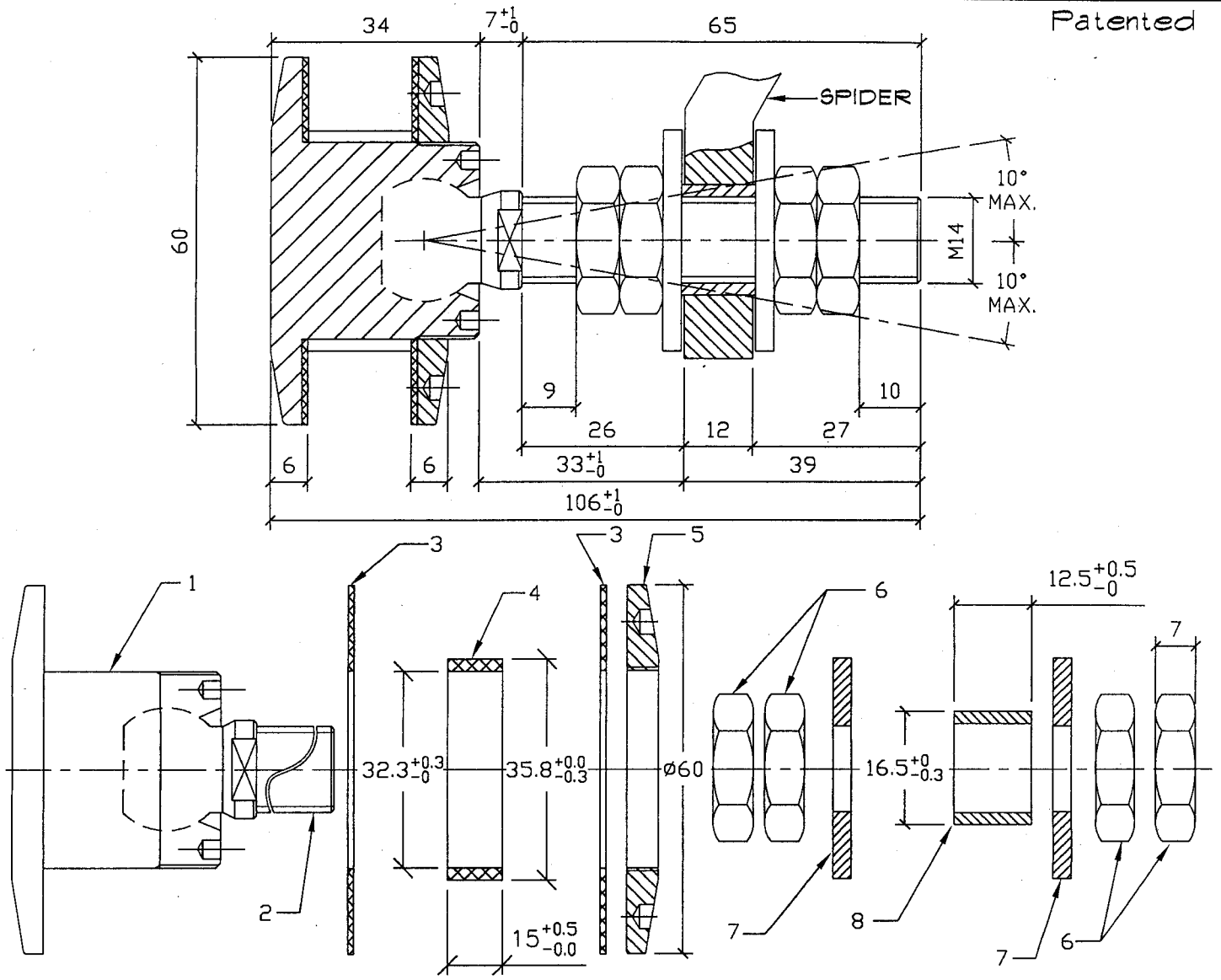
SHEET NUMBER: 905

Appendix D

RB2 Rotule Drawing for TAS 202-94 Test

MERO®	RB2 BUTTONHEAD ROTULE (MERO STOCK)	SHEET NO.:	BY:
		PROJ. NO.	DATE:

Patented



RB2-ROTULE,BUTTONHEAD, 34mm/M14 x 65

USED WITH GLASS THICKNESS OF: 17mm (11/16"), 19mm (3/4"), 20mm (13/16"), AND SPIDER THICKNESS OF 12mm (1/2")
TOLERANCE ± 1mm IF NOT SHOWN

PART #	QTY	DESIGNATION	MATERIAL
1	1	BALL JOINT HOUSING	STAINLESS STEEL AISI 316L
2	1	BALL JOINT/THRD ROD M14 x 65	STAINLESS STEEL EN 10088-3 X 4 CrNiMo 16-5-1
3	2	CONTACT WASHER	NYLON (BLACK)
4	1	ROTULE SLEEVE	ALUMINUM
5	1	TIGHTENING RING (60mm)	STAINLESS STEEL AISI 316L
6	4	M14 JAM NUT	STAINLESS STEEL A4
7	2	36mm ODx15IDx3mm WASHERS	STAINLESS STEEL AISI 316L
8	1	RING INSERT 14.5mm ID (+0.2 -0)	STAINLESS STEEL AISI 303

XX-REQ'D MERO PART# 161-102

Appendix E

Test Report for RB2 Rotule

Failure Analysis · Materials Testing · Product Evaluation

2345 S. 170th Street
New Berlin, Wisconsin 53151-2701 USA

Telephone : (262) 782-6344
Toll Free : (800) 726-6385
Telefax : (262) 782-3653
E-Mail : stork.technimet@stork.com
Website : www.storktechnimet.com

Mr. Thomas Dega
Mero Structures, Inc.
W126 N8585 Westbrook Crossing
Menomonee Falls, WI 53051

Report No. 0404-09609

TENSION AND BEND TESTS OF A ROTULE

Anna Mayhew-Rozek

May 11, 2004

It is our policy to retain components and sample remnants for a minimum of 30 days from the report date, after which time they may be discarded. The data herein represents only the item(s) tested. This report shall not be reproduced, except in full, without prior permission of Stork Technimet, Inc.

I. DESCRIPTION AND PURPOSE

Four RB2 14mm x 65 mm long rotules were received for evaluation. The rotules are used to hold glass. The rotules are comprised of a mushroom head (for the glass) and a threaded stem (for a steel plate). The two parts are attached by a ball and socket joint. It was requested to test the joint of four rotules, in two orientations. The axial force to separate the ball and socket joint and the force to bend a rotule, with a deflection of 0.25 inches, was required.

II. TEST SETUP

Tension Test

A fixture was designed and fabricated to hold the rotule in place so a universal test machine could pull it apart as shown in Figure 1 and 2. The mushroom head of the rotule fit through a hole in a 0.5" thick steel plate. A nut tightened the head to the fixture plate. Another set of nuts, steel plate, and a washer were threaded onto the stem. A coupler fit around the nuts and washer. The Universal Test machine was used to test the rotule in tension. The load versus deflection was recorded for one of the two tension tests. In each test, the ball pulled out of the socket. It should be noted that in the first test, the mushroom head of the rotule was not fixed with a nut on the bottom of the plate, and therefore, the maximum load was not as high as the second. The deflection data from the first test was not recorded, but only the maximum load to failure was. The trace of load versus deflection is included in Figure 3. The displacements of the rotule measured at increments of 500 lbs. to the maximum load are included in Table 1. The maximum loads are included in Table 2.

Bend Test

A fixture was designed and fabricated to hold the rotule horizontally as shown in Figure 4 and 5. Nuts were used to fasten the rotule to the angle and bottom fixture. A universal test machine compressed one side of the fixture, which resulted in bending the rotule. The load versus deflection was recorded and the traces from the two tests are included in Figure 3. The displacements of the rotule were measured at increments of 500 lbs. and are included in Table 3. The maximum loads are included in Table 2.

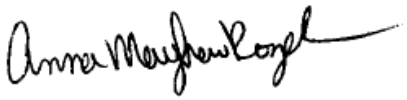
III. RESULTS

The tension strength of the rotules was 4,700 lbs. without a nut holding the mushroom head on a steel plate and 6,920 lbs. with a nut. The second rotule elongated 0.146 inches at the maximum load.

The bend strength of the rotules, in the horizontal position, averaged 4,090 lbs. The average deflection of the rotules was approximately 0.562 inches under the maximum load.

If you have any questions concerning the contents of this report, please contact me. The rotules were returned on April 28, 2004.

Respectfully submitted,



Anna Mayhew-Rozek
Mechanical Engineer

Table 1

Results of Tension Test 2

Load, lbs.	Displacement, inches
500	0.034
1,000	0.046
1,500	0.058
2,000	0.064
2,500	0.069
3,000	0.073
3,500	0.078
4,000	0.083
4,500	0.088
5,000	0.094
5,500	0.100
6,000	0.108
6,500	0.118

Table 2

Results of the Tests

Description of Test	Maximum Load, lbs.	Displacement, inches
Tension Test 1	4,700	N.R.
Tension Test 2	6,920	0.146
Bend Test 1	3,950	0.559
Bend Test 2	4,230	0.566

N.R. = Not Recorded

Table 3

Bend Test Results

Load, lbs.	Displacement, inches	
	Test 1	Test 2
500	0.000	0.069
1,000	0.140	0.141
1,500	0.203	0.242
2,000	0.298	0.310
2,500	0.376	0.375
3,000	0.429	0.425
3,500	0.502	0.487
4,000	N.A.	0.535

N.A. = Not Applicable

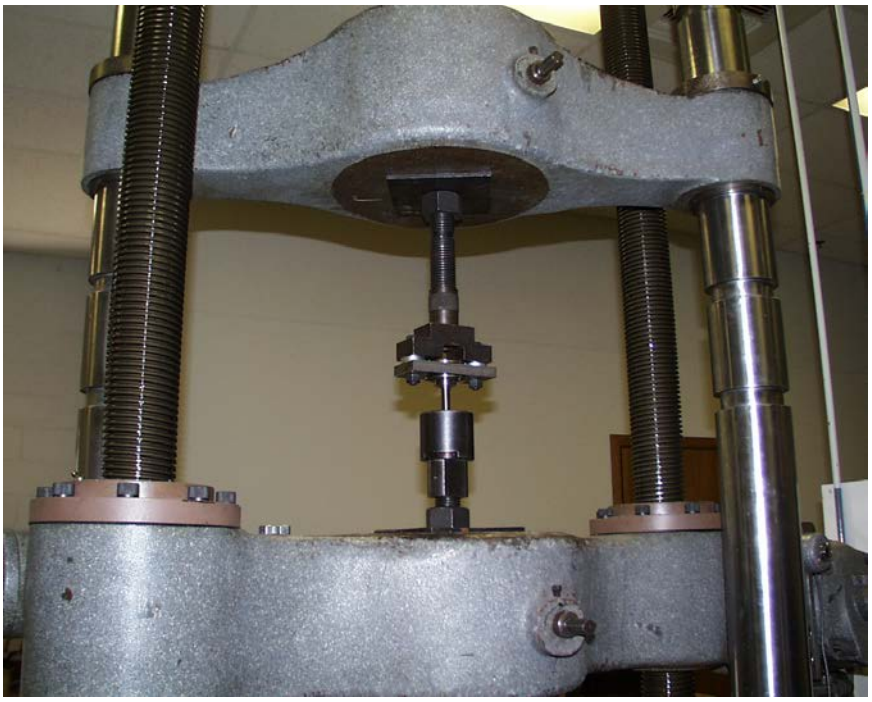


Fig. 1 - The rotules were tested in a Universal Test machine.



Fig. 2 - A nut was fastened against the steel plate that fit through the mushroom head of the rotule.

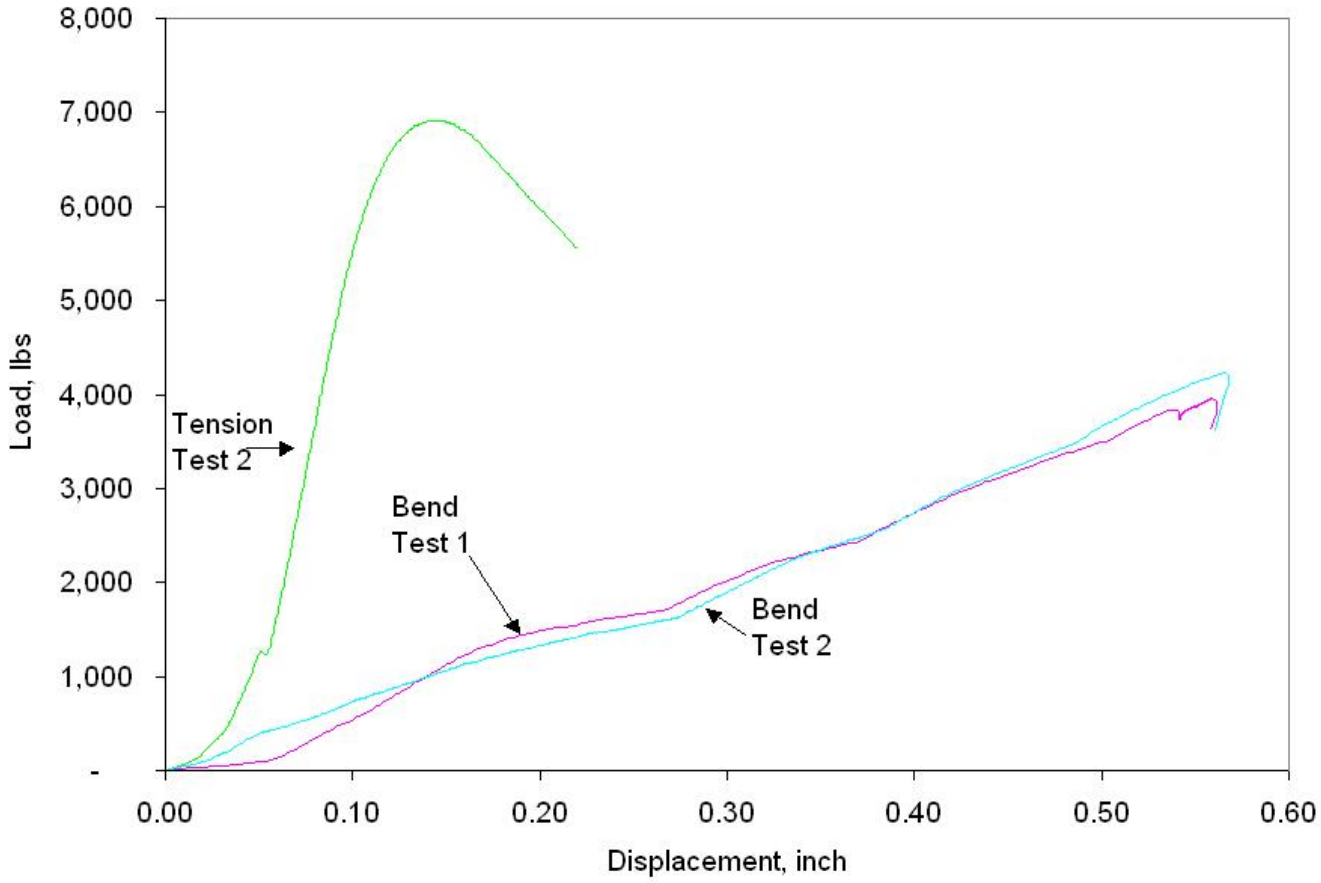


Fig. 3 - The load versus deflection was recorded for three of the tests.

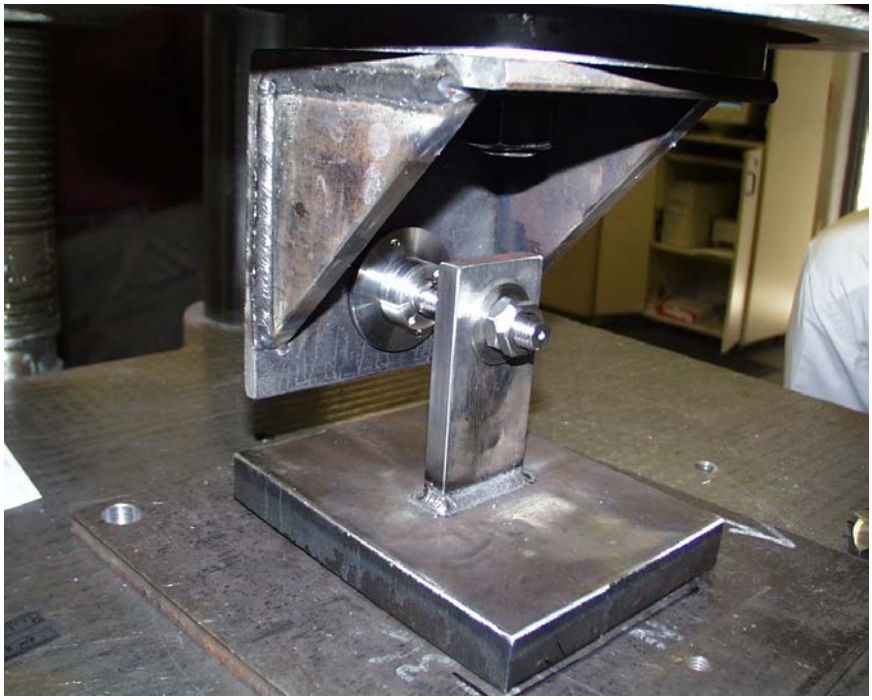


Fig. 4 - For the bend test, a rotule was mounted into the above fixture.

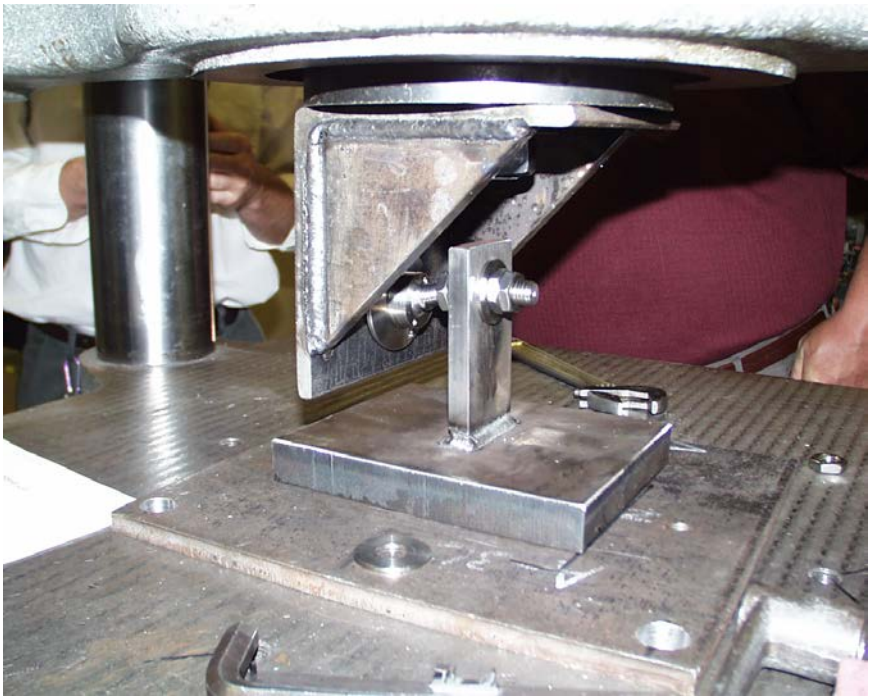


Fig. 5 - The bend tests resulted in rotules that bent at the stem but did not pull out of the socket.

Appendix F

Quality Assurance Letter

PFS Corporation d/b/a PFS TECO
An Employee-Owned Company

December 12th, 2018

Mr. Robert Benbow
Government Operations Consultant
Florida Dept. of Business
And Professional Regulation
Suite 90 – Codes and Standards
1940 North Monroe Street
Tallahassee, FL 32399

Mrs. Zubeyde Binici
Management Analyst
Florida Department of Business and Professional Regulation
2601 Blair Stone Road
Tallahassee, FL 32399-0772

RE: **Novum Structures LLC**

Dear Mr. Benbow and Mrs. Binici

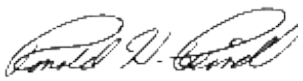
This letter is a follow-up to a conversation with Scott Knoblock of Novum Structures, LLC located in Menomonee Falls, Wisconsin requesting confirmation of their third-party auditing agency for Florida approval FL 17478-R1.

This is to inform you that PFS TECO (formerly PFS Corporation) is the auditing agency and has been retained by for the purpose of auditing the Quality Control Program and to perform audits on their Florida product (FL 17478-R1). The PFS TECO/Novum Structures, LLC contract is effective until November 12, of 2028.

PFS TECO performs audits at the manufacturing facilities located in Menomonee Falls, Wisconsin . We audit its production with such frequency and as thoroughly as necessary to verify that the product and production process quality control program is in compliance with the current regulations.

If you have any questions, please feel free to contact me at any time.

Respectfully Submitted,



Ronald H. Reindl, R.A.
Vice President – Building Components Division

CC: Scott Knoblock (Novum Structures, LLC)
Deepak Shrestha, PE, Phd (PFS TECO)

Appendix G

RB22-16 Assembly Drawing

NOVUM
Novum Structures LLC
W126 N8585 Westbrook Crossing
Menomonee Falls, WI 53051 USA
T 262.255.5561
www.novumstructures.com
info@novumstructures.com

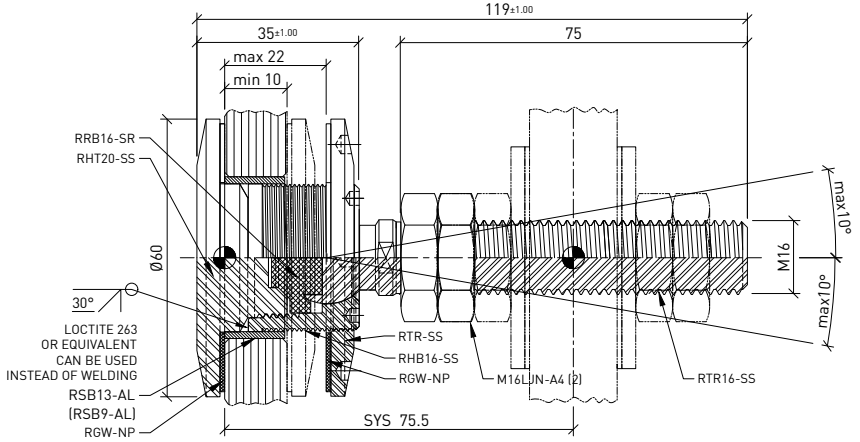
SYSTEM:
POINT SUPPORTED GLASS SYSTEM (PSG)

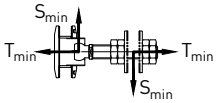
RB22-16 BUTTONHEAD ROTULE ASSEMBLY

FOR 10mm-22mm GLASS

DRAWING NO: PS-601-9
PART NO: RB22-16
DRAWN BY: DZ
DATE: 20SEP16

REV.NO.	DATE	DWG.BY	CHK.BY	DESCRIPTION
7	25SEP17	MH	MH	JAM NUT SPEC & TEFLON WASHER COLOR UPDATE
6	27APR23	MH	TR	SLEEVE REPLACED BY RSB16-AL
5	08JAN24	AA	MH	UPDATED SLEEVE NOTES





	T(min)		S(min)	
	lbf	N	lbf	N
Min. Breaking load *	5266.5	23425.4	3410.2	15168.6
LRFD Capacity	3949.9	17569.2	2557.6	11376.2
ASD Capacity	2633.2	11712.5	1705.1	7584.3

FOR TEST BUILD UP OF TENSILE TEST REFER DRAWING PS-900
FOR TEST BUILD UP OF BENDING TEST REFER DRAWING PS-920

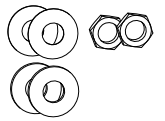
(*) Statistically determined as the 5% characteristic value as per EN 1990, Annex D (Clause D7.2 and Table D1, Vx unknown) with a material safety factor of 1.1 based on destructive sample testing of at least 3 randomly selected rotules per batch.

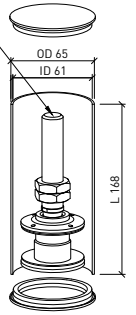
NOTES:
THIS ROTULE IS SUPPLIED WITH SLEEVE RSB16-AL (PS-635) 9
FOR GLASS THICKNESS 10-12mm PURCHASE RSB9-AL (PS-630)
REFER DRAWING PS-120, -130...134 FOR SELECTION OF PROPER SLEEVE AND SLEEVE INSTALLATION
M16 CAP NUT (RCN16-25) TO BE LISTED SEPARATELY IN BOM WITH ITEM-No.
REFER DRAWING PS-681 FOR INSTALLATION OF RB22-16
SCREW ROTULE HEAD BASE TIGHTLY ONTO ROTULE HEAD TOP SUCH THAT THE RTR16-SS IS LIMITED TO 10° (±1°) ROTATION IN ALL DIRECTIONS.

PACKAGING DIAGRAM
(NOT TO SCALE)

1pcs BUTTONHEAD ROTULE UNIT
RB22-16 (pre-installed)
1pcs BUTTONHEAD ROTULE SLEEVE
13mm (or 9mm)

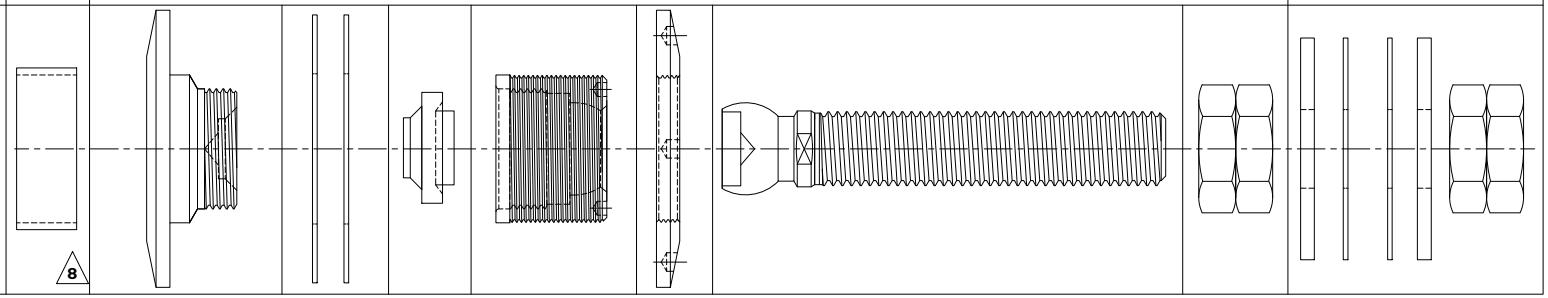
ACCESSORY PACK
(packed in a plastic bag within the tube)
typical:
2pcs M16 LOW HEXAGON JAM NUTS
2pcs TEFLON M16 WASHERS
2pcs STAINLESS STEEL M16 WASHER





OVERVIEW REQUIRED SINGLE PARTS

PART NAME	RSB16-AL	RHT20-SS	RGW-NP	RRB16SR	RHB16-SS	RTR-SS	RTR16-SS	M16LJN-A4	RW16-SS	RW16-TP
DRAWING-No.	PS-635	PS-662	PS-650	PS-655	PS-656	PS-653	PS-654	-	PS-652	PS-651
	ENCLOSED	PRE-INSTALLED PARTS BY FABRICATOR							ENCLOSED PARTS BY FABRICATOR	
VIEW										



REQUIRED PART LIST

DWG-No.	PART	QTY.	DESCRIPTION	MATERIAL REFERENCE (see comp. dwg)
PS-662	RHT20-SS	1	ROTULE HEAD TOP	316SS
PS-656	RHB16-SS	1	M16 ROTULE HEAD BASE	316SS
PS-655	RRB16-SR	1	ROTULE ROD BUSHING	SILICONE OR EPDM RUBBER
PS-654	RTR16-SS	1	20MMØ BALL JOINT HEAD w/ M16x75 THREADED ROD	316SS
PS-650	RGW-NP	2	GLASS CONTACT WASHER	NYLON, BLACK
PS-653	RTR-SS	1	TIGHTENING RING	316SS
PS-651	RW16-TP	2	TEFLON M16 WASHER	PTFE TEFLON - GRAY 7
PS-652	RW16-SS	2	STAINLESS STEEL M16 WASHER	316SS
PS-635	RSB16-AL	1	BUTTONHEAD ROTULE SLEEVE, 16mm LONG	ALUMINUM 6061-T6 8
-	M16LJN-A4	4	M16 LOW HEXAGON JAM NUT	DIN936 / ISO 4035-A4 7

ENGINEERING NOTE FOR PSG FACADES USING SPIDER WITH INSERTS:

IF GLASS WEIGHT PER ROTULE EXCEEDS 300lbf (1.33kN), USE 6mm THICK ROTULE WASHERS INSTEAD OF 3mm WASHERS (RW16-SS)
(NOT APPLICABLE FOR ROOFS.
SEPARATE CHECK FOR CUSTOM LENGTH ROTULE RODS REQUIRED)

Appendix H

Test Report for RB22-16 Rotule

Failure Analysis · Materials Testing · Product Evaluation

3200 S. 166th Street
New Berlin, Wisconsin 53151-4141 USA

Telephone : (262) 782-6344
Toll Free : (800) 726-6385
Telefax : (262) 782-3653
E-Mail : stork.technimet@stork.com
Website : www.storksmt.com/technimet

Mr. Mark Huntoon
Novum Structures, LLC
W126 N8585 Westbrook Crossing
Menomonee Falls, WI 53051

Report No. 0901-26315-1

ULTIMATE STRENGTH TESTS OF ROTULES

Rob M. Evans

March 18, 2009

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DESCRIPTION AND PURPOSE

Novum Structures requested that Stork Technimet ultimate strength test several configurations of rotules, under several loading schemes. The rotules are configured such that there is a threaded rod protruding from the base, which is connected by a ball joint and socket. The base can be either countersunk, or a button head design and can vary in clamping distance from 0.5 inches to greater than 1.5 inches. The threaded rod is either an M20x2.5, or an M16x2.0 threaded rod, which also varies in length. Each of the rotules was to be tested by either axial or transverse loading.

CONCLUSIONS

The average ultimate tensile load was 30,700 N for the M16 rotules, and 26,400 N for the M20 rotules.

The average ultimate cantilever bending load was 25,500 N for the M16 rotules, and 26,200 N for the M20 rotules.

The average ultimate complex bending load was 26,000 N for the M16 rotules, and 27,600 N for the M20 rotules.

PROCEDURE AND RESULTS

Axial Tests

The axial tension tests were performed on a 60,000 pound universal tester. Special fixtures were fabricated to adapt the rotules to the test machine. Load was applied until failure, which occurred when the ball joint popped out of the base and resulted in mushrooming of the base. The rotules were tested without the glass retaining ring per the request of Novum. This is likely a worst case scenario. With the retaining ring included, the radial stiffness of the base would have been greater, thereby requiring more force to mushroom the base. The peak tensile loads ranged from 19,970 N to 34,680 N. The average ultimate tensile load was 30,700 N for the M16 rods, and 26,400 N for the M20 rods. The test setup for the axial tension tests is shown in Figure 1, and a typical failure is shown in Figure 2. All of the ultimate axial loads are listed in Table 1.

Transverse Tests

The transverse tests were performed on either a 60,000 pound or 120,000 pound universal tester. Special fixtures were designed and fabricated to perform the transverse tests in two ways. A right angle weldment was fabricated as a base fixture to position either a countersunk or buttonhead rotule horizontally. As the rotules had different minimum clamping distance requirements, spacers were used to adjust the clamping distance on the base fixture.

The first test was set up as cantilever bending. A clevis fixture was used that allowed the loading arm to pivot, allowing bending, and resulting in a maximum stress at the base. This setup is shown in Figure 3. Load was applied until failure, which occurred when the ball joint popped out of the base, resulting in distortion of the base. In particular, the spanner wrench holes deformed the most. The rotule is shown during and after the cantilever bending test in Figures 4 and 5.

A second test was complex bending with rotation restricted at both ends. A rigid loading arm was used to apply the load, resulting in maximum stresses near the base and near the innermost nut. This setup is shown in Figure 6. Load was applied until failure. Failures of the M20 rotules occurred when the rod bent significantly and popped out of the base. The rotule is shown during testing in Figure 7. The base also fractured along the spanner wrench holes as illustrated in Figure 8. Failures of the M16 rotules were different. Initially, the rotule was tested with a single nut on each side. In this case, the M16 rod fractured before the ball joint popped out of the base as shown in Figure 9. For the remaining tests, two nuts were used. One failure occurred when the ball joint popped out of the base, and the other failed when the rod fractured at the same time as the ball joint popped out of the base, as shown in Figure 10. All of the ultimate transverse loads are listed in Table 2.

If you have any questions concerning the contents of this report, please contact me. It should be noted that it is our policy to retain components and sample remnants for 30 days from February 27, 2009, after which time they will be discarded. If you would like to make alternate arrangements for disposition of the material, please let me know. This project shall be governed exclusively by the General Terms and Conditions of Sale and Performance of Testing Services by Stork Technimet, Inc. a Wisconsin business corporation d.d. November 4, 2008. In no event shall Stork Technimet, Inc. be liable for any consequential, special or indirect loss or any damages above the cost of the work.

Respectfully submitted,



Rob M. Evans
Mechanical Engineer

Table 1

Ultimate Axial Load Results

Rotule ID	Ultimate Load (N)
RB22-16 tensile1	27,860
RB22-16 tensile2	33,270
RB22-16 tensile3	34,680
RC22-16 tensile1	28,140
RC22-16 tensile2	32,220
RC22-16 tensile3	29,360
RC22-16 tensile4	30,190
RC22-16 tensile5	29,760
RB26-20 tensile1	19,970
RB26-20 tensile2	excluded
RB26-20 tensile3	23,660
RC26-20 tensile1	29,640
RC26-20 tensile2	30,990
RC26-20 tensile3	28,280
RC26-20 tensile4	28,750
RC26-20 tensile5	26,290
RB36-20 tensile1	22,280
RB36-20 tensile2	27,380
RB36-20 tensile3	26,340
RC36-20 tensile1	25,110
RC36-20 tensile2	24,320
RC36-20 tensile3	25,930
RB46-20 tensile1	28,820
RB46-20 tensile2	26,010
RB46-20 tensile3	26,080
RC46-20tensile1	27,820
RC46-20 tensile2	25,310
RC46-20 tensile3	29,250

Table 2

Ultimate Bending and Shear Results

Rotule ID	Ultimate Load (N)
RB22-16 Bend 1	23,540
RB22-16 Bend 2	23,886
RB22-16 Bend 3	25,211
RC22-16 Bend 1	25,701
RC22-16 Bend 2	24,540
RC22-16 Bend 3	26,310
RC22-16 Bend 4	27,395
RC22-16 Bend 5	27,498
RB26-20 Bend 1	23,070
RB26-20 Bend 2	23,561
RB26-20 Bend 3	22,974
RC26-20 Bend 1	26,132
RC26-20 Bend 2	30,006
RC26-20 Bend 3	28,716
RC26-20 Bend 4	26,452
RC26-20 Bend 5	28,921
RB22-16 Shear 1	22,934
RB22-16 Shear 2	26,710
RB22-16 Shear 3	28,307
RB26-20 Shear 1	26,168
RB26-20 Shear 2	27,111
RB26-20 Shear 3	29,561



Fig. 1 - The axial tension test was set up using special fixtures and metric mandrels on a 60,000 pound universal tester.

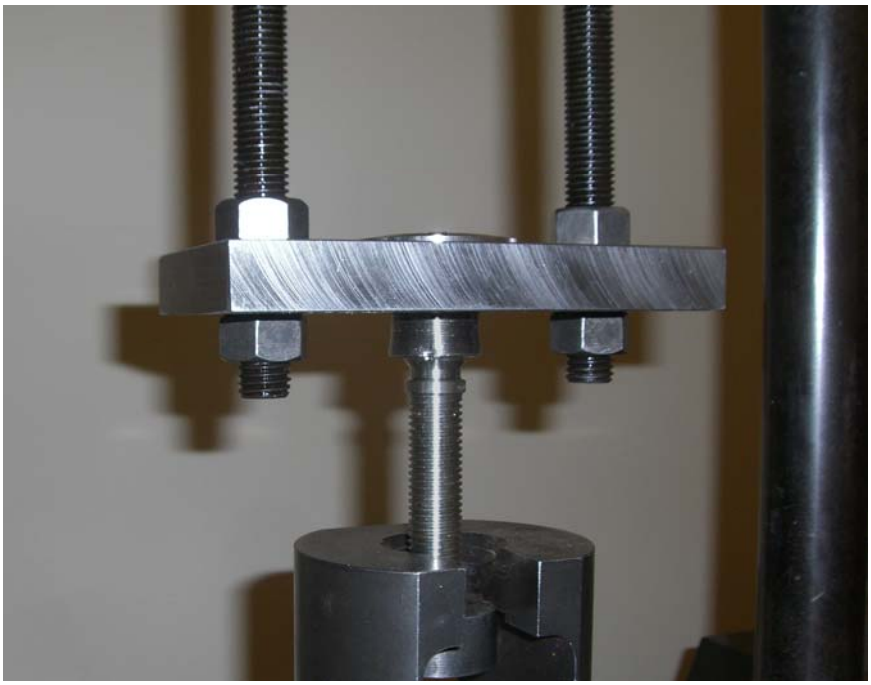


Fig. 2 - A typical rotule axial failure is shown. The base mushroomed when the ball joint was pulled out.



Fig. 3 - The cantilever bending test was set up using a special angle bracket fixture and pivoting loading arm.



Fig. 4 - A rotule is shown during the cantilever bending test.

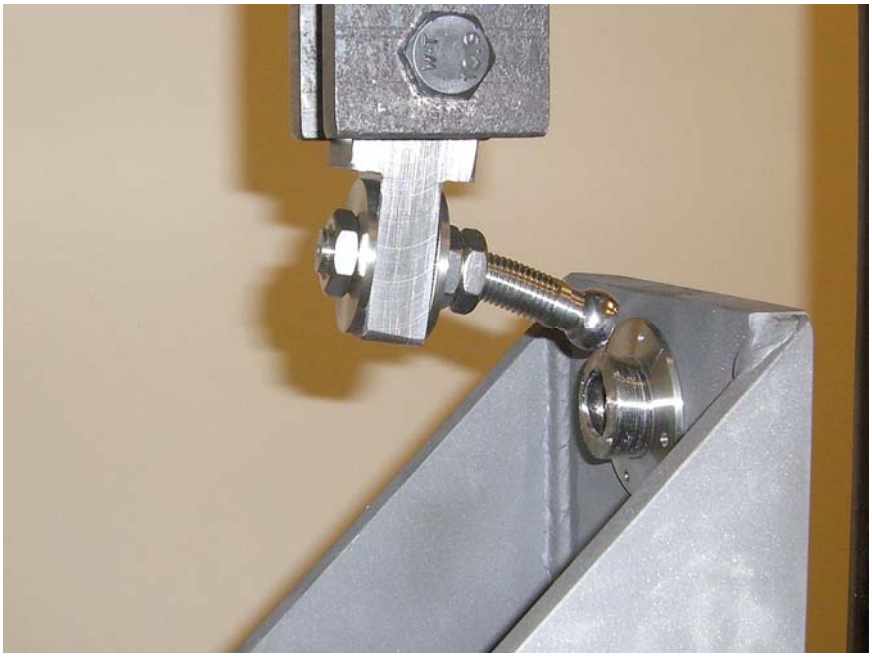


Fig. 5 - A typical rotule cantilever bending failure is shown. The rod bent and the ball joint popped out of the base.



Fig. 6 - The complex bending test was set up using the angle bracket fixture and a rigid loading fixture.



Fig. 7 - A M20 rotule is shown during the complex bending test. Multiple curvatures are evident in the rod.

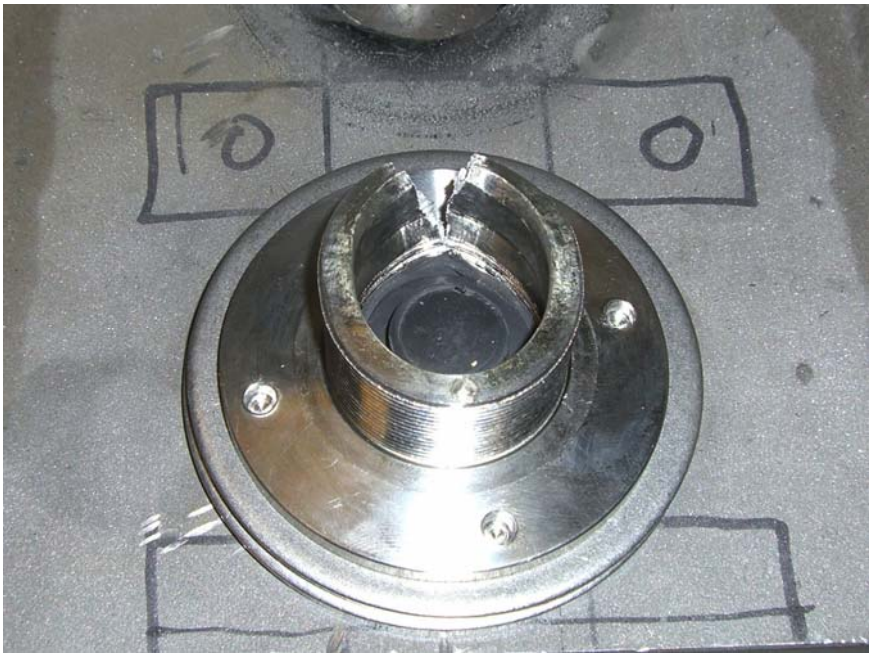


Fig. 8 - A typical M20 rotule complex bending failure is shown. The base bent and tore along the hole for a spanner wrench, and the ball joint popped out of the base.



Fig. 9 - When one nut was used, the M16 rod failed before the ball joint popped out of the base.



Fig. 10 - A M16 rotule rod failed at the same time that the ball joint popped out of the base.

Appendix I

Bake/Impact Test Report for 21.52 mm Glass without Frit

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TEST REPORT

SCOPE OF WORK
TESTING ON SAFETY GLAZING MATERIAL

THE BELOW LISTED REPORT NUMBERS HAVE BEEN REVIEWED
P9755.01-201-37
P9755.02-201-37
P9755.03-201-37
P9755.04-201-37
P9755.05-201-37
P9755.06-201-37

TANYA A. DOLBY LICENSE No. 93536 STATE OF FLORIDA PROFESSIONAL ENGINEER

2023.11.10 10:06:03 -05'00'

For INTERTEK B&C:

COMPLETED BY:	Lukas M. Bayer	**REVIEWED BY:**	Tanya Dolby, P.E.
TITLE:	Project Lead – Building & Construction	**TITLE:**	Senior Engineer - Engineering Services
SIGNATURE:	Digitally Signed by: Lukas Bayer	**SIGNATURE:**	Digitally Signed by: Tanya Dolby
DATE:	11/09/23	**DATE:**	11/09/23

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TEST REPORT FOR NOVUM STRUCTURES LLC

Report No.: P9755.04-201-37 R1
Revision Date: 11/09/23

REPORT ISSUED TO

NOVUM STRUCTURES LLC
W126 N8585 Westbrook Crossing
Menomonee Falls, Wisconsin 53051

SECTION 1

TEST SAMPLE DESCRIPTION

Tested in Accordance with: ANSI Z97.1-2015 (R2020), CPSC 16 CFR 1201-2012, & CAN/CGSB 12.1-2022
Samples Obtained from Manufacturer: Beijing Wuhuatianbao Glass Co., Ltd
Received Date: 06/21/23
Glazing Product Designation: G1 (10mm Clear FT + 1.52 mm PVB + 10mm Clear FT)
Overall Glazing Thickness: 7/8" (nominal) (21.52 mm)
Glazing Type: Laminated Transparent Glass (LTG)
Sample Dimensions: **Impact**: 34" wide x 76" high (±1/8") **Thermal**: 12" x 12" (±1/8")
Interlayer Manufacturer/Type: Eastman / Saflex PVB
Interlayer Manufacturer/Type Obtained from: Novum Structures LLC
Size Classification: Unlimited
Thickness Standard: ASTM C1036

Laminated Glazing Composition Details

	THICKNESS MEASUREMENTS (inches) [A]			
SAMPLE TYPE	OVERALL	GLASS LITE 1	INTERLAYER [B]	GLASS LITE 2
Thermal	0.838	0.390	0.058	0.390
Impact	0.840	0.390	0.060	0.390
Type	--	Tempered	Interlayer	Tempered

[A] Measurement values obtained from the first test specimen of the thermal and impact test.
[B] Calculated thickness based on summation of glass thicknesses subtracted from overall thickness.

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TEST REPORT FOR NOVUM STRUCTURES LLC
Report No.: P9755.04-201-37 R1
Revision Date: 11/09/23

SECTION 2
TEST RESULTS

Test Date: 08/16/23
Lab Temperature: 70 °F
Duration of Pre-Conditioning @ 65 - 85°F: 4 Hours

Thermal Test Results
Method: Bake

SPECIMEN NUMBER	OVERALL THICKNESS (inches)	TEST RESULTS & OBSERVATIONS	PASS/FAIL
G1.02	0.838	No crack, no bubbles, or defects within 1/2"	Pass
G1.03	0.838	No crack, no bubbles, or defects within 1/2"	Pass
G1.04	0.838	No crack, no bubbles, or defects within 1/2"	Pass

Acceptance Criteria: No bubbles or defects more than 1/2" from edge or crack.

Impact Test Results
Specimens were impacted once from a drop height of 48 inches.

SPECIMEN NUMBER	OVERALL THICKNESS (inches)	TEST RESULTS & OBSERVATIONS	PASS/FAIL
G1.08[A]	0.840	Did not break	Pass
G1.07[B]	0.841	Did not break	Pass
G1.06[A]	0.840	Did not break	Pass
G1.09[B]	0.840	Did not break	Pass

[A] Impacted, Lite 1 side
[B] Impacted, Lite 2 side

Acceptance Criteria: After impact, openings are evaluated as described below and detached particles are collected. Individual detached particles less than the mass equivalent of 1 sq. in. of the original test specimen are excluded from evaluation.
(a) No shear or opening through which a 3" sphere can freely pass with 4 lbs. force.
(b) Detached particles collected after impact shall not weigh more than 15.5 sq. in. of the original test specimen.
(c) No single particle shall weigh more than 6.82 sq. in. of the original test specimen.

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TEST REPORT FOR NOVUM STRUCTURES LLC
Report No.: P9755.04-201-37 R1
Revision Date: 11/09/23

SECTION 3
CONCLUSION

The specimens meet the thermal and impact requirements of the referenced standards for the size classification listed, meet the thickness requirements of the referenced standard, and meet the permanent label requirements.

All test specimens were destroyed by test or by personnel and have been disposed of as trash. Representative sections of failed samples will be retained for up to 30 days from the date of report issuance. After 30 days, representative samples will be automatically discarded. The test record retention period ends four years after the test date.

SECTION 4
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Thomas P. Ehlert - S.E, P.E.	Novum Structures LLC
Lukas M. Bayer	Intertek B&C

SECTION 5
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	09/07/23	N/A	Original Report Issue
1	11/09/23	Cover	Revised Report. Report revised to correct PE stamp.

Appendix J

Bake/Impact Test Report for 21.52 mm Glass with 50% Dot Frit

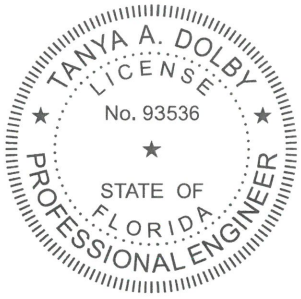
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TEST REPORT

SCOPE OF WORK
TESTING ON SAFETY GLAZING MATERIAL

THE BELOW LISTED REPORT NUMBERS HAVE BEEN REVIEWED
P9755.01-201-37
P9755.02-201-37
P9755.03-201-37
P9755.04-201-37
P9755.05-201-37
P9755.06-201-37



2023.11.10 10:06:03 -05'00'

For INTERTEK B&C:

COMPLETED BY:	Lukas M. Bayer	**REVIEWED BY:**	Tanya Dolby, P.E.
TITLE:	Project Lead – Building & Construction	**TITLE:**	Senior Engineer - Engineering Services
SIGNATURE:	Digitally Signed by: Lukas Bayer	**SIGNATURE:**	Digitally Signed by: Tanya Dolby
DATE:	11/09/23	**DATE:**	11/09/23

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TEST REPORT FOR NOVUM STRUCTURES LLC

Report No.: P9755.06-201-37 R1
Revision Date: 11/09/23

REPORT ISSUED TO

NOVUM STRUCTURES LLC
W126 N8585 Westbrook Crossing
Menomonee Falls, Wisconsin 53051

SECTION 1

TEST SAMPLE DESCRIPTION

Tested in Accordance with: ANSI Z97.1-2015 (R2020), CPSC 16 CFR 1201-2012, & CAN/CGSB 12.1-2022
Samples Obtained from Manufacturer: Beijing Wuhuatianbao Glass Co., Ltd
Received Date: 06/21/23
Glazing Product Designation: G5 (10mm Clear w/ Frit on Surface #2 (Dot, 50 % Coverage) FT + 1.52 mm PVB + 10mm Clear FT)
Overall Glazing Thickness: 7/8" (nominal) (21.52 mm)
Glazing Type: Laminated Transparent Glass (LTG)
Sample Dimensions: **Impact**: 34" wide x 76" high (±1/8") **Thermal**: 12" x 12" (±1/8")
Interlayer Manufacturer/Type: Eastman / Saflex PVB
Interlayer Manufacturer/Type Obtained from: Novum Structures LLC
Size Classification: Unlimited
Thickness Standard: ASTM C1036

Laminated Glazing Composition Details

SAMPLE TYPE	THICKNESS MEASUREMENTS (inches) [A]			
	OVERALL	GLASS LITE 1	INTERLAYER [B]	GLASS LITE 2
Thermal	0.838	0.388	0.060	0.390
Impact	0.840	0.391	0.060	0.389
Type	--	Tempered	Interlayer	Tempered

[A] Measurement values obtained from the first test specimen of the thermal and impact test.
[B] Calculated thickness based on summation of glass thicknesses subtracted from overall thickness.

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TEST REPORT FOR NOVUM STRUCTURES LLC

Report No.: P9755.06-201-37 R1
Revision Date: 11/09/23

SECTION 2

TEST RESULTS

Test Date: 08/16/23
Lab Temperature: 70 °F
Duration of Pre-Conditioning @ 65 - 85°F: 4 Hours

Thermal Test Results
Method: Bake

SPECIMEN NUMBER	OVERALL THICKNESS (inches)	TEST RESULTS & OBSERVATIONS	PASS/FAIL
G5.01	0.838	No crack, no bubbles, or defects within 1/2"	Pass
G5.02	0.838	No crack, no bubbles, or defects within 1/2"	Pass
G5.03	0.837	No crack, no bubbles, or defects within 1/2"	Pass

Acceptance Criteria: No bubbles or defects more than 1/2" from edge or crack.

Impact Test Results
Specimens were impacted once from a drop height of 48 inches.

SPECIMEN NUMBER	OVERALL THICKNESS (inches)	TEST RESULTS & OBSERVATIONS	PASS/FAIL
G5.07[A]	0.840	Did not break	Pass
G5.06[B]	0.840	Did not break	Pass
G5.05[A]	0.840	Did not break	Pass
G5.08[B]	0.840	Did not break	Pass

[A] Impacted, Lite 1 side
[B] Impacted, Lite 2 side

Acceptance Criteria: After impact, openings are evaluated as described below and detached particles are collected. Individual detached particles less than the mass equivalent of 1 sq. in. of the original test specimen are excluded from evaluation.
(a) No shear or opening through which a 3" sphere can freely pass with 4 lbs. force.
(b) Detached particles collected after impact shall not weigh more than 15.5 sq. in. of the original test specimen.
(c) No single particle shall weigh more than 6.82 sq. in. of the original test specimen.

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TEST REPORT FOR NOVUM STRUCTURES LLC
Report No.: P9755.06-201-37 R1
Revision Date: 11/09/23

SECTION 3
CONCLUSION

The specimens meet the thermal and impact requirements of the referenced standards for the size classification listed, meet the thickness requirements of the referenced standard, and meet the permanent label requirements.

All test specimens were destroyed by test or by personnel and have been disposed of as trash. Representative sections of failed samples will be retained for up to 30 days from the date of report issuance. After 30 days, representative samples will be automatically discarded. The test record retention period ends four years after the test date.

SECTION 4
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Thomas P. Ehlert - S.E, P.E.	Novum Structures LLC
Lukas M. Bayer	Intertek B&C

SECTION 5
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	09/07/23	N/A	Original Report Issue
1	11/09/23	Cover	Revised Report. Report revised to correct PE stamp.

Appendix K

Bake/Impact Test Report for 21.52 mm Glass with 50% Line Frit

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NOVUM STRUCTURES LLC

TEST REPORT

SCOPE OF WORK
TESTING ON SAFETY GLAZING MATERIAL

THE BELOW LISTED REPORT NUMBERS HAVE BEEN REVIEWED
P9755.01-201-37
P9755.02-201-37
P9755.03-201-37
P9755.04-201-37
P9755.05-201-37
P9755.06-201-37

TANYA A. DOLBY LICENSE No. 93536 STATE OF FLORIDA PROFESSIONAL ENGINEER

2023.11.10 10:06:03 -05'00'

For INTERTEK B&C:

COMPLETED BY:	Lukas M. Bayer	**REVIEWED BY:**	Tanya Dolby, P.E.
TITLE:	Project Lead – Building & Construction	**TITLE:**	Senior Engineer - Engineering Services
SIGNATURE:	Digitally Signed by: Lukas Bayer	**SIGNATURE:**	Digitally Signed by: Tanya Dolby
DATE:	11/09/23	**DATE:**	11/09/23

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TEST REPORT FOR NOVUM STRUCTURES LLC

Report No.: P9755.05-201-37 R1
Revision Date: 11/09/23

REPORT ISSUED TO

NOVUM STRUCTURES LLC
W126 N8585 Westbrook Crossing
Menomonee Falls, Wisconsin 53051

SECTION 1

TEST SAMPLE DESCRIPTION

Tested in Accordance with: ANSI Z97.1-2015 (R2020), CPSC 16 CFR 1201-2012, & CAN/CGSB 12.1-2022
Samples Obtained from Manufacturer: Beijing Wuhuatianbao Glass Co., Ltd
Received Date: 06/21/23
Glazing Product Designation: G9 (10mm Clear w/ Frit on Surface #2 (Line, 50 % Coverage) FT + 1.52 mm PVB + 10mm Clear FT)
Overall Glazing Thickness: 7/8" (nominal) (21.52 mm)
Glazing Type: Laminated Transparent Glass (LTG)
Sample Dimensions: **Impact**: 34" wide x 76" high (±1/8") **Thermal**: 12" x 12" (±1/8")
Interlayer Manufacturer/Type: Eastman / Saflex PVB
Interlayer Manufacturer/Type Obtained from: Novum Structures LLC
Size Classification: Unlimited
Thickness Standard: ASTM C1036

Laminated Glazing Composition Details

SAMPLE TYPE	THICKNESS MEASUREMENTS (inches) [A]			
	OVERALL	GLASS LITE 1	INTERLAYER [B]	GLASS LITE 2
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Impact	0.840	0.390	0.060	0.390
Type	--	Tempered	Interlayer	Tempered

[A] Measurement values obtained from the first test specimen of the thermal and impact test.
[B] Calculated thickness based on summation of glass thicknesses subtracted from overall thickness.

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TEST REPORT FOR NOVUM STRUCTURES LLC

Report No.: P9755.05-201-37 R1
Revision Date: 11/09/23

SECTION 2

TEST RESULTS

Test Date: 08/16/23
Lab Temperature: 70 °F
Duration of Pre-Conditioning @ 65 - 85°F: 4 Hours

Thermal Test Results
Method: Bake

SPECIMEN NUMBER	OVERALL THICKNESS (inches)	TEST RESULTS & OBSERVATIONS	PASS/FAIL
G9.01	0.840	No crack, no bubbles, or defects within 1/2"	Pass
G9.02	0.838	No crack, no bubbles, or defects within 1/2"	Pass
G9.03	0.838	No crack, no bubbles, or defects within 1/2"	Pass

Acceptance Criteria: No bubbles or defects more than 1/2" from edge or crack.

Impact Test Results
Specimens were impacted once from a drop height of 48 inches.

SPECIMEN NUMBER	OVERALL THICKNESS (inches)	TEST RESULTS & OBSERVATIONS	PASS/FAIL
G9.06[A]	0.840	Did not break	Pass
G9.05[B]	0.840	Did not break	Pass
G9.08[A]	0.840	Did not break	Pass
G9.07[B]	0.840	Did not break	Pass

[A] Impacted, Lite 1 side
[B] Impacted, Lite 2 side

Acceptance Criteria: After impact, openings are evaluated as described below and detached particles are collected. Individual detached particles less than the mass equivalent of 1 sq. in. of the original test specimen are excluded from evaluation.
(a) No shear or opening through which a 3" sphere can freely pass with 4 lbs. force.
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TEST REPORT FOR NOVUM STRUCTURES LLC
Report No.: P9755.05-201-37 R1
Revision Date: 11/09/23

SECTION 3
CONCLUSION

The specimens meet the thermal and impact requirements of the referenced standards for the size classification listed, meet the thickness requirements of the referenced standard, and meet the permanent label requirements.

All test specimens were destroyed by test or by personnel and have been disposed of as trash. Representative sections of failed samples will be retained for up to 30 days from the date of report issuance. After 30 days, representative samples will be automatically discarded. The test record retention period ends four years after the test date.

SECTION 4
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Thomas P. Ehlert - S.E, P.E.	Novum Structures LLC
Lukas M. Bayer	Intertek B&C

SECTION 5
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	09/07/23	N/A	Original Report Issue
1	11/09/23	Cover	Revised Report. Report revised to correct PE stamp.

Appendix L

Bake/Impact Test Report for 17.52 mm Glass without Frit

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NOVUM STRUCTURES LLC

TEST REPORT

SCOPE OF WORK
TESTING ON SAFETY GLAZING MATERIAL

THE BELOW LISTED REPORT NUMBERS HAVE BEEN REVIEWED
P9755.01-201-37
P9755.02-201-37
P9755.03-201-37
P9755.04-201-37
P9755.05-201-37
P9755.06-201-37

TANYA A. DOLBY LICENSE No. 93536 STATE OF FLORIDA PROFESSIONAL ENGINEER

2023.11.10 10:06:03 -05'00'

For INTERTEK B&C:

COMPLETED BY:	Lukas M. Bayer	**REVIEWED BY:**	Tanya Dolby, P.E.
TITLE:	Project Lead – Building & Construction	**TITLE:**	Senior Engineer - Engineering Services
SIGNATURE:	Digitally Signed by: Lukas Bayer	**SIGNATURE:**	Digitally Signed by: Tanya Dolby
DATE:	11/09/23	**DATE:**	11/09/23

LMB:td/wma

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TEST REPORT FOR NOVUM STRUCTURES LLC

Report No.: P9755.01-201-37 R1
Revision Date: 11/09/23

REPORT ISSUED TO

NOVUM STRUCTURES LLC
W126 N8585 Westbrook Crossing
Menomonee Falls, Wisconsin 53051

SECTION 1

TEST SAMPLE DESCRIPTION

Tested in Accordance with: ANSI Z97.1-2015 (R2020), CPSC 16 CFR 1201-2012, & CAN/CGSB 12.1-2022
Samples Obtained from Manufacturer: Beijing Wuhuatianbao Glass Co., Ltd
Received Date: 06/21/23
Glazing Product Designation: G11 (8mm Clear FT + 1.52 mm Clear PVB + 8mm Clear FT)
Overall Glazing Thickness: 5/8" (nominal) / (17.52 mm)
Glazing Type: Laminated Transparent Glass (LTG)
Sample Dimensions: **Impact**: 34" wide x 76" high (±1/8") **Thermal**: 12" x 12" (±1/8")
Interlayer Manufacturer/Type: Eastman / Saflex PVB
Interlayer Manufacturer/Type Obtained from: Novum Structures LLC
Size Classification: Unlimited
Thickness Standard: ASTM C1036

Laminated Glazing Composition Details

	THICKNESS MEASUREMENTS (inches) [A]			
SAMPLE TYPE	OVERALL	GLASS LITE 1	INTERLAYER [B]	GLASS LITE 2
Thermal	0.678	0.310	0.058	0.310
Impact	0.678	0.309	0.059	0.310
Type	--	Tempered	Interlayer	Tempered

[A] Measurement values obtained from the first test specimen of the thermal and impact test.
[B] Calculated thickness based on summation of glass thicknesses subtracted from overall thickness.

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TEST REPORT FOR NOVUM STRUCTURES LLC

Report No.: P9755.01-201-37 R1
Revision Date: 11/09/23

SECTION 2

TEST RESULTS

Test Date: 08/16/23
Lab Temperature: 70 °F
Duration of Pre-Conditioning @ 65 - 85°F: 4 Hours

Thermal Test Results
Method: Bake

SPECIMEN NUMBER	OVERALL THICKNESS (inches)	TEST RESULTS & OBSERVATIONS	PASS/FAIL
G11.02	0.678	No crack, no bubbles, or defects within 1/2"	Pass
G11.03	0.678	No crack, no bubbles, or defects within 1/2"	Pass
G11.04	0.678	No crack, no bubbles, or defects within 1/2"	Pass

Acceptance Criteria: No bubbles or defects more than 1/2" from edge or crack.

Impact Test Results
Specimens were impacted once from a drop height of 48 inches.

SPECIMEN NUMBER	OVERALL THICKNESS (inches)	TEST RESULTS & OBSERVATIONS	PASS/FAIL
G11.09[A]	0.678	Did not break	Pass
G11.08[A]	0.678	Did not break	Pass
G11.06[B]	0.679	Did not break	Pass
G11.07[B]	0.678	Did not break	Pass

[A] Impacted, Lite 1 side
[B] Impacted, Lite 2 side

Acceptance Criteria: After impact, openings are evaluated as described below and detached particles are collected. Individual detached particles less than the mass equivalent of 1 sq. in. of the original test specimen are excluded from evaluation.
(a) No shear or opening through which a 3" sphere can freely pass with 4 lbs. force.
(b) Detached particles collected after impact shall not weigh more than 15.5 sq. in. of the original test specimen.
(c) No single particle shall weigh more than 6.82 sq. in. of the original test specimen.

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TEST REPORT FOR NOVUM STRUCTURES LLC
Report No.: P9755.01-201-37 R1
Revision Date: 11/09/23

SECTION 3
CONCLUSION

The specimens meet the thermal and impact requirements of the referenced standards for the size classification listed, meet the thickness requirements of the referenced standard, and meet the permanent label requirements.

All test specimens were destroyed by test or by personnel and have been disposed of as trash. Representative sections of failed samples will be retained for up to 30 days from the date of report issuance. After 30 days, representative samples will be automatically discarded. The test record retention period ends four years after the test date.

SECTION 4
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Thomas P. Ehlert - S.E, P.E.	Novum Structures LLC
Lukas M. Bayer	Intertek B&C

SECTION 5
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	09/07/23	N/A	Original Report Issue
1	11/09/23	Cover	Revised Report. Report revised to change PE stamp.

Appendix M

Bake/Impact Test Report for 17.52 mm Glass with 50% Dot Frit

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TEST REPORT

SCOPE OF WORK
TESTING ON SAFETY GLAZING MATERIAL

THE BELOW LISTED REPORT NUMBERS HAVE BEEN REVIEWED
P9755.01-201-37
P9755.02-201-37
P9755.03-201-37
P9755.04-201-37
P9755.05-201-37
P9755.06-201-37

TANYA A. DOLBY
LICENSE
No. 93536
STATE OF FLORIDA
PROFESSIONAL ENGINEER

2023.11.10 10:06:03 -05'00'

For INTERTEK B&C:

COMPLETED BY:	Lukas M. Bayer	**REVIEWED BY:**	Tanya Dolby, P.E.
TITLE:	Project Lead – Building & Construction	**TITLE:**	Senior Engineer - Engineering Services
SIGNATURE:	Digitally Signed by: Lukas Bayer	**SIGNATURE:**	Digitally Signed by: Tanya Dolby
DATE:	11/09/23	**DATE:**	11/09/23

LMB:td/wma

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TEST REPORT FOR NOVUM STRUCTURES LLC

Report No.: P9755.02-201-37 R1
Revision Date: 11/09/23

REPORT ISSUED TO

NOVUM STRUCTURES LLC
W126 N8585 Westbrook Crossing
Menomonee Falls, Wisconsin 53051

SECTION 1

TEST SAMPLE DESCRIPTION

Tested in Accordance with: ANSI Z97.1-2015 (R2020), CPSC 16 CFR 1201-2012, & CAN/CGSB 12.1-2022
Samples Obtained from Manufacturer: Beijing Wuhuatianbao Glass Co., Ltd
Received Date: 06/21/23
Glazing Product Designation: G15 (8mm Clear w/ Frit on Surface #2 (Dot, 50 % Coverage) FT + 1.52 mm PVB + 8mm Clear FT)
Overall Glazing Thickness: 5/8" (nominal) (17.52 mm)
Glazing Type: Laminated Transparent Glass (LTG)
Sample Dimensions: **Impact**: 34" wide x 76" high (±1/8") **Thermal**: 12" x 12" (±1/8")
Interlayer Manufacturer/Type: Eastman / Saflex PVB
Interlayer Manufacturer/Type Obtained from: Novum Structures LLC
Size Classification: Unlimited
Thickness Standard: ASTM C1036

Laminated Glazing Composition Details

	THICKNESS MEASUREMENTS (inches) [A]			
SAMPLE TYPE	OVERALL	GLASS LITE 1	INTERLAYER [B]	GLASS LITE 2
Thermal	0.678	0.310	0.058	0.310
Impact	0.678	0.310	0.060	0.308
Type	--	Tempered	Interlayer	Tempered

[A] Measurement values obtained from the first test specimen of the thermal and impact test.
[B] Calculated thickness based on summation of glass thicknesses subtracted from overall thickness.

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TEST REPORT FOR NOVUM STRUCTURES LLC

Report No.: P9755.02-201-37 R1
Revision Date: 11/09/23

SECTION 2

TEST RESULTS

Test Date: 08/16/23
Lab Temperature: 70 °F
Duration of Pre-Conditioning @ 65 - 85°F: 4 Hours

Thermal Test Results
Method: Bake

SPECIMEN NUMBER	OVERALL THICKNESS (inches)	TEST RESULTS & OBSERVATIONS	PASS/FAIL
G15.01	0.678	No crack, no bubbles, or defects within 1/2"	Pass
G15.02	0.678	No crack, no bubbles, or defects within 1/2"	Pass
G15.03	0.680	No crack, no bubbles, or defects within 1/2"	Pass

Acceptance Criteria: No bubbles or defects more than 1/2" from edge or crack.

Impact Test Results
Specimens were impacted once from a drop height of 48 inches.

SPECIMEN NUMBER	OVERALL THICKNESS (inches)	TEST RESULTS & OBSERVATIONS	PASS/FAIL
G15.07[A]	0.678	Did not break	Pass
G15.08[B]	0.678	Did not break	Pass
G15.06[A]	0.678	Did not break	Pass
G15.05[B]	0.678	Did not break	Pass

[A] Impacted, Lite 1 side
[B] Impacted, Lite 2 side

Acceptance Criteria: After impact, openings are evaluated as described below and detached particles are collected. Individual detached particles less than the mass equivalent of 1 sq. in. of the original test specimen are excluded from evaluation.
(a) No shear or opening through which a 3" sphere can freely pass with 4 lbs. force.
(b) Detached particles collected after impact shall not weigh more than 15.5 sq. in. of the original test specimen.
(c) No single particle shall weigh more than 6.82 sq. in. of the original test specimen.

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TEST REPORT FOR NOVUM STRUCTURES LLC
Report No.: P9755.02-201-37 R1
Revision Date: 11/09/23

SECTION 3
CONCLUSION

The specimens meet the thermal and impact requirements of the referenced standards for the size classification listed, meet the thickness requirements of the referenced standard, and meet the permanent label requirements.

All test specimens were destroyed by test or by personnel and have been disposed of as trash. Representative sections of failed samples will be retained for up to 30 days from the date of report issuance. After 30 days, representative samples will be automatically discarded. The test record retention period ends four years after the test date.

SECTION 4
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Thomas P. Ehlert - S.E, P.E.	Novum Structures LLC
Lukas M. Bayer	Intertek B&C

SECTION 5
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	09/07/23	N/A	Original Report Issue
1	11/09/23	Cover	Revised Report. Report revised to correct PE stamp.

Appendix N

Bake/Impact Test Report for 17.52 mm Glass with 50% Line Frit

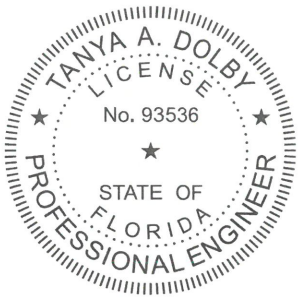
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NOVUM STRUCTURES LLC

TEST REPORT

SCOPE OF WORK
TESTING ON SAFETY GLAZING MATERIAL

THE BELOW LISTED REPORT NUMBERS HAVE BEEN REVIEWED
P9755.01-201-37
P9755.02-201-37
P9755.03-201-37
P9755.04-201-37
P9755.05-201-37
P9755.06-201-37



2023.11.10 10:06:03 -05'00'

For INTERTEK B&C:

COMPLETED BY:	Lukas M. Bayer	**REVIEWED BY:**	Tanya Dolby, P.E.
TITLE:	Project Lead – Building & Construction	**TITLE:**	Senior Engineer - Engineering Services
SIGNATURE:	Digitally Signed by: Lukas Bayer	**SIGNATURE:**	Digitally Signed by: Tanya Dolby
DATE:	11/09/23	**DATE:**	11/09/23

LMB:td/wma

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TEST REPORT FOR NOVUM STRUCTURES LLC

Report No.: P9755.03-201-37 R1
Revision Date: 11/09/23

REPORT ISSUED TO

NOVUM STRUCTURES LLC
W126 N8585 Westbrook Crossing
Menomonee Falls, Wisconsin 53051

SECTION 1

TEST SAMPLE DESCRIPTION

Tested in Accordance with: ANSI Z97.1-2015 (R2020), CPSC 16 CFR 1201-2012, & CAN/CGSB 12.1-2022
Samples Obtained from Manufacturer: Beijing Wuhuatianbao Glass Co., Ltd
Received Date: 06/21/23
Glazing Product Designation: G19 (8mm Clear w/ Frit on Surface #2 (Line, 50 % Coverage) FT + 1.52 mm PVB + 8mm Clear FT)
Overall Glazing Thickness: 5/8" (nominal) (17.52 mm)
Glazing Type: Laminated Transparent Glass (LTG)
Sample Dimensions: **Impact**: 34" wide x 76" high (±1/8") **Thermal**: 12" x 12" (±1/8")
Interlayer Manufacturer/Type: Eastman / Saflex PVB
Interlayer Manufacturer/Type Obtained from: Novum Structures LLC
Size Classification: Unlimited
Thickness Standard: ASTM C1036

Laminated Glazing Composition Details

SAMPLE TYPE	THICKNESS MEASUREMENTS (inches) [A]			
	OVERALL	GLASS LITE 1	INTERLAYER [B]	GLASS LITE 2
Thermal	0.678	0.310	0.059	0.309
Impact	0.678	0.308	0.060	0.310
Type	--	Tempered	Interlayer	Tempered

[A] Measurement values obtained from the first test specimen of the thermal and impact test.
[B] Calculated thickness based on summation of glass thicknesses subtracted from overall thickness.

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TEST REPORT FOR NOVUM STRUCTURES LLC

Report No.: P9755.03-201-37 R1
Revision Date: 11/09/23

SECTION 2

TEST RESULTS

Test Date: 08/16/23
Lab Temperature: 70 °F
Duration of Pre-Conditioning @ 65 - 85°F: 4 Hours

Thermal Test Results
Method: Bake

SPECIMEN NUMBER	OVERALL THICKNESS (inches)	TEST RESULTS & OBSERVATIONS	PASS/FAIL
G19.01	0.678	No crack, no bubbles, or defects within 1/2"	Pass
G19.02	0.678	No crack, no bubbles, or defects within 1/2"	Pass
G19.03	0.678	No crack, no bubbles, or defects within 1/2"	Pass

Acceptance Criteria: No bubbles or defects more than 1/2" from edge or crack.

Impact Test Results
Specimens were impacted once from a drop height of 48 inches.

SPECIMEN NUMBER	OVERALL THICKNESS (inches)	TEST RESULTS & OBSERVATIONS	PASS/FAIL
G19.08[A]	0.678	Did not break	Pass
G19.06[B]	0.678	Did not break	Pass
G19.05[A]	0.678	Did not break	Pass
G19.07[B]	0.678	Did not break	Pass

[A] Impacted, Lite 1 side
[B] Impacted, Lite 2 side

Acceptance Criteria: After impact, openings are evaluated as described below and detached particles are collected. Individual detached particles less than the mass equivalent of 1 sq. in. of the original test specimen are excluded from evaluation.
(a) No shear or opening through which a 3" sphere can freely pass with 4 lbs. force.
(b) Detached particles collected after impact shall not weigh more than 15.5 sq. in. of the original test specimen.
(c) No single particle shall weigh more than 6.82 sq. in. of the original test specimen.

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www.intertek.com/building

TEST REPORT FOR NOVUM STRUCTURES LLC
Report No.: P9755.03-201-37 R1
Revision Date: 11/09/23

SECTION 3
CONCLUSION

The specimens meet the thermal and impact requirements of the referenced standards for the size classification listed, meet the thickness requirements of the referenced standard, and meet the permanent label requirements.

All test specimens were destroyed by test or by personnel and have been disposed of as trash. Representative sections of failed samples will be retained for up to 30 days from the date of report issuance. After 30 days, representative samples will be automatically discarded. The test record retention period ends four years after the test date.

SECTION 4
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Thomas P. Ehlert - S.E, P.E.	Novum Structures LLC
Lukas M. Bayer	Intertek B&C

SECTION 5
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	09/07/23	N/A	Original Report Issue
1	11/09/23	Cover	Revised Report. Report revised to correct PE Stamp.

Appendix O

Declaratory Statement DS 2015-022

FILED
Department of Business and Professional Regulation
Deputy Agency Clerk
CLERK Brandon Nichols
Date 5/11/2015
File # 2015-04098

STATE OF FLORIDA
BUILDING COMMISSION

In the Matter of

NOVUM STRUCTURES, LLC

Petitioner.
_____/

DS 2015-022

DECLARATORY STATEMENT

The foregoing proceeding came before the Florida Building Commission (Commission) by a Petition from Novum Structures, LLC (Petitioner), which was received March 4, 2015. Based on the statements in the petition submitted by the Petitioner, the Commission states the following:

Findings of Fact

1. The petition is filed pursuant to, and must conform to the requirements of Rule 28-105.002, Florida Administrative Code.

2. Petitioner's representative in this matter is Scott Knoblock, PE, at Novum Structures, W126 N8585 Westbrook Crossing, Menomonee Falls, Wisconsin, 53051.

3. Petitioner is a specialty contractor for spatial architectural structures. The firm designs, manufactures and installs glass-clad steel structures. Petitioner applied for Florida Product Approval #3885 in January of 2005 for a point supported glass panel skylight system for use on canopies and other similar cladding applications that do not enclose a space.

4. Petitioner has since reapplied for a renewal of its Product Approval under #17488J for several reasons stated in Petitioner's Appendix section of the Petition and was advised the product fell outside the scope of the state product approval program. The product itself has not changed in any way.

5. The product at issue was first approved on October 11, 2006. The application for the product at issue had not been updated since that original approval, which was granted on, and was specific to, the 2001 Florida Building Code.

6. Petitioner seeks clarification regarding the applicability of Rule 61G20-3.001 as to whether Petitioner's skylight product is ineligible for statewide product approval because it is not part of the building envelope.

7. Specifically, the Petitioner requests an answer to the following question:

> Is a skylight product ineligible for a Florida Product Approval solely because it is not part of the building envelope?

Conclusions of Law

8. The Commission has the specific statutory authority pursuant to Section 553.775(3)(a), Florida Statutes (2014) to interpret the provisions of the Florida Building Code by entering a declaratory statement.

9. Section 553.8425, Florida Statutes (2014) states, in pertinent part:

> **Local Product Approval –**
>
> **(1)** For local product approval, products or systems of construction shall demonstrate compliance with the structural windload requirements of the Florida Building Code through one of the following methods:
>
> **(a)** A certification mark, listing, or label from a commission-approved certification agency indicating that the product complies with the code;
>
> **(b)** A test report from a commission-approved testing laboratory indicating that the product tested complies with the code;
>
> **(c)** A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code;

> **(d)** A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code;
>
> **(e)** A statewide product approval issued by the Florida Building Commission; or
>
> **(f)** Designation of compliance with a prescriptive, material standard adopted by the commission by rule under s. 553.842(15)
>
> **(6)** Upon review of the compliance documentation, and a finding that the product complies with the code, the authority having jurisdiction or a local building official shall deem the product approved for use in accordance with its approval and limitation of use.

10. Florida Administrative Code Rule 61G20-3.001, which pertains to products available for approval by the Commission states, in pertinent part:

> **Scope.**
>
> **(2)** This rule applies to approval of products and systems, which comprise the *building envelope* and structural frame, for compliance with the structural requirements of the Florida Building Code. (emphasis added).

11. Florida Administrative Code Rule 9B-72, which pertained to products available for approval by the Commission before November 11, 2006, stated in pertinent part:

> **(28)** Structural component means any part or assembly of a *building or structure* used to or intended to support or *shelter any use or occupancy,* and which affects he safety of such building or structure or which supports any dead or designed live load and the removal of which part, material or assembly could cause, or be expected to cause, all or any portion to collapse or to fail, or both. (emphasis added).

12. Section 202, Definitions, Florida Building Code, Building (2010) states:

> **CANOPY.** Any fixed roof-like structure, not movable like an awning, and which is cantilevered in whole or in part self-supporting, but having no side walls or curtains other than valances not more than 18 inches (457 mm) deep. Lean-to canopies, fixed umbrellas and *similar structures* are included in this classification. Structures having side walls or valances more than 18 inches (457 mm) deep shall be classified as a tent as set forth therein. (emphasis added).

13. In response to Petitioner's question, the answer is no, as long as the applications/limits of use of the product in question are limited to those applications where the said product is directly attached or applied to the building envelope, then the product would fall within the scope of Rule 61G20-3.001. Standalone-open structure applications of the product in question fall outside of the scope of the state product approval program. However, standalone-open structure applications must meet the requirements of the Florida Building Code and are subject to approval by the local authority having jurisdiction.

DONE AND ORDERED this 6th day of May, 2015 in Jacksonville, Duval County, State of Florida.

Richard S. Browdy

RICHARD S. BROWDY
Chairman, Florida Building Commission

NOTICE OF RIGHT TO APPEAL

Petitioner and all other interested parties are hereby advised of their right to seek judicial review of this Order in accordance with Section 120.68(2)(a), Florida Statutes (2014), and Florida Rules of Appellate Procedure 9.110(a) and 9.030(b)(1)(C). To initiate an appeal, a Notice of Appeal must be filed with Agency Clerk, Department of Business and Professional Regulation, 1940 North Monroe Street, Tallahassee, Florida 32399-1000 and with the appropriate District Court of Appeal not later than thirty (30) days after this Order is filed with the Clerk of the Department of Business and Professional Regulation. A Notice of Appeal filed with the District Court of Appeal shall be accompanied by the filing fee specified by Section 35.22(3), Florida Statutes (2014).

CERTIFICATE OF FILING AND SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing order has been filed with the undersigned and furnished by U. S. Mail to the persons listed below this 11th day of May, 2015.



Agency Clerk's Office
Department of Business and Professional Regulation
& Florida Building Commission
1940 North Monroe Street
Tallahassee, Florida 32399-1000

Via U.S. Mail

Scott Knoblock, PE
Senior Project Engineer
Novum Structures, LLC
W126 N8585 Westbrook Crossing
Menomonee Falls, Wisconsin 53051

Via Inter-Office or Email Delivery

Mo Madani, Planning Manager
Codes and Standards Section
Department of Business and Professional Regulation
1940 North Monroe Street
Tallahassee, Florida 32399
Mo.Madani@myfloridalicense.com

Marjorie Holladay
Joint Administrative Procedures Committee
Pepper Building, Room 680
Tallahassee, Florida 32399-1300

FILED
Department of Business and Professional Regulation
Deputy Agency Clerk
CLERK Brandon Nichols
Date 3/4/2015
File #

Novum Structures LLC | W126 N8585 Westbrook Crossing, Menomonee Falls, WI 53051

NOVUM

PETITION FOR DECLARATORY STATEMENT BEFORE THE FLORIDA BUILDING COMMISION

DS 2015-022

Date: 03 March 2015

Company: Novum Structures LLC
Address: W126 N8585 Westbrook Crossing
Menomonee Falls, WI 53051

Name: Scott Knoblock, PE
Title: Senior Project Engineer
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Statue(s), Agency Rule(s), Agency Order(s) and/or Code Section(s) on which the Declaratory Statement is sought:

Florida Administrative Code
Rule 61G20-3.001 Scope.
(1) Products in the following categories as defined by subcategories of subsection 61G20-3.002(33), F.A.C., shall be available for approval by the Commission pursuant to Rule 61G20-3.007, F.A.C., for use in the state:

(a) Panel Walls;
(b) Exterior Doors;
(c) Roofing Products;
(d) Skylights;
(e) Windows;
(f) Shutters;
(g) Structural Components; and
(h) Impact Protective Systems.

(2) This rule applies to approval of products and systems, which comprise the building envelope and structural frame, for compliance with the structural requirements of the Florida Building Code.

Background:

I am an engineer with Novum Structures. Novum is an internationally recognized specialty contractor for high technology spatial architectural structures. Our firm designs, manufactures and installs glass clad steel structures. For the sake of this discussion about product approval, we are a manufacturer.

My company received Florida Product approval #FL3885 in January of 2005 for a point supported glass (PSG) panel skylight system for use on canopies and other similar cladding applications that do not enclose a space. We decided to apply for a renewal our product approval (under #17478) for 4 minor reasons provided in the Appendix section of this letter. The product itself has not changed in anyway. We have submitted all the necessary FL PE signed and sealed documents from an independent firm and employed a Validation Entity who has submitted the required checklist.

Norman Bellamy, the government operations consultant who has reviewed our application, has indicated the following:

Dear Product Approval Applicant,

A review of your Florida Product Approval Application has the following comment(s):
As noted in limits of use "not for use as part of the building envelope" and as per Rule 61G20-3 (see below), this product falls outside the scope of the State Product Approval Program. Please see below.

61G20-3.001 Scope.
(1) Products in the following categories as defined by subcategories of subsection 61G20-3.002(33), F.A.C., shall be available for approval by the Commission pursuant to Rule 61G20-3.007, F.A.C., for use in the state:
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(2) **This rule applies to approval of products and systems, which comprise the building envelope and structural frame,** for compliance with the structural requirements of the Florida Building Code.

The Question

Is a skylight product ineligible for a Florida Product Approval solely because it is not part of the building envelope?

It is our hope that the answer is "no" and that a canopy skylight can receive product approval.

The reason we indicate that our product is not to be used as part of the building envelope is that it is not designed for, nor been tested for, large or small missile impacts. Per Section 1626 of the 2010 FBC the envelope of a building needs to be impact resistant to avoid internal pressure changes to a building due to penetrations in the envelope during a high wind event. Further, in section 1626.1, exception "a" specifically excludes "canopies" from requiring ballistic testing.

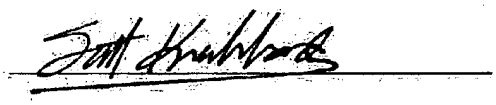
We were told back in 2005 that we could forego the missile testing and perform only the uniform load pressure testing and that this would make our product eligible for a product approval for use in non-envelope areas such as canopies. This is what we did and we received product approval and have been installing PSG panels on canopies in Florida since 2005.

We believe the reason we were given that direction and product approval in 2005 was because in the 2010 FBC section 1625.1 and 1625.2 it indicates (paraphrasing) *"any construction where there is insufficient evidence of compliance with the code, the building official may require load testing"* and the load testing needed is defined there. As there is no nationally recognized design standard which provides clear analytical calculation methods, Point Supported Glass is the type of product that would likely fall into this category of requiring testing. As such, we desire the product approval to avoid having to prove ourselves to every building official each time we take on a new project.

We are only asking to renew the approval of a product that has been thoroughly tested and used successfully in the field for many years.

I thank you for your consideration of this matter.

Respectfully



Scott Knoblock PE
Lead Project Engineer
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APPENDIX

The four reasons we have applied for a renewed Florida Product approval, which are listed in the introduction to the Evaluation Report of our Product Approval application, are:

1) The original approval was given under the 2001 Florida Building Code. Changes below reflect the move to the 2010 Florida Building Code and the use of ultimate wind speeds. The design wind load limits are now presented as a factored value rather than the original un-factored value. As such it is requested that the new Florida Product Approval certification of this product be based on the 2010 Florida Building Code.

2) The original approval was for the product manufacturer, MERO Structures, Inc. Mero changed its name to Novum Structures, LLC in 2006. The testing drawings, the test reports and the letter of compliance do not reflect the new name as those documents reflect what was originally tested and therefore there is no need to change the name there. However, we request the name change be present on the Florida Product approval paperwork and on the website.

3) The NOA of the PVB interlayer listed on the original approval has expired. However, that same PVB product is listed in a current NOA and therefore deemed appropriate that NOA be listed as part of this product's FL approval.

4) The ATI Test Report used in the original approval had an expiration date on the cover. The FL PE who wrote the Evaluation Report has reviewed the current TAS 202-94 and finds no significant changes to the test procedure that would void the results of these tests.