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TEST REPORT # **T1248-3B**

DATE: July 3, 2019

CLIENT: **Artistic Skylight Domes**
255 Regina Road
Woodbridge, Ontario
L4L 8M3
Contact: Nenzio Ferrazzo

Summary of Results:

PRODUCT MANUFACTURER:	Artistic Skylight Domes
PRODUSCT TYPE:	SKG- Unit Skylight (glazed with glass)
PRODUCT SERIES/MODEL:	G-FF-Butted
PRODUCT DESIGNATORS:	SKG – PG80: Size tested 1303 x 1303 mm (~51x 51 in) SKG – PG3840 (SI): Size tested 1303 x 1303 mm- Unit Skylight (glazed with glass)
OPTIONAL SECONDARY DESIGNATION:	Positive Design Pressure (DP) = 3840 Pa (80 psf) Negative Design Pressure (DP) = -3840 Pa (-80 psf) Water Penetration Resistance Test Pressure = 720 Pa (15 psf) Canadian Air Infiltration / Exfiltration = Fixed Level
TEST COMPLETION DATE:	May 16, 2019

SAMPLE ID: Model G-FF Butted

SAMPLE DESCRIPTION: Aluminum Fixed Butted Curb Mount Skylight having a centrally located rafter midway between the jambs and glazed with two insulating glass units (IGU) separated by the rafter.
Width: 1303 mm (51-5/16″); Length: 1303 mm (51-5/16″); See pages 5 for full description.

SAMPLING PROCEDURES: See page 3 for the sampling procedure.

DATE OF RECEIPT: February 12, 2019

DATE(S) OF TESTING: April 14 to May 16, 2019.

TESTING REQUESTED: **Testing to the mandatory requirements of AAMA/WDMA/CSA 101/I.S.2/A440-17 NAFS - North American Fenestration Standard / Specification for windows, doors and skylights.**

TEST RESULTS: See page 4 for the test results.

CONTENTS: Test report pages 1 through 9, appendix A1 through A11.

TESTING PERFORMED AT: QAI Laboratories Ltd., Toronto.

Tested by: David Wren

Reported by

David Wren
Senior Technician

Reviewed by

Neil Dumont
Fenestration Reviewer

Sampling Plan/Procedures:

One unused, Aluminum Fixed Butted Skylight was provided by the client as a typical production sample and examined at the QAI laboratory to determine compliance with the submitted documentation, then tested from April 14 to May 16, 2019 as being representative of the model covered in this report.

Test Conditions:

QAI Laboratories Ltd. (QAI) was retained by Artistic Skylight Domes to perform testing in accordance with the mandatory test requirements of AAMA/WDMA/CSA 101/I.S.2/A440-17 NAFS - North American Fenestration Standard / Specification for windows, doors and skylights on a representative sample of a 1303 mm (51-5/16″) x 1303 mm (51-5/16″) curb-mounted aluminum fixed butted skylight glazed with dual-glazed insulating glass units (IGU).

This report includes tests performed on a specimen of specific dimensions. Actual product performance may be affected by variations in the products dimensions, assembly details and installation method. The drawings supplied by Artistic Skylight Domes were verified by QAI for the unit tested and are shown in Appendix A.

The test specimen was installed by the client into a simulated wood roof deck test section, complete with curb, as described below. Two parallel courses of closed cell adhesive-backed foam tape were applied to the top of the curb, the corners of the tape being liberally sealed with silicone prior to sample installation for approximately 100 mm (4") either side of each corner. The skylight base was fastened to the side of the curb using #10 x 2″ long hex-head self-drilling tek screws (Master Gripper MDP #JS1000) complete with a neoprene washer bonded to a flat stainless steel washer. There were four fasteners per each of the four sides of the skylight base, spaced nominally 355 mm (14″) apart o/c.

The simulated wood roof deck test section measured nominally 2490 mm (98″) square. It was fabricated from 2x6 SPF wood framing sheathed with 15.9 mm (5/8″) plywood. A centrally located curb was fastened to the deck surface and underlying framing, and was fabricated from 2x8 SPF lumber. The inside of the curb was open to below, the opening measuring 1175 mm (46-1/4″) square. The underlying framing of the deck section consisted of a 2x6 perimeter frame, two doubled-up 2x6 members spanning two opposing sides of the perimeter frame, these doubled up 2x6 members being centrally located, spaced 1175 mm (46-1/4″) apart. Two doubled-up 2x6 members spanned the above mentioned full-length 2x6 members, and were centrally located and spaced 1175 mm (46-1/4″) apart as well. These doubled-up 2x6's were aligned with, and supported, the above mentioned curb. The plywood sheathing was further supported by 2x6 members spanning the full-length doubled-up 2x6 members and the parallel adjacent perimeter 2x6 members, three per side nominally 590 mm (23-1/4″) apart o/c. The deck surface and curb were covered with an impermeable self-adhered membrane, the membrane covering the top and sides of the deck, continuing up the sides of the curb and wrapping around the top edge of the curb. The roof deck test section was supported on legs, the surface of the deck nominally 1220 mm (48″) from the floor.

The underside of the test deck was enclosed beneath the curb opening with a chamber fabricated from 2x4 SPF framing and OSB sheathing. The chamber was sealed so that positive and negative test pressures could be applied to it and the associated skylight. The chamber also provided access for observations during the water penetration resistance test.

Product Ratings:

Table 1: Summary of test results

Test Name	AAMA/WDMA/CSA 101/I.S.2/A440-17 NAFS - North American Fenestration Standard / Specification for windows, doors and skylights Result:
Air Leakage Resistance Test (ASTM E283) Test Date and Time: April 14/19 10:30 am Temperature During Test: 24.0ºC Barometric Pressure During Test: 978 kPa Orientation: 5º Slope from Horizontal	Pressure differential = 75 Pa Fixed Level Requirement = Max. 0.2 L/s/m^2 (0.04 cfm/ft^2) Infiltration result = 0.171 L/s/m^2 (0.034 cfm/ft^2) - Fixed Level Exfiltration result = 0.122 L/s/m^2 (0.024 cfm/ft^2) - Fixed Level
Water Penetration Resistance Test (ASTM E547) Test Date and Time: May 10/19 9:30 am Temperature During Test: 23.5ºC Water Application Rate: 1.492 L/min Orientation: 5º Slope from Horizontal	Maximum pressure differential = 720 Pa (DP 100 – 15 psf) Observations: No leakage or trapped water.
Uniform Load Deflection Test at Design Pressure (ASTM E330 – Procedure A) Test Date and Time: May 13/19 1230 pm Temperature During Test: 23.0ºC Load Duration (+ve WL): 60 sec. Load Duration (-ve WL): 10 sec. Use of Tape or Film: No Effect of Tape/Film: N/A Orientation: 5º Slope from Horizontal	Maximum pressure differential = 3960 Pa (DP 80 - 80 psf) Component Measured: Rafter (Mullion) Span = 1275 mm (50.1875") Maximum Deflection (+ve WL)= 0.76 mm (0.030") Maximum Residual Deflection (+ve WL) = 0.05 mm (0.002") Maximum Deflection (-ve WL)= -0.89 mm (-0.035") Maximum Residual Deflection (-ve WL) = -0.05 mm (-0.002") Observations: No damage. Maximum Allowable Deflection (1/175 of span) at Design Load= 7.28 mm (0.287")
Uniform Load Structural Test (ASTM E330 – Procedure A) Test Date and Time: May 16/19 11 am Temperature During Test: 25.0ºC Load Duration (+ve WL): 60 sec. Load Duration (-ve WL): 10 sec. Use of Tape or Film: No Effect of Tape/Film: N/A Orientation: 5º Slope	Design pressure = 3840 Pa (DP 80) Component Measured: Rafter (Mullion) Span = 1275 mm (50.1875") Maximum pressure differential (+ve WL)= 7680 Pa (160 psf) Maximum Residual Deflection (+ve WL) = 0.10 mm (0.004) Maximum pressure differential (-ve WL)= 5760 Pa (120 psf) Maximum Residual Deflection (-ve WL) = -0.10 mm (-0.004") Observations: No damage. Maximum Allowable Residual Deflection = 3.82 mm (0.151")

Performance Classification: N/A for Skylights
Performance Grade: PG 80
Maximum Size Tested: 1303 mm wide x 1303 mm high (51-5/16" x 51-5/16")

Primary Designator:
SKG – PG80: Size tested 1303 x 1303 mm (~51 x 51 in)
SKG – PG3840 (SI): Size tested 1303 x 1303 mm- Unit Skylight (glazed with glass)

Secondary Designator:
Positive Design Pressure (DP) = 3840 Pa (80 psf)
Negative Design Pressure (DP) = -3840 Pa (-80 psf)
Water Penetration Resistance Test Pressure = 720 Pa (15 psf) - At 5º slope
Canadian Air Infiltration / Exfiltration = Fixed Level - At 5º slope

Note: AAMA/WDMA/CSA 101/I.S.2/A440-17, Clause 9.2.5: The air, water and structural tests were performed on test specimens installed per the method outlined in the test conditions section of this report. The test procedures are designed to test the performance of the test specimen only and are not used to test the performance of the installation, in particular the perimeter sealant joint and the anchoring of the assembly. However, products not installed according to the installation method described in this report may not perform to an equivalent performance level.

Description:

Aluminum Fixed Butted Curb Mount Skylight		
Frame:	Description:	Extruded aluminum curb frame members (Artistic Skylight Domes Drawing No. SD.01 dated 25/03/15, File No. ART15-2503). Frame dimensions: Width: 1303 mm (51-5/16″), Length: 1303 mm (51-5/16″).
	Joints:	Corners were mitred and welded along the vertical joints of the down-turned leg on the interior (backside) of the corner joints. Along the horizontal portion of the corner, the joint was welded along the underside. Along the top side of the horizontal portion of the joint, the joint was tack welded. The upstanding portion of the corner was also welded then ground smooth along the outside vertical portion of the joint.
	Rafter (Mullion):	An extruded aluminum rafter (Artistic Skylight Domes Drawing titled “Alumicor 2x3 Rafter) spanned the head and sill of the aluminum curb frame mid-way between the jambs. Each end of the rafter was notched to receive the curb frame. Aluminum angle-shaped tabs secured the rafter to the curb frame. The tabs measured 15.9 mm (5/8") wide and 3.2 mm (1/8") thick, with a 25.4 mm (1") long leg tack-welded to the curb frame and a 22 mm (7/8") upstanding leg fastened to the rafter using a #10 x 15.9 mm (5/8") long hex-head self-drilling tek screw. Two tabs per rafter end, one on each side.
Condensation Gutter/Thermal Break:	Description:	Extruded PVC combination condensation gutter and thermal break (Artistic Skylight Domes Drawing titled ”Small FF Vinyl Frame- Glass Only” dated September 14, 2016) was fitted to the top surface of the curb frame and secured to it using #8 x 12.7 mm (1/2″) long pan head self-drilling tek screws complete with a neoprene washer bonded to a flat stainless steel washer. There were four fasteners per jamb member of the frame located on nominally 356 mm (14″) to 432 mm (17″) centres. Along the head and sill curb frame members, the gutter terminated at the rafter, the ends of the gutter being sealed to the sides of the rafter about the full perimeter of the end of the gutter. Along the underside of the curb frame, the mullion was liberally sealed to the adjacent curb frame from the end of the gutter on one side to the end of the gutter on the other side of the mullion with silicone(GE SCS2000 structural silicone). Three of the above mentioned fasteners secured each section of the gutter to the curb frame. The outer perimeter of the gutter was sealed to the curb frame with a cap bead of silicone sealant on both the topside and underside (GE SCS2000 structural silicone). The combination condensation gutter and thermal break frame was complete with a co-extruded flexible vinyl ‘V’-shaped glazing fin along its top surface. Thermal Break dimensions: Width: 1303 mm (49-3/4″), Length: 1303 mm (49-3/4″).
	Joints:	Corners were mitred and welded.
Glazing Method:	Interior:	Laid-in glazed on the co-extruded ‘V’-shaped fin of the condensation gutter, with butyl shim tape applied (Tremco Polyshim II) to the fin, and on butyl shim tape applied to the glazing legs of the aluminum rafter. The shim tape measured 9.5 mm (3/8") in width and 3.8 mm (0.150") in thickness with a 3.2 mm (1/8") diameter shim with the corners of the tape sealed with caulking (GE SCS2000 structural silicone) prior to glazing.

Aluminum Fixed Butted Curb Mount Skylight (Continued)		
Glazing Method (Continued):	Exterior:	Extruded aluminum retainer cap frame (AFP Part# AFP 492) was fitted to the curb frame on the exterior, the aluminum cap retainer being sealed to the underlying glazing using butyl shim tape (Tremco Polyshim II) measuring 9.5 mm (3/8") in width and 3.8 mm (0.150") in thickness with a 3.2 mm (1/8") diameter shim. The shim tape was applied to the perimeter of the opening along the underside of the retainer cap. Corners of the retainer cap frame were mitred and welded. The retainer cap was fastened to the sides of the curb frame using five #8 x 12.7 mm (1/2″) pan head self-drilling tek screws per side spaced nominally 280 mm (11″) apart o/c. The lower edge of the cap was sealed to the side of the curb frame around the perimeter with silicone sealant (GE SCS2000 structural silicone) during assembly. Along the rafter, a rubber gasket (Artistic Skylight Domes Drawing titled ”Alumicor Screw Channel Gasket”) was fitted to the pressure plate screw channel. At the ends of screw channel a 51 mm (2") square piece of 25 ga sheet aluminum spanned the adjacent insulated glass units, sealed to them and the underlying screw channel. An extruded aluminum pressure plate (Artistic Skylight Domes Drawing titled ”Alumicor 2" Channel”) complete with a kerf-inserted rubber glazing gasket (Artistic Skylight Domes Drawing titled ”Alumicor Spline Gasket”) along each edge on the underside, was fastened to the rafter using nine 1/4"-20 x 19 mm (3/4") long pan head screws. The screws were complete with stainless steel flat washers having a neoprene washer bonded to the underside. The intermediate seven screws were on 152 mm (6") centres, with the lowest screw 38 mm (1-1/2") apart o/c from the adjacent screw, and the top screw 64 mm (2-1/2") apart on centre from the adjacent screw. The pressure plate was sealed to the underlying sheet aluminum across the ends on the underside and across the ends to the adjacent retainer cap with silicone sealant (GE SCS2000 structural silicone). An extruded aluminum trim cap (Artistic Skylight Domes Drawing titled ”Alumicor 2" Snap Cap”) was fitted to the pressure plate, the ends of the cap closed with a 90º inward return, silicone sealant (GE SCS2000 structural silicone) applied to the underside at the ends prior to cap installation. Following assembly, a continuous cap bead of silicone sealant (GE SCS2000 structural silicone) was applied to perimeter of each insulating glass unit, sealing them to the edge of the adjacent retaining frame or rafter trim cap. The cap bead also continued across the ends of the trim cap, sealing it to the adjacent retaining frame. Retaining Frame dimensions: Width: 1308 mm (51-1/2″), Length: 1308 mm (51-1/2″). Pressure Plate Length: 1210 mm (47-5/8"). Trim Cap Length: 1280 mm (50-3/8")
	Setting Blocks:	Each glazing unit was supported by two adhesive-backed neoprene setting blocks spaced nominally 75 mm to 115 mm (3" to 4-1/2") o/c from the adjacent end of the glazing unit. Along the outboard jambs and head, two neoprene shims were fitted to the glazing units along these edges, spaced nominally 90 mm to 140 mm (3-1/2" to 5-1/2") o/c from the adjacent end of the glazing unit. The setting blocks measured 44.5 mm (1-3/4") x 25.4 mm (1") x 6.4 mm (0.250"). The shims/setting blocks were fitted between the glazing units and the retaining frame once installed. Along the mullion, two adhesive-backed neoprene shims were fitted to each of the glazing units, spaced nominally 140mm (5-1/2") o/c from the adjacent end of the glazing unit. These setting blocks measured 44.5 mm (1-3/4") x 25.4 mm (1") x 3.2 mm (0.125").
Glazing:	Description:	Two sheets of 6 mm thick glass, 15.9 mm (5/8″) air space giving an overall nominal thickness of 25.4 mm (1").
Drainage:	Description:	One 3.6 mm (9/64") diameter hole drained each sill condensation gutter to the retainer frame. They were each located 102 mm (4") o/c from the adjacent outboard jamb end of the gutter. Retainer frame (at sill) to exterior- None

MODIFICATIONS:

- Sealed condensation gutter to rafter.
- Sealed retainer frame weeps along sill.

CONCLUSION:

QAI Laboratories Ltd., with lab facilities located in Toronto, Ontario, performed testing in accordance with AAMA/WDMA/CSA 101/I.S.2/A440-17 NAFS - North American Fenestration Standard / Specification for windows, doors and skylights on a representative sample of an Artistic Skylight Domes Model G-FF-Butted Aluminum Fixed Curb Mount Skylight.

Test results in this report may not be reproducible in the field. Test results relate only to those products tested.

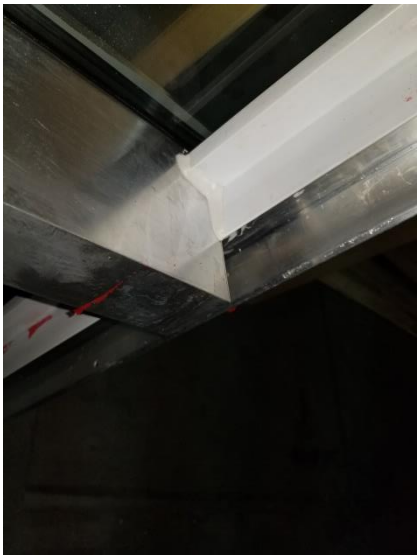
See Table 1 for a summary of test results and window ratings. The sample tested was found to comply with the applicable requirements and obtained test results as reported in Table 1 of this report.

Report Revision History

Date	Revision	Change Description	Initials
July 3, 2019	0	Original Report	DW

PHOTOS

Photo 1- Test assembly



Photos 2, 3, and 4- Sealing of condensation gutters to rafter and curb frame.

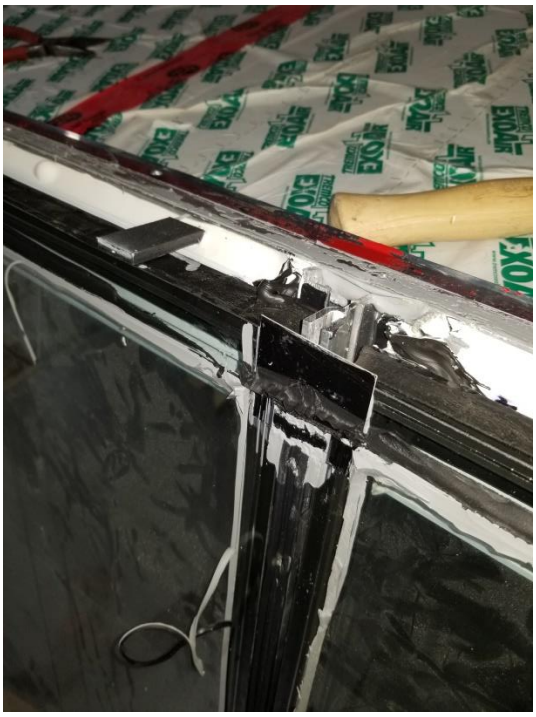


Photo 6- Aluminum plate at ends of pressure plate.

Photo 7- Angle bracket securing rafter.

Photo 8- Cap bead of sealant at ends of pressure plate.

Photo 9- Cap bead of sealant on trim cap and retainer frame.