



## **AAMA 506 TEST REPORT**

**Report No.:** F4526.01-501-44

**Rendered to:**

VEKA INC.  
Fombell, Pennsylvania

**PRODUCT TYPE:** PVC Double Hung Window  
**SERIES/MODEL:** DHA4WW

**Test Date:** 01/06/16

**Revision 3:** 01/31/17

**Report Date:** 01/14/16

**Test Record Retention End Date:** 01/06/20



Architectural Testing

Test Report No.: F4526.01-501-44

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**1.0 Report Issued To:** Veka Inc.  
100 Veka Drive  
Fombell, Pennsylvania 16123-0250

**2.0 Test Laboratory:** Architectural Testing, Inc., a subsidiary of Intertek (Intertek-ATI)  
1140 Lincoln Avenue  
Springdale, Pennsylvania 15144  
724-275-7100

**3.0 Project Summary:**

**3.1 Product Type:** PVC Double Hung Window

**3.2 Series/Model:** DHA4WW

**3.3 Compliance Statement:** Results obtained are tested values and were secured by using the designated test method(s). The specimen(s) tested met the performance requirements set forth in the referenced test procedures for a  $\pm 2400$  Pa ( $\pm 50.13$  psf) Design Pressure with missile impacts corresponding to Missile Level D and Wind Zone 3.

**3.4 Test Date:** 01/06/16

**3.5 Test Record Retention End Date:** All test records for this report will be retained until January 6, 2020.

**3.6 Test Location:** Intertek-ATI in Springdale, Pennsylvania.

**3.7 Test Specimen Source:** The test specimens were provided by the client. Representative samples of the test specimen(s) will be retained by Intertek-ATI for a minimum of four years from the test completion date.

**3.8 Drawing Reference:** The test specimen drawings have been reviewed by Intertek-ATI and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Intertek-ATI per the drawings located in Appendix B. Any deviations are documented herein or on the drawings.

### 3.0 Project Summary: (Continued)

#### 3.9 List of Official Observers:

<u>Name</u>	<u>Company</u>
James Grippo	Intertek-ATI
Joseph Allison	Intertek-ATI

### 4.0 Test Specification(s):

AAMA 506-11, *Voluntary Specifications for Impact and Cycle Testing of Fenestration Products*.

ASTM E1886-13a, *Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials*

ASTM E1996-14a, *Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes*

### 5.0 Test Specimen Description:

#### 5.1 Product Sizes:

##### Test Specimens #1 - #3 (Replacement); Test Specimen #4 (New Construction):

Overall Area: 2.2 m <sup>2</sup> (24.0 ft <sup>2</sup> )	Width		Height	
	millimeters	inches	millimeters	inches
Overall size	1118	44	1930	76
Exterior sash size	1032	40-5/8	940	37
Interior sash size	1057	41-5/8	965	38

#### 5.2 Frame Construction:

Frame Member	Material	Description
Head, sill, and jambs	PVC	Extruded

	Joinery Type	Detail
All corners	Mitered	Thermally welded

## 5.0 Test Specimen Description: (Continued)

### 5.3 Sash Construction:

Sash Member	Material	Description
All rails and stiles	PVC	Extruded

	Joinery Type	Detail
All corners	Mitered	Thermally welded

### 5.4 Reinforcement:

Drawing Number	Location	Material
RF SEA745 AOM	Bottom stiles, bottom rail	Extruded aluminum
RF SEA746 AOM	Lock rail	Extruded aluminum
RF SEA434 AOM	Exterior meeting rail	Extruded aluminum
RF SEA435 AOM	Top rail, top stiles	Extruded aluminum

### 5.5 Weatherstripping:

Description	Quantity	Location
0.187" backed by 0.270" high center fin pile	1 Row	Sill, lock rail, head
0.187" backed by 0.270" high center fin pile	2 Rows	Exterior meeting rail, top rail (exterior)
0.187" backed by 0.270" high center fin pile	3 Rows	Stiles, top rail
0.187" backed by 0.450" high foam filled vinyl bulb	1 Row	Exterior meeting rail
0.187" by 0.450" vinyl jacket / foam-filled bulb with flexible fin and 90° offset base	1 Row	Bottom rail

## 5.0 Test Specimen Description: (Continued)

**5.6 Glazing:** *No conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimen(s) can be made.*

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
1" IG	Rectangular-shaped aluminum, single sealed	1/8" annealed glass / 0.090" thick Solutia Saflex® PVB inner layer / 1/8" annealed glass	1/8" annealed	The glass was set from the exterior against a PECORA 896-HIS silicone sealant

Location	Quantity	Daylight Opening		Glass Bite
		millimeters	inches	
Exterior sash	1	962 x 870	37-7/8 x 34-1/4	1/2"
Interior sash	1	962 x 870	37-7/8 x 34-1/4	1/2"

## 5.7 Drainage:

Drainage Method	Size	Quantity	Location
Weepslot with flap	1-1/4" wide by 5/16" high	2	Exterior sill face, one 3" from each end
Weepslot	1" wide by 3/16" high	4	Intermediate sill walls, one at each end of each wall
Weephole	1-1/4" deep by 1/2" wide	2	Sill/jamb intersection, one at each end
Weep notch	1/8" wide by leg height	2	Sill sash retainer leg, one at each end
Weep notch	5/8" wide by leg height	4	Sill screen retainer legs (2), one at each end of each leg

## 5.8 Hardware:

Description	Quantity	Location
Locking composite cam lock	2	Lock rail, one 8" from each end with mating keepers on the exterior meeting rail
Constant force balance system	4	Two per jamb
Locking metal surface mount tilt latch	2	Top corners of bottom sash
Recessed tilt latch	2	Top corners of top sash
Interlocking metal pivot bar	4	Bottom rail and exterior meeting rail, one at each end
Metal jamb clip	2	Interior jamb track mating with the bottom sash tilt latches

## 6.0 Installation:

The specimen was installed into a Spruce-Pine-Fir wood buck. The rough opening allowed for a 1/8" shim space. The exterior perimeter of the window was sealed with a silicone sealant.

### Test Specimens #1 - #3:

Location	Anchor Description	Anchor Location
Jambs	#8 x 2" truss head screw	Five per jamb, one each at the top, bottom, approximate midspan through the metal jamb clip, and one each 6" above and below midspan.

### Test Specimen #4:

Location	Anchor Description	Anchor Location
Integral nail fin	#8 x 2" truss head screw	Nominally spaced at 9" on center, and beginning at each corner

**7.0 Test Results:** The results are tabulated as follows:**ASTM E1886, Large Missile Impact****Conditioning Temperature:** 22°C (72°F)**Missile Weight:** 4037 g (8.90 lbs)**Missile Length:** 2.4 m (94-3/4")**Muzzle Distance from Test Specimen:** 5.2 m (17' 0")**Test Unit #1:** Orientation within  $\pm 5^\circ$  of horizontal

Impact #1: Missile Velocity: 15.0 m/s (49.2 fps)	
<b>Impact Area:</b>	Center of bottom sash
<b>Observations:</b>	Missile hit target area, no penetration
<b>Results:</b>	Pass

**Note:** See Intertek-ATI Sketch #1 for impact locations.**Test Unit #2:** Orientation within  $\pm 5^\circ$  of horizontal

Impact #1: Missile Velocity: 15.0 m/s (49.3 fps)	
<b>Impact Area:</b>	Lower left of bottom sash
<b>Observations:</b>	Missile hit target area, no penetration
<b>Results:</b>	Pass

**Note:** See Intertek-ATI Sketch #2 for impact locations.**Test Unit #3:** Orientation within  $\pm 5^\circ$  of horizontal

Impact #1: Missile Velocity: 15.0 m/s (49.3 fps)	
<b>Impact Area:</b>	Upper right of bottom sash
<b>Observations:</b>	Missile hit target area, no penetration
<b>Results:</b>	Pass

**Note:** See Intertek-ATI Sketch #3 for impact locations.

**7.0 Test Results:** (Continued)**Test Unit #4:** Orientation within  $\pm 5^\circ$  of horizontal

<b>Impact #1:</b> Missile Velocity: 15.1 m/s (49.4 fps)	
<b>Impact Area:</b>	Center of bottom sash
<b>Observations:</b>	Missile hit target area, no penetration
<b>Results:</b>	Pass

**Note:** See Intertek-ATI Sketch #1 for impact locations.



## 7.0 Test Results: (Continued)

### ASTM E1886, Air Pressure Cycling

#### Test Unit #1

**Design Pressure:**  $\pm 2400$  Pa ( $\pm 50.13$  psf)

#### POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
480 to 1200 (10.03 to 25.06)	3500	1.14	No additional deformation observed
0 to 1440 (0.0 to 30.08)	300	1.38	
1200 to 1920 (25.06 to 40.10)	600	1.33	
720 to 2400 (15.04 to 50.13)	100	2.40	

#### NEGATIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
720 to 2400 (15.04 to 50.13)	50	2.30	No additional deformation observed
1200 to 1920 (25.06 to 40.10)	1050	1.25	
0 to 1440 (0.0 to 30.08)	50	1.72	
480 to 1200 (10.03 to 25.06)	3350	1.10	

**Result:** Pass

**Note:** Test Specimens #1, #2, #3 and #4 were cycled in a common chamber.

## 7.0 Test Results: (Continued)

### ASTM E1886, Air Pressure Cycling

#### Test Unit #2

Design Pressure:  $\pm 2400$  Pa ( $\pm 50.13$  psf)

#### POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
480 to 1200 (10.03 to 25.06)	3500	1.14	No additional deformation observed
0 to 1440 (0.0 to 30.08)	300	1.38	
1200 to 1920 (25.06 to 40.10)	600	1.33	
720 to 2400 (15.04 to 50.13)	100	2.40	

#### NEGATIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
720 to 2400 (15.04 to 50.13)	50	2.30	No additional deformation observed
1200 to 1920 (25.06 to 40.10)	1050	1.25	
0 to 1440 (0.0 to 30.08)	50	1.72	
480 to 1200 (10.03 to 25.06)	3350	1.10	

**Result:** Pass

**Note:** . Test Specimens #1, #2, #3 and #4 were cycled in a common chamber.

## 7.0 Test Results: (Continued)

### ASTM E1886, Air Pressure Cycling

#### Test Unit #3

Design Pressure:  $\pm 2400$  Pa ( $\pm 50.13$  psf)

#### POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
480 to 1200 (10.03 to 25.06)	3500	1.14	No additional deformation observed
0 to 1440 (0.0 to 30.08)	300	1.38	
1200 to 1920 (25.06 to 40.10)	600	1.33	
720 to 2400 (15.04 to 50.13)	100	2.40	

#### NEGATIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
720 to 2400 (15.04 to 50.13)	50	2.30	No additional deformation observed
1200 to 1920 (25.06 to 40.10)	1050	1.25	
0 to 1440 (0.0 to 30.08)	50	1.72	
480 to 1200 (10.03 to 25.06)	3350	1.10	

**Result:** Pass

**Note:** Test Specimens #1, #2, #3 and #4 were cycled in a common chamber.

## 7.0 Test Results: (Continued)

### ASTM E1886, Air Pressure Cycling

#### Test Unit #4

Design Pressure:  $\pm 2400$  Pa ( $\pm 50.13$  psf)

#### POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
480 to 1200 (10.03 to 25.06)	3500	1.14	No additional deformation observed
0 to 1440 (0.0 to 30.08)	300	1.38	
1200 to 1920 (25.06 to 40.10)	600	1.33	
720 to 2400 (15.04 to 50.13)	100	2.40	

#### NEGATIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
720 to 2400 (15.04 to 50.13)	50	2.30	No additional deformation observed
1200 to 1920 (25.06 to 40.10)	1050	1.25	
0 to 1440 (0.0 to 30.08)	50	1.72	
480 to 1200 (10.03 to 25.06)	3350	1.10	

**Result:** Pass

**Note:** Test Specimens #1, #2, #3 and #4 were cycled in a common chamber.

**General Note:** Upon completion of testing, the specimens met the requirements of Section 7 of ASTM E1996.

#### **8.0 Test Equipment:**

**Cannon:** Constructed from steel piping utilizing compressed air to propel the missile

**Missile:** 2x4 Southern Pine

**Timing Device:** Electronic Beam Type

**Cycling Mechanism:** Computer controlled centrifugal blower with electronic pressure measuring device

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.



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Intertek-ATI will service this report for the entire test record retention period. Test records such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Intertek-ATI for the entire test record retention period.

This 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 approval of Intertek-ATI.

For ARCHITECTURAL TESTING, INC.:

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James P. Grippo  
Technician

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Joseph E. Allison  
Interim Laboratory Supervisor

JEA:sld

Attachments (pages): This report is complete only when all attachments listed are included.

Appendix A: Sketch(es) (3)

Appendix B: Drawing(s) (1) Complete drawings packet on file with Intertek-ATI

### Revision Log

<b><u>Rev. #</u></b>	<b><u>Date</u></b>	<b><u>Page(s)</u></b>	<b><u>Revision(s)</u></b>
1	02/16/16	Page 2	Corrected Wind zone 4 to Wind zone 3.
2	5/17/16	Page 5	Revised Hardware description under tilt latch.
3	1/31/17	Page 5	Removed incorrect hardware description for jamb clip.



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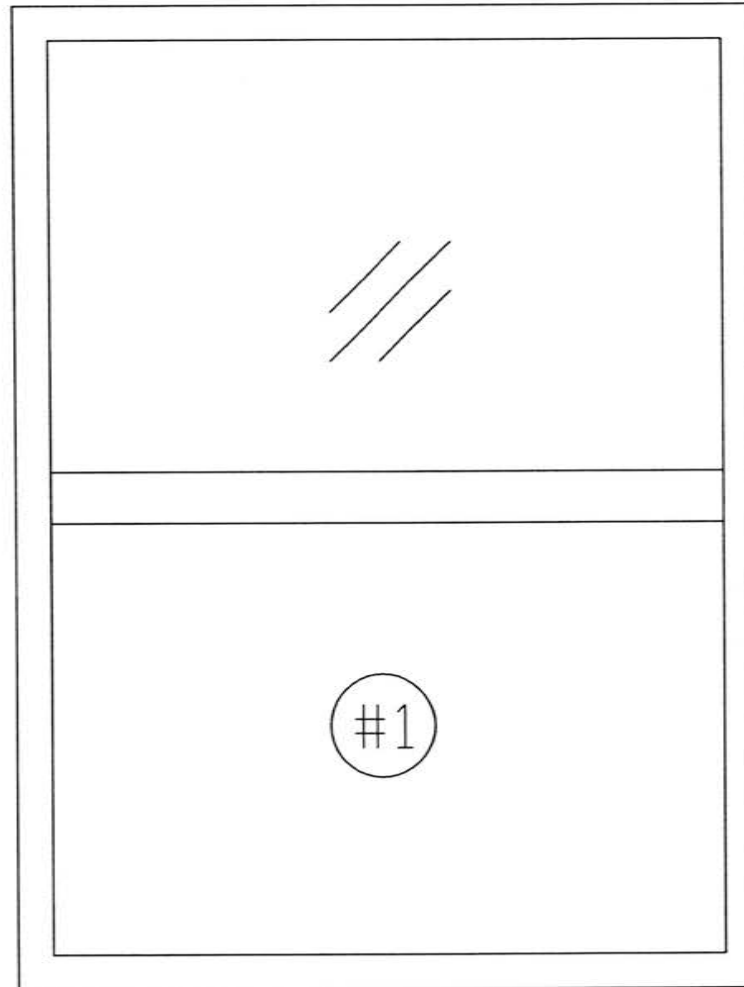
Report Date: 01/14/16

## **Appendix A**

### **Sketch(es)**



REV	DATE	DESCRIPTION	BY
			LG



Impact Locations

PROJECT NO.  
F4526.01.01  
501-44

PROJECT NAME: DHA4WW  
CLIENT: Veka



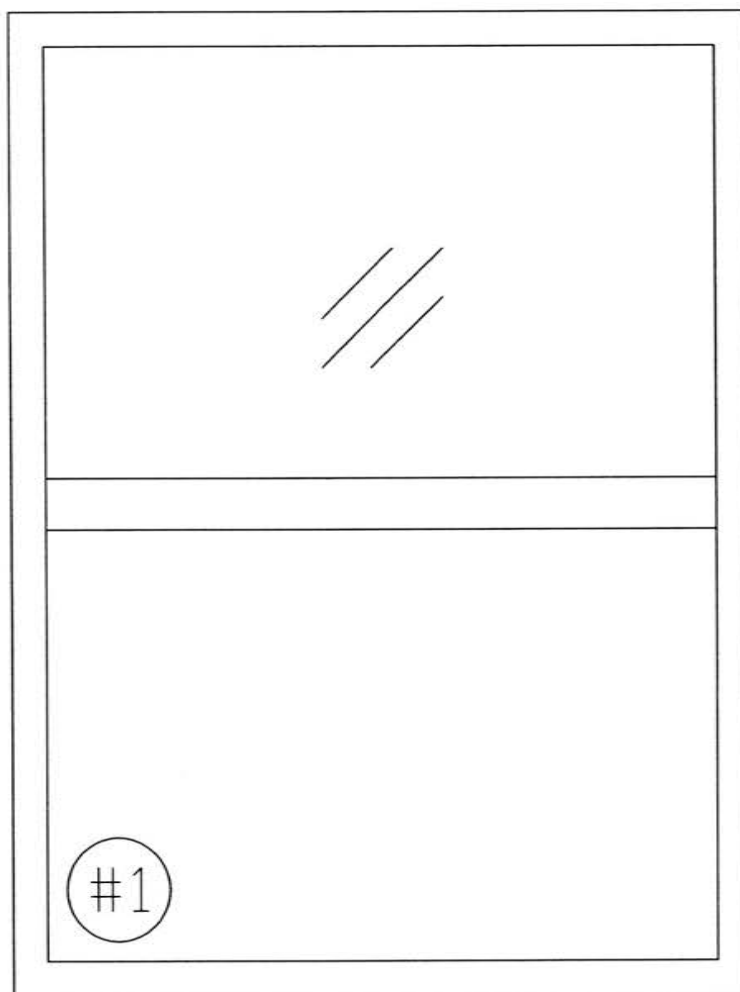
DRAWING

Sketch #1 (Impacts)

DWG. BY:  
LG  
DATE:  
1-11-16

SHEET  
1 OF  
3

REV	DATE	DESCRIPTION	BY
			LG



Impact Locations

PROJECT NO.  
F4526.01  
501-44

PROJECT NAME: DHA4WW  
CLIENT: Veka

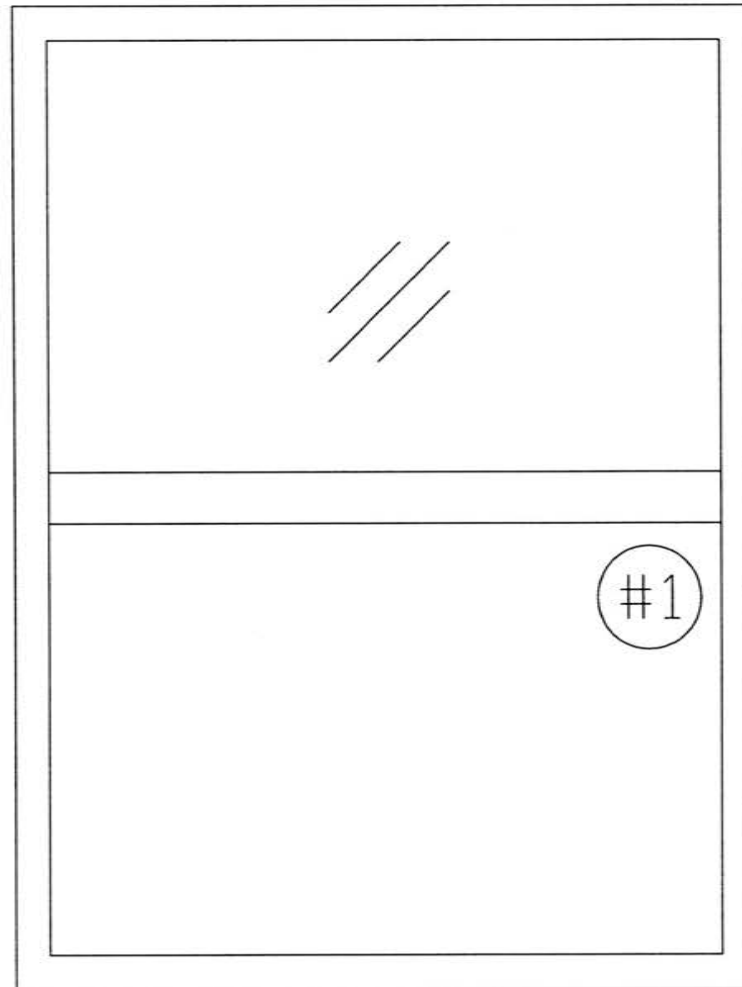


DRAWING  
Sketch 2 (Impact locations)

DWG. BY:  
LG  
DATE:  
1-11-16

SHEET  
2 OF  
3

REV	DATE	DESCRIPTION	BY
			LG



Impact Locations

PROJECT NO. F4526.01 501-44	PROJECT NAME: DHA4WW CLIENT: Veka	 Architectural Testing	DRAWING  Sketch #3 (Impacts)	DWG. BY: LG	SHEET 3 OF 3
				DATE: 1-11-16	



Architectural Testing

Test Report No.: F4526.01-501-44

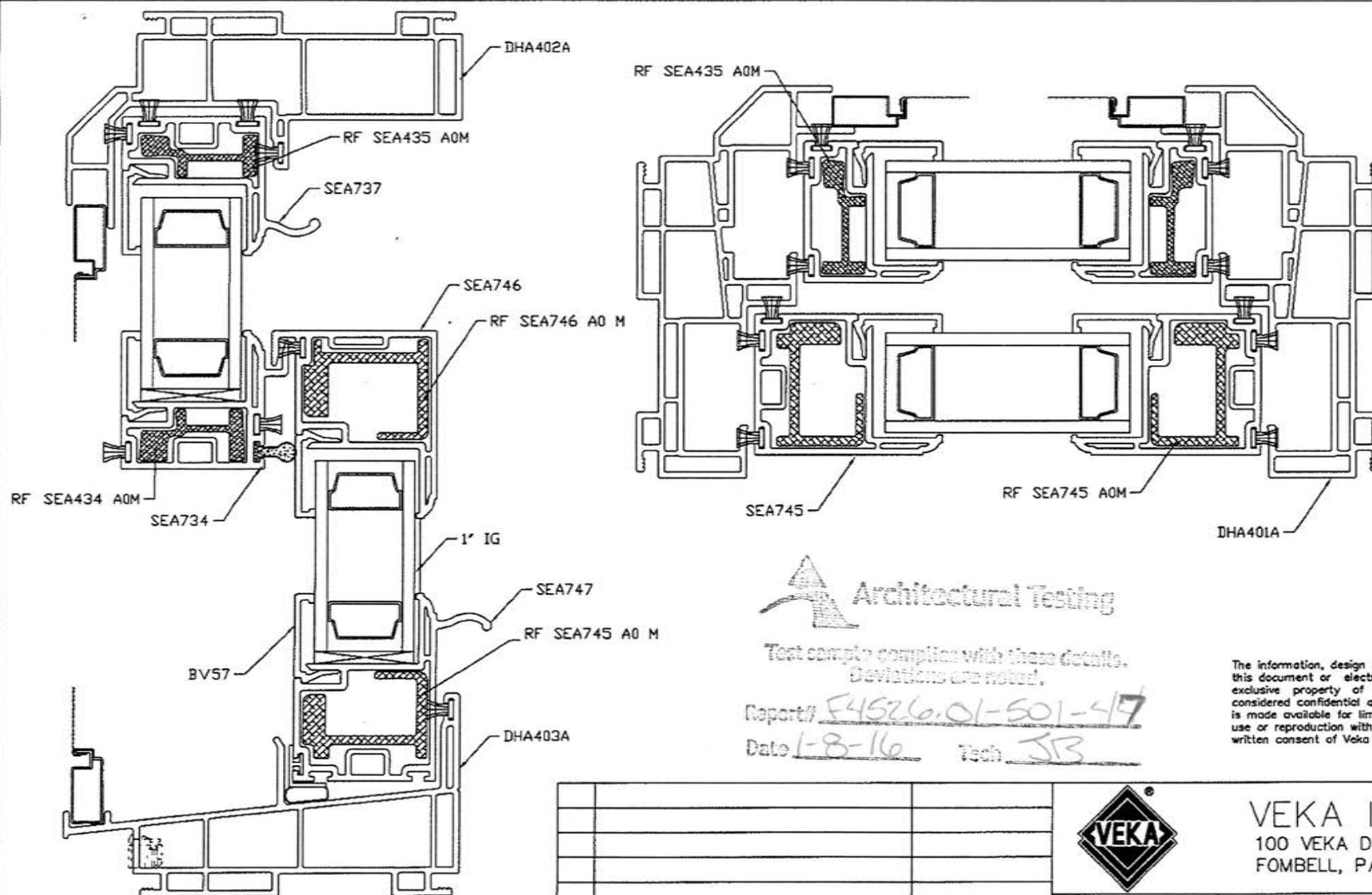
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## **Appendix B**

### **Drawing(s)**

*Note: Complete drawings packet on file with Intertek-ATI*




Test sample complies with these details.  
Deviations are noted.

Report# E4526.01-501-47

Date 1-8-16 Tech JB

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			<b>VEKA INC.</b> 100 VEKA DRIVE FOMBELL, PA 16123	
			DRAWN: BJF	DATE: 09-24-2015
			CHK'D:	DATE:
			TITLE: DOUBLE HUNG DHA4WW DP50 EQUAL GLASS (SEA7 sash)	SCALE: FULL
REVISIONS		DATE	APPV'D:	DWG. #
				DHA4WW EQ