TEST REPORT

AAMA/WDMA/CSA 101/I.S.2/A440-11
AAMA/WDMA/CSA 101/I.S.2/A440-08

REPORT NO.: 2481.02-109-12-R1

RENDERED TO: TROPHY WINDOWS
16261 Hollister Street
Houston, Texas 77066

PRODUCT TYPE: PVC Single Hung Window, Oriel – Single, Integrally Mulled Twin & Integrally Mulled Triple

SERIES / MODEL: 82

Test	**Specimen #1 Summary of Results** *Single Unit*
Primary Product Designator	Class LC – PG25 1207 x 2426 (48 x 96)-H
Design Pressure	±1200 Pa (±25.06 psf)
Air Infiltration	1.0 L/s/m^2 (0.20 cfm/ft^2)
Canadian Air Infiltration/Exfiltration Level	A2
Water Penetration Resistance Test Pressure	330 Pa (6.89 psf)

Test	**Specimen #2 Summary of Results** *Integrally Mulled Twin Unit*
Primary Product Designator	Class LC – PG40 1816 x 2121 (72 x 84)-H
Design Pressure	±2160 Pa (±45.11 psf)
Air Infiltration	1.0 L/s/m^2 (0.20 cfm/ft^2)
Canadian Air Infiltration/Exfiltration Level	A2
Water Penetration Resistance Test Pressure	290 Pa (6.06 psf)

Test	**Specimen #3 Summary of Results** *Integrally Mulled Triple Unit*
Primary Product Designator	Class LC – PG35 2731 x 2121 (108 x 84)-H
Design Pressure	±1920 Pa (±40.10 psf)
Air Infiltration	0.9 L/s/m^2 (0.18 cfm/ft^2)
Canadian Air Infiltration/Exfiltration Level	A2
Water Penetration Resistance Test Pressure	260 Pa (5.43 psf)

Test Completion Date: 7/23/2020

Revision Date: 9/4/2020

Reference must be made to Revised Report No. 2481.02-109-12-R1, dated 9/2/2020 for complete test specimen description and detailed test results.

CLIENT INFORMATION: TROPHY WINDOWS
16261 Hollister Street
Houston, Texas 77066

TEST LABORATORY: Molimo, LLC
1410 Eden Road
York, Pennsylvania 17402
717-900-6034

PROJECT SUMMARY:

PRODUCT TYPE: PVC Single Hung Window, Oriel – Single, Integrally Mulled Twin & Integrally Mulled Triple

SERIES/MODEL: 82

PROJECT SUMMARY:

Molimo, LLC was contracted to perform testing on the above referenced product. The results are tested values and were secured by using the designated test methods. A summary of the rating achieved for the specimen tested are shown in the table below.

This product was originally tested by Veka, Inc. as Series SH46WW, PVC Single Hung Window, Oriel – Single, Integrally Mulled Twin & Integrally Mulled Triple. This report is a reissue of Report No. 2481.01-109-12 in the name of Trophy Windows through written authorization by Veka, Inc.

SPECIMEN	SPECIFICATION	PRODUCT RATING
1	101/I.S.2/A440-08 and -11	Class LC – PG25 1207 x 2426 (48 x 96)-H
2	101/I.S.2/A440-08 and -11	Class LC – PG40 1816 x 2121 (72 x 84)-H
3	101/I.S.2/A440-08 and -11	Class LC – PG35 2731 x 2121 (108 x 84)-H

PROJECT DETAILS:

Test Date: 7/21/2020 - 7/23/2020

Test Record Retention End Date: 7/23/2024

Test Location: Veka, Inc. test facility in Fombell, PA. In accordance with AAMA 205.01, calibration of manufacturers' test equipment is documented under Report No. 2477.01-109-12.

Test Specimen Source: The test specimen was provided by the client. Representative samples of the test specimen will be retained by Molimo for a minimum of four years from the test completion date.

Drawing Reference: The test specimen drawings were supplied by the client. The test specimen construction was verified by Molimo and was found to be representative of the product tested. Test specimen drawings are located in Appendix C of this report.

WITNESSES:

The following representatives witnessed all or part of the testing.

Name	Company
Doug Merry	VEKA, Inc.
Cornell Charles	VEKA, Inc.
Joseph Allison	Molimo, LLC

TEST METHODS:

AAMA/WDMA/CSA 101/I.S.2/A440-11, *NAFS 2011 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights*

AAMA/WDMA/CSA 101/I.S.2/A440-08, *NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights*

TEST SPECIMEN DESCRIPTION:

PRODUCT SIZES:

Test Specimen #1:

Overall Size:	1207 mm x 2426 mm (47-1/2" x 95-1/2")
Overall Area:	2.93 m^2 (31.50 ft^2)
Sash Size:	1153 mm x 727 mm (45-3/8" x 28-5/8")
Screen Size:	1124 mm x 718 mm (44-1/4" x 28-1/4")

Test Specimen #2:

Overall Size:	1816 mm x 2121 mm (71-1/2" x 83-1/2")
Overall Area:	3.85 m^2 (41.46 ft^2)
Sash Size (2):	845 mm x 727 mm (33-1/4" x 28-5/8")
Screen Size (2):	816 mm x 718 mm (32-1/8" x 28-1/4")

Test Specimen #3:

Overall Size:	2731 mm x 2121 mm (107-1/2" x 83-1/2")
Overall Area:	5.79 m^2 (62.34 ft^2)
Sash Size (3):	848 mm x 727 mm (33-3/8" x 28-5/8")
Screen Size (3):	816 mm x 718 mm (32-1/8" x 28-1/4")

FRAME CONSTRUCTION:

Material: Extruded PVC

Corner Details: Miter cut and thermally welded.

Fixed rails: Each was coped, butted and fastened with two #8 x 2-1/2" truss head screws at jamb end and with a metal clip at the integral mullion end. Each metal clip was fastened to the fixed meeting rail reinforcement with one #8 x 3/4" flat head screw. Each metal clip was fastened into the integral mullion two #8 x 5/8" flat head screws. The entire mechanical joint was sealed with silicone sealant

Integral mullions: The integral mullions were coped, butted and fastened with four #8 x 2-1/2" truss head screws at each end. The entire mechanical joint was sealed with silicone sealant.

SASH CONSTRUCTION:

Material: Extruded PVC

Corner Details: Miter cut and thermally welded

REINFORCEMENT:

Drawing Number	Material	Location
S-046	Extruded Aluminum	Fixed meeting rails
S-047	Extruded Aluminum	Lock rails
RF V-718	Extruded Aluminum	Integral mullions

TEST SPECIMEN DESCRIPTION: (Continued)

GLAZING DETAILS: *No conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimens can be made.*

Description	**Detail:** *All Specimens*
Glass Type	3/4" IG
Glazing Construction (Exterior to Interior)	5/32" Thick annealed glass 7/16" "U" shaped steel spacer system 5/32" Thick annealed glass
Glazing Method	The sash was exterior glazed, and the fixed lite interior glazed against a bed of silicone sealant. A heal bead of silicone sealant was then applied and the IG was secured with rigid vinyl glazing beads.
Glazing Bite	1/2"
Daylight Opening #1 Sash: #1 Fixed: #2 Sash (2): #2 Fixed (2): #3 Sash (3): #3 Fixed (3):	 1092 mm x 667 mm (43" x 26-1/4") 1092 mm x 1584 mm (43" x 62-3/8") 784 mm x 667 mm (30-7/8" x 26-1/4") 787 mm x 1280 mm (31" x 50-3/8") 787 mm x 667 mm (31" x 26-1/4") 787 mm x 1276 mm (31" x 50-1/4")

WEATHERSTRIPPING:

Description	**Quantity**	**Location**
0.187" Backed by 0.270" high center fin pile	2 Rows	Stiles
0.187" Backed by 0.250" high center fin pile	1 Row	Sill
0.187" Backed by 0.230" high center fin pile	1 Row	Lock rail
0.400" Diameter foam-filled vinyl bulb with fin on an offset base	1 Row	Bottom rail

TEST SPECIMEN DESCRIPTION: (Continued)

DRAINAGE:

Description	Quantity	Location
1-3/16" wide by 3/16" high weep slot with open cell foam baffle	2	Exterior sill face, one 3-5/8" from each end
9/16" wide by 1-1/4" deep weep hole	2	Sill/Jamb intersection, one at each end of sill
Leg height weep notch	6	Top surface sill legs (3), one at each end of each

HARDWARE:

Description	Quantity	Location
Composite lock	2 per sash	Lock rail, one 7-1/4" from each end with integral mating groove on the fixed meeting rail
Plastic flush mount tilt latch	2 per sash	Top corners of each sash
Metal interlocking pivot bar	2 per sash	Bottom rail, one at each end
Constant force balance system	2 per sash	One per jamb

SCREEN CONSTRUCTION:

Frame Material:	Formed Aluminum
Mesh Type:	Fiber
Corner Construction:	Square cut and secured with snap-in plastic corner keys
Mesh Attachment Method:	Flexible vinyl spline

INSTALLATION: The specimen was installed into a Spruce-Pine-Fir wood buck. The rough opening allowed for a 1/8" shim space. The integral nailing fin the specimen was sealed to the wood buck with silicone sealant.

Location	Anchor Description	Anchor Spacing
Integral nailing fin	#8 x 2" Truss head screw	Beginning at each corner then spaced 8” on center, through the nailing fin and into the wood buck. Two additional screws were placed above and below each integral mullion.

TEST RESULTS: The temperature during testing was 19°C (67°F).

SPECIMEN #1 - SINGLE UNIT:

OPERATING FORCE: (per ASTM E 2068)

Test	Results	Allowable
Initiate Motion	155 N (35 lbf)	Report Only
Maintain Motion (Opening)	178 N (40 lbf)	180 N (40 lbf)
Maintain Motion (Closing)	89 N (20 lbf)	180 N (40 lbf)
Locks / Latches	62 N (14 lbf)	100 N (22.5 lbf)

Note #1: The operating force results listed above represent the maximum force measured among all sash tested.

AIR LEAKAGE TESTING: (per ASTM E 283)

Test	Results	Allowable
Infiltration @ 75 Pa (1.57 psf)	1.0 L/s/m^2 (0.20 cfm/ft^2)	1.5 L/s/m^2 (0.30 cfm/ft^2)
Exfiltration @ 75 Pa (1.57 psf)	1.0 L/s/m^2 (0.19 cfm/ft^2)	1.5 L/s/m^2 (0.30 cfm/ft^2)

Canadian Air Infiltration Rating: A2

Note #2: The specimen tested meets (or exceeds) the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440 for air leakage resistance.

WATER PENETRATION TESTING: (per ASTM E 547)

Test	Results	Allowable
330 Pa (6.89 psf)	Pass	No Leakage

Note #3: Water Penetration testing was performed with and without an insect screen.

TEST RESULTS: (Continued)

SPECIMEN #1 - SINGLE UNIT: (Continued)

UNIFORM LOAD TESTING: (per ASTM E 330)

Design Pressure Test	Results	Allowable
Deflection measured at fixed meeting rail		
+1200 Pa (+25.06 psf)	16.0 mm (0.63")	
-1200 Pa (-25.06 psf)	14.8 mm (0.58")	Report Only

Structural Test	Results	Allowable
Permanent Set measured atfixed meeting rail		
+1800 Pa (+37.59 psf)	0.8 mm (0.03")	4.3 mm (0.17")
-1800 Pa (-37.59 psf)	0.8 mm (0.03")	4.3 mm (0.17")

Note #4: The deflections reported are not limited by AAMA/WDMA/CSA 101/I.S.2/A440 for this product designation and is recorded for information purposes only.

Note #5: All loads were held for 10 seconds.

Note #6: Tape and film were used to seal against air leakage. In our opinion, the tape and film did not influence the results of the test.

SECONDARY TESTING:

Test	Results	Allowable
FORCED ENTRY RESISTANCE		
per ASTM F 588		
Type: A– Grade: 10	Pass	No Entry
THERMOPLASTIC CORNER WELD	Pass	Meets as stated
DEGLAZING		
per ASTM E 987		
Operating Direction – 320 N (70 lbf)	Pass	Meets as stated
Remaining Direction – 230 N (50 lbf)	Pass	Meets as stated

TEST RESULTS: (Continued)

SPECIMEN #2 - INTEGRALLY MULLED TWIN UNIT: (Continued)

OPERATING FORCE: (per ASTM E 2068)

Test	Results	Allowable
Initiate Motion	107 N (24 lbf)	Report Only
Maintain Motion (Opening)	120 N (27 lbf)	180 N (40 lbf)
Maintain Motion (Closing)	89 N (20 lbf)	180 N (40 lbf)
Locks / Latches	53 N (12 lbf)	100 N (22.5 lbf)

Note #7: The operating force results listed above represent the maximum force measured among all sash tested.

AIR LEAKAGE TESTING: (per ASTM E 283)

Test	Results	Allowable
Infiltration @ 75 Pa (1.57 psf)	1.0 L/s/m^2 (0.20 cfm/ft^2)	1.5 L/s/m^2 (0.30 cfm/ft^2)
Exfiltration @ 75 Pa (1.57 psf)	0.9 L/s/m^2 (0.18 cfm/ft^2)	1.5 L/s/m^2 (0.30 cfm/ft^2)

Canadian Air Infiltration Rating: A2

Note #8: The specimen tested meets (or exceeds) the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440 for air leakage resistance.

WATER PENETRATION TESTING: (per ASTM E 547)

Test	Results	Allowable
290 Pa (6.06 psf)	Pass	No Leakage

Note #9: Water Penetration testing was performed with and without an insect screen.

TEST RESULTS: (Continued)

SPECIMEN #2 - INTEGRALLY MULLED TWIN UNIT: (Continued)

UNIFORM LOAD TESTING: (per ASTM E 330)

Design Pressure Test	Results	Allowable
Deflection measured at integral mullion		
+2160 Pa (+45.11 psf)	32.0 mm (1.26")	
-2160 Pa (-45.11 psf)	26.5 mm (1.04")	Report Only

Structural Test	Results	Allowable
Permanent Set measured at integral mullion		
+3240 Pa (+67.67 psf)	2.5 mm (0.10")	8.4 mm (0.33")
-3240 Pa (-67.67 psf)	2.0 mm (0.08")	8.4 mm (0.33")

Note #10: The deflections reported are not limited by AAMA/WDMA/CSA 101/I.S.2/A440 for this product designation and is recorded for information purposes only.

Note #11: All loads were held for 10 seconds.

Note #12: Tape and film were used to seal against air leakage. In our opinion, the tape and film did not influence the results of the test.

SECONDARY TESTING:

Test	Results	Allowable
FORCED ENTRY RESISTANCE		
per ASTM F 588		
Type: A– Grade: 10	Pass	No Entry
THERMOPLASTIC CORNER WELD	Pass	Meets as stated
DEGLAZING		
per ASTM E 987		
Operating Direction – 320 N (70 lbf)	Pass	Meets as stated
Remaining Direction – 230 N (50 lbf)	Pass	Meets as stated

TEST RESULTS: (Continued)

SPECIMEN #3 - INTEGRALLY MULLED TRIPLE UNIT: (Continued)

OPERATING FORCE: (per ASTM E 2068)

Test	Results	Allowable
Initiate Motion	111 N (25 lbf)	Report Only
Maintain Motion (Opening)	147 N (33 lbf)	180 N (40 lbf)
Maintain Motion (Closing)	89 N (20 lbf)	180 N (40 lbf)
Locks / Latches	62 N (14 lbf)	100 N (22.5 lbf)

Note #13: The operating force results listed above represent the maximum force measured among all sash tested.

AIR LEAKAGE TESTING: (per ASTM E 283)

Test	Results	Allowable
Infiltration @ 75 Pa (1.57 psf)	0.9 L/s/m^2 (0.18 cfm/ft^2)	1.5 L/s/m^2 (0.30 cfm/ft^2)
Exfiltration @ 75 Pa (1.57 psf)	0.9 L/s/m^2 (0.17 cfm/ft^2)	1.5 L/s/m^2 (0.30 cfm/ft^2)

Canadian Air Infiltration Rating: A2

Note #14: The specimen tested meets (or exceeds) the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440 for air leakage resistance.

WATER PENETRATION TESTING: (per ASTM E 547)

Test	Results	Allowable
260 Pa (5.43 psf)	Pass	No Leakage

Note #15: Water Penetration testing was performed with and without an insect screen.

TEST RESULTS: (Continued)

SPECIMEN #3 - INTEGRALLY MULLED TRIPLE UNIT: (Continued)

UNIFORM LOAD TESTING: (per ASTM E 330)

Design Pressure Test	Results	Allowable
Deflection measured at right side integral mullion		
+1920 Pa (+40.10 psf)	29.8 mm (1.17")	
-1920 Pa (-40.10 psf)	27.0 mm (1.06")	Report Only

Structural Test	Results	Allowable
Permanent Set measured at right side integral mullion		
+2880 Pa (+60.15 psf)	1.0 mm (0.04")	8.4 mm (0.33")
-2880 Pa (-60.15 psf)	1.8 mm (0.07")	8.4 mm (0.33")

Note #16: The deflections reported are not limited by AAMA/WDMA/CSA 101/I.S.2/A440 for this product designation and is recorded for information purposes only.

Note #17: All loads were held for 10 seconds.

Note #18: Tape and film were used to seal against air leakage. In our opinion, the tape and film did not influence the results of the test.

SECONDARY TESTING:

Test	Results	Allowable
FORCED ENTRY RESISTANCE per ASTM F 588 Type: A– Grade: 10	Pass	No Entry
THERMOPLASTIC CORNER WELD	Pass	Meets as stated
DEGLAZING per ASTM E 987		
Operating Direction – 320 N (70 lbf)	Pass	Meets as stated
Remaining Direction – 230 N (50 lbf)	Pass	Meets as stated

***General Note**: All testing was performed in accordance with reference test methods.*

This report is reissued in the name of Trophy Windows through written authorization from Veka, Inc. to whom the original report was rendered. The original Report No. is 2481.01-109-12.

A copy of this report, detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Molimo, LLC for the entire test record retention period. At the end of this retention period, the service life of this report will expire.

Results obtained are tested values and were secured by using the designated test methods. This test report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen(s) tested. This report may not be reproduced, except in full, without the written permission of Molimo, LLC.

For MOLIMO, LLC:

Joseph E. Allison
Regional Project Manager

Michael D. Stremmel, P.E.
Senior Project Engineer

JEA:dro

Attachments (pages): This report is complete only when all attachments listed are included.
- Appendix-A: Alteration Addendum (1)
- Appendix-B: Air Seal Location (1)
- Appendix-C: Drawings (3)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
1	9/4/2020	3	Specimen #3, Sash width corrected

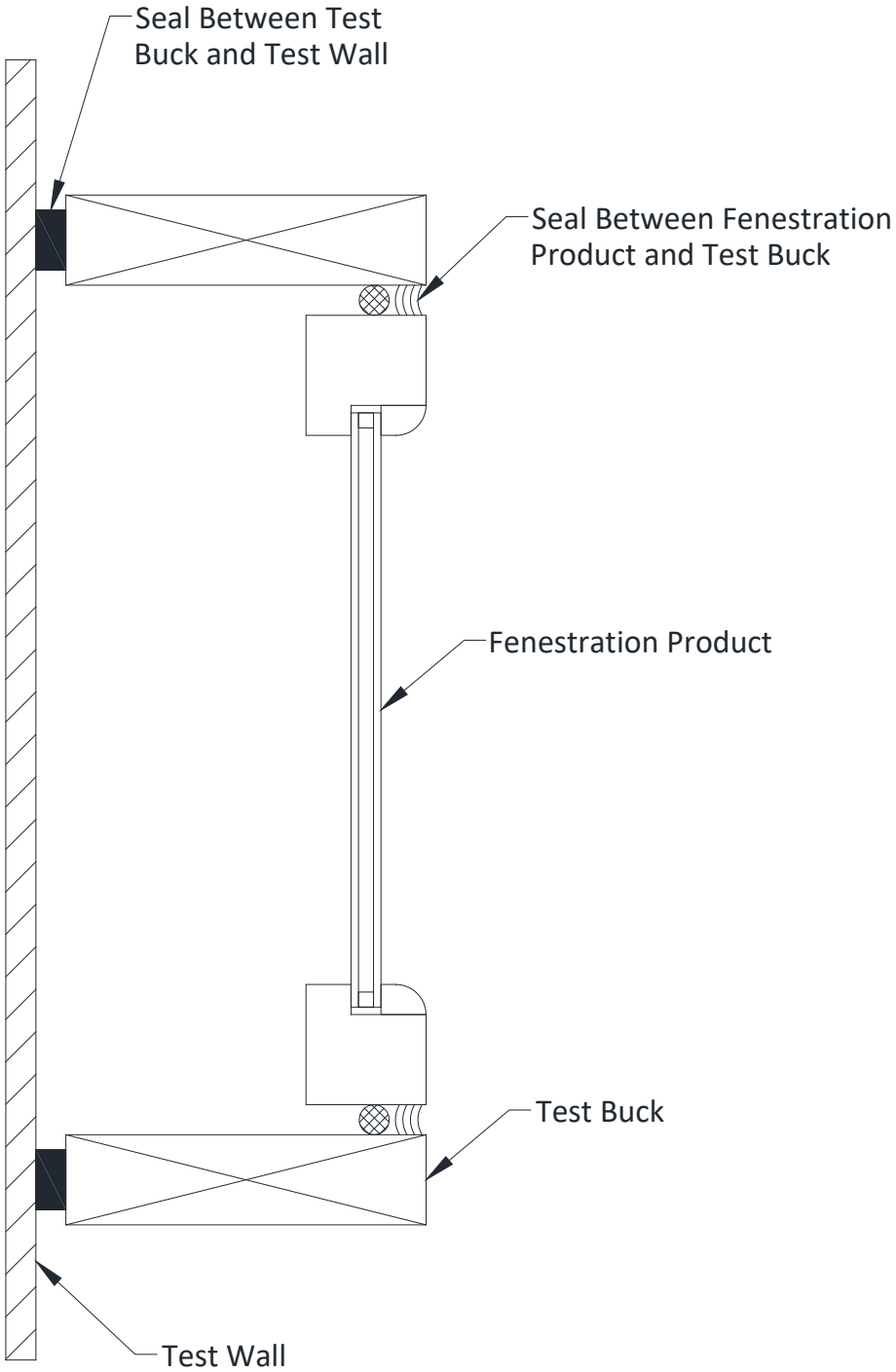
Appendix A

Alteration Addendum

No alterations were performed.

Appendix B

Air Seal Location

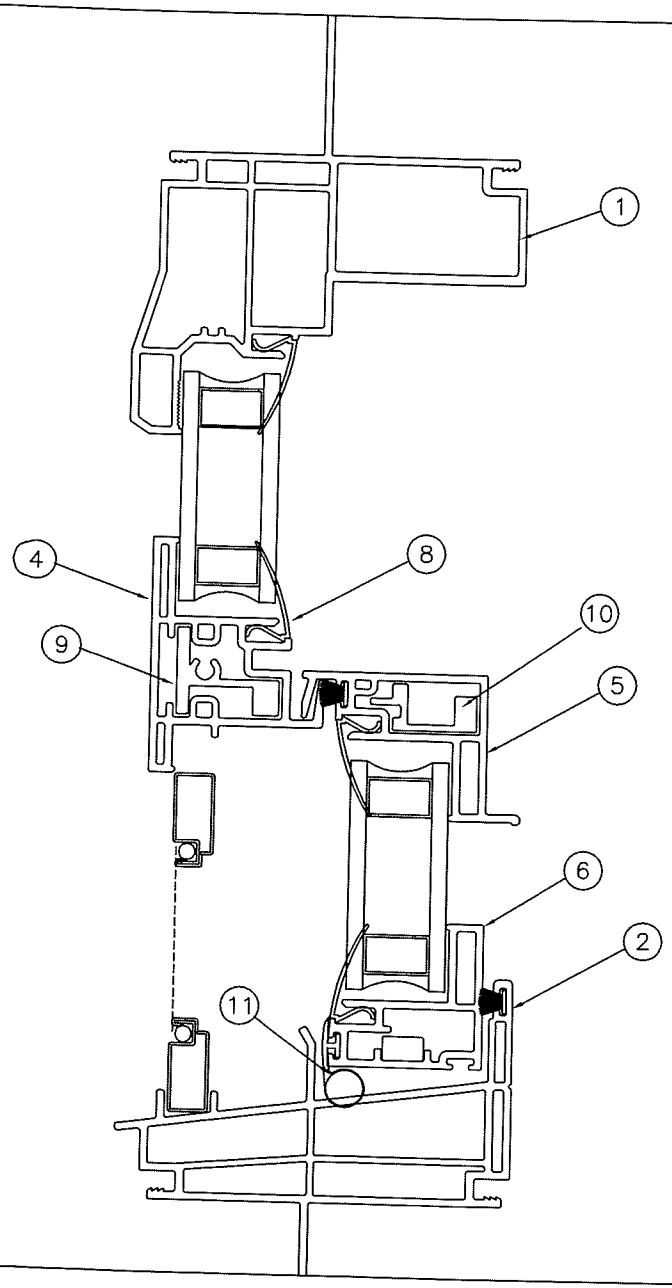


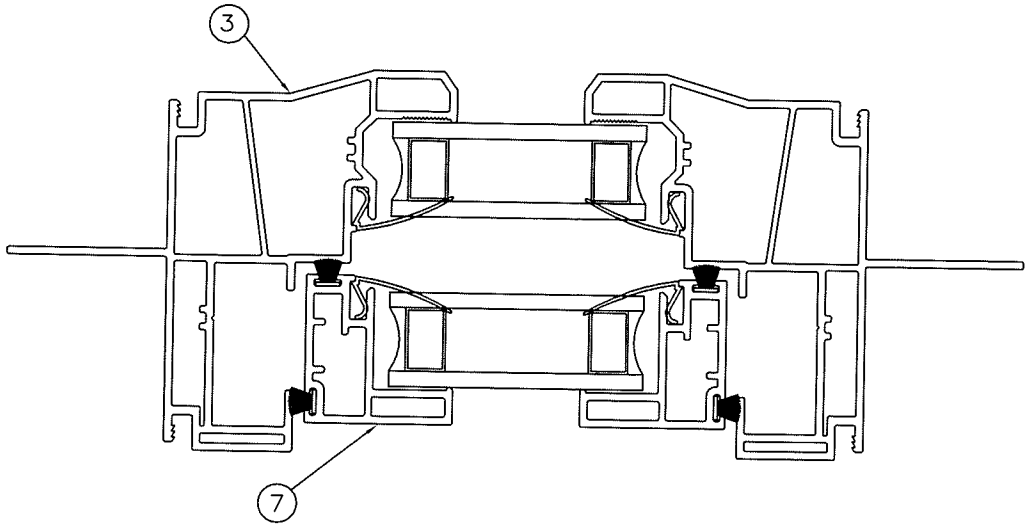
Appendix C

Drawings

Molimo™
Architectural Product Testing

Report #:	2481.02-109-12
Date:	9/2/2020
By:	J.Allison





VINYL & ALUMINUM EXTRUSIONS

1	SH4602	FRAME HEAD	7	V–705	SASH STILE
2	SH4603	FRAME SILL	8	V–716	GLAZING BEAD
3	SH4601	FRAME JAMB	9	S–046	M.R. REINFORCEMENT
4	V–706	MEETING RAIL	10	S–047	SASH REINFORCEMENT
5	V–704	SASH LOCK RAIL	11	AMESBURY 32684	BULB SEAL
6	V–705	SASH BOTTOM RAIL			

REV	ECN.	CHANGE	BY	DATE
C		UPDATED SH4602 TCR#0517–002	BJF	13 SEP 17
B		UPDATED SH4603	BJF	18 MAY 10
A		UPDATED SH4601	BJF	13 NOV 08

THIS DOCUMENT CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION
DO NOT COPY OR DISCLOSE WITHOUT CONSENT OF VINYLSOURCE INC.

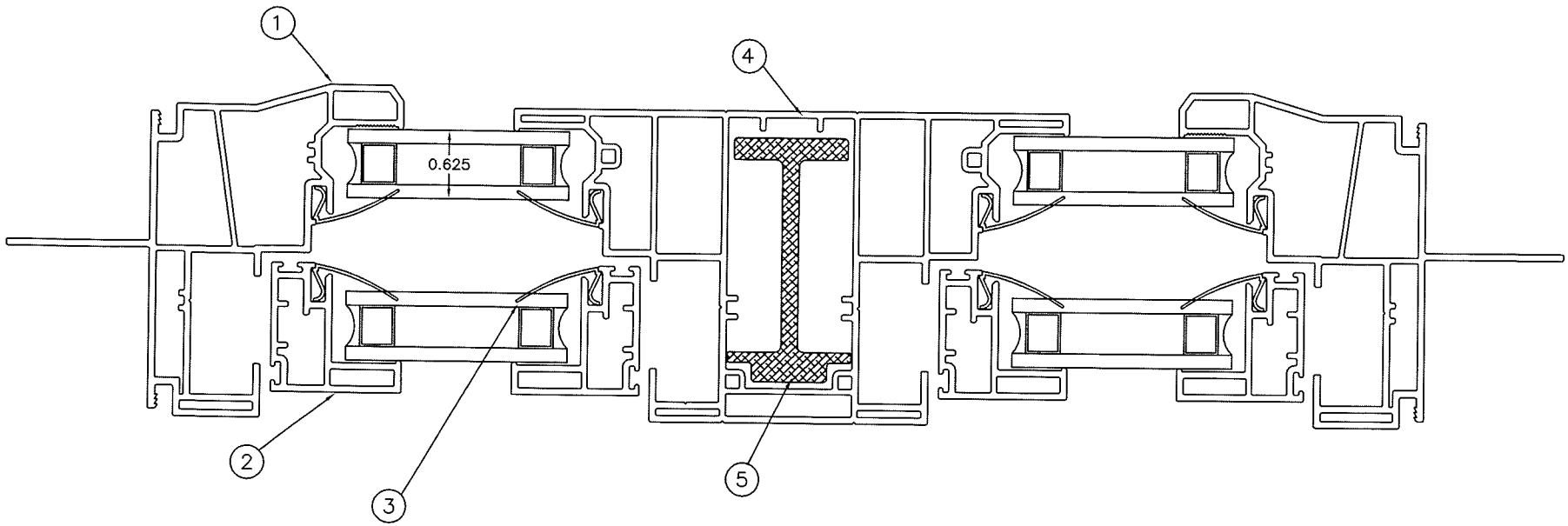
VEKA INC.
100 VEKA DRIVE
FOMBELL, PA 16123

SINGLE HUNG SH46WW

B–SIZE	BY: BJF	DATE: 4/29/04
SCALE: FULL	DWG #: SH46WW	

Molimo
Architectural Product Testing

Report #:	2481.02-109-12
Date:	9/2/2020
By:	J.Allison



VINYL & ALUMINUM EXTRUSIONS

1	SH4601	FRAME JAMB
2	V-705	SASH STILE
3	V-716	GLAZING BEAD
4	V-718	INTEGRAL MULLION
5	RF V718	AOM REINFORCEMENT

CUT LOGIC : cut_chart_SH46WW.xls

REV	ECN.	CHANGE	BY	DATE
	XXXX			

THIS DOCUMENT CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION
DO NOT COPY OR DISCLOSE WITHOUT CONSENT OF VEKA INC.

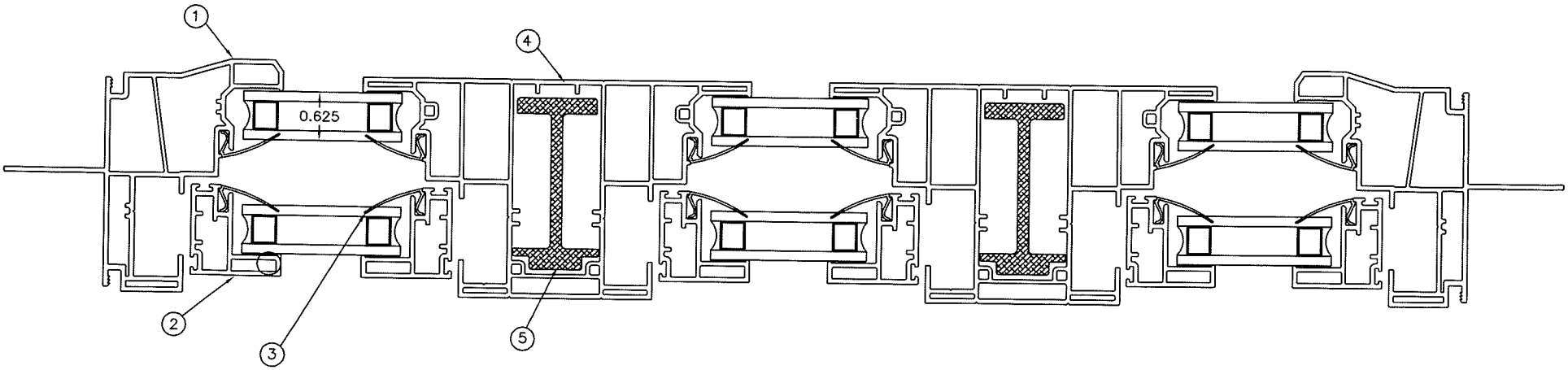
VEKA INC.
100 VEKA DRIVE
FOMBELL, PA 16123

TWIN SINGLE HUNG SH46WW

B-SIZE	BY: BJF	DATE: 10/12/15
SCALE: FULL	DWG #: SH46WW-2	

Molimo
Architectural Product Testing

Report #:	2481.02-109-12
Date:	9/2/2020
By:	J.Allison



VINYL & ALUMINUM EXTRUSIONS

1. SH4601 FRAME JAMB
2. V-705 SASH STILE
3. V-716 GLAZING BEAD
4. V-718 INTEGRAL MULLION
5. RF V718 AOM REINFORCEMENT

CUT LOGIC : cut_chart_SH46WW.xls

REV	ECN.	CHANGE	BY	DATE
	XXXX			

THIS DOCUMENT CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION
DO NOT COPY OR DISCLOSE WITHOUT CONSENT OF VEKA INC.

VEKA INC.
100 VEKA DRIVE
FOMBELL, PA 16123

TRIPLE SINGLE HUNG SH46WW

B-SIZE	BY: BJF	DATE: 10/12/15
SCALE: 3/4	DWG #: SH46WW-3	