Test Method: **CSA A440-00 Windows**

Manufacturer/Client: Oasis Windows Ltd.	Manufacturer/Client Address: 109-12889 84th Street Surrey, British Columbia Canada
Job Number: W410-2	

Sample Number: 400 Series Awning Window	Description: Width: 1000mm, Height: 1000mm See report for details
Date Received: June 2006	

Test Technician(s): Adam Perczyk	Testing Performed at: Quality Auditing Institute Ltd 2825 Murray Street Port Moody, BC Canada, V3H 1X3
	Date(s) of Testing: June 22, 2006 -- August 1, 2006

REPORT NUMBER W410-2

Edition 1: August 28, 2006
Contents: Pages 1-16, A1-A5

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Sampling Plan/Procedures:

One unused, glazed 400 Series Awning window complete with all hardware, was provided by the client and examined at the QAI laboratory, then tested between June 22, 2006 and August 1, 2006 as being a typical sample of the model covered in this report.

Test Equipment:

Table 1: Test Equipment

Equipment Used:	QAI Laboratory Code:	Calibration Due:
Omega FL910G (0-2.7 cfm) Air Flow Meter	FLOW3	October 2006
Omega FL911G (0-10.2 cfm) Air Flow Meter	FLOW4	October 2006
Dwyer Manometer (0-250 kPa)	MANOMETER1	Adjusted to zero before test
Dwyer Manometer (0-1500 kPa)	MANOMETER2	Adjusted to zero before test
Dwyer Manometer (0-6000 kPa)	MANOMETER3	Adjusted to zero before test
Tuf-E-Nuf Measuring Tape	LENGTH1	October 2008
Spray Rack	SPRAYRACK1	Verified using test procedure described in ASTM Standard E547 in January 2006.
Mititoyo Calipers	CALIPER1	Verified with gauge block before use
Gauge block (0.125", 0.25", 0.5")	GAUGEBLOCK1 GAUGEBLOCK2 GAUGEBLOCK3	May 2007
Pressure Regulator, Pressure Gauge and pneumatic cylinders calibrated together as complete system.	CYLINDER1,2,3, REGULATOR1,2,3 GAUGE1,2,3	System verified with LOADCELL5
Load Cell	LOADCELL5	Verified with weights. Weights verified with SCALE3 before use.
Excell Scale FA 132 (0-30kg)	SCALE3	September 2006
Spring Balance	PULL1	Verified with weights. Weights verified with SCALE3 before use.
Dial Gauge	DIAL1	Verified with gauge block before use.
Dial Barometer	BAROMETER1	August 2007
Thermocouple	TC-1	June 2007
Sash Pull Off Clamp (CSA A440-00, Figure 8)	SASHPULL1	Adjusted and weighed using SCALE3 before each test

Test Conditions:

Quality Auditing Institute Ltd. (QAI) was retained by Oasis Windows Ltd. to perform testing in accordance with the test requirements of CSA A440-00 "Windows" on a representative sample of 400 Series Awning window.

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

As directed by the manufacturer, the window specimen was installed in a test buck using #8 x 1 ½" screws 8" spacing along the jambs and sill. A bead of Window and Door silicone sealant was applied to the side of the window flange mating with the surface of the wooden test buck. One full tube (750ml) of silicone was used for each installation.

The wooden test buck consisted of a 84" x 84" square, ¾" plywood surface reinforced with nominal 2" x 6" stud backing. The center of the buck was built with a rough opening measuring ¾" larger than the test specimen in length and width, framed in by nominal 2" x 6" members to facilitate mounting of the test specimen. For each test conducted, the test specimen was leveled and set plumb in the wooden test buck.

Table 2: Test Sequence and Alterations

Test Number	Test Clause	Test	Alterations
1	10.9	Ease of Operation	None
2	10.2	Air Leakage	None
3	10.3	Water Penetration	None
4	10.4	Wind Load Resistance	None
5	10.8	Sash Strength and Stiffness	None
6	10.2	Air Leakage	Manufacturer requested to retest air leakage. A smoking stick was used to determine sources of air leakage. It was noted that the majority of air leakage was through weatherstrip between jamb and sash stiles. The manufacturer requested to take the sample back to their manufacturing facility for inspection. A second sample was submitted with identical construction and hardware. Result: Air leakage rating improved from A2 to A3.
7	10.11	Sash Pull Off	None
8	10.13	Forced Entry	None

Summary of Results:

Table 3: Test Results (Window Ratings)

Clause	Test Name	Rating
10.2	Air Tightness	A3
10.3	Water Tightness	B7
10.4	Wind Load Resistance	C4
10.5	Safety Drop	-
10.6	Blocked Operation	-
10.7	Sash Strength and Stiffness, Casement	-
10.8	Sash Strength and Stiffness, Projecting	PASS
10.9	Ease of Operation	PASS
10.10	Screen Strength	-
10.11	Sash Pull-Off	PASS
10.12	Condensation Resistance	-
10.13	Resistance to Forced Entry	F1

Note: "-" indicates test was not performed

Window Components:

400 Series Vinyl Awning Window		
Frame:	Size:	Width: 1000mm, Height: 1000mm Vinyl. Part Number BX421. Drawing in appendix A.
	Joints:	Mitered corner. Thermally welded. Corners cleaned.
Sash:	Size:	Width: 37 5/8", Height: 37 5/8" Vinyl. Part Number BX402. Drawing in appendix A.
	Joints:	Mitered corner. Thermally welded. Corners cleaned.
Glazing Method:	Glazing Tape	Venture 1/16" x 3/8" double sided foam glazing tape. Tape applied in one continuous piece. Caulking around perimeter of tape.
	Glazing Bead	Vinyl. Part Number BX309. Drawing in appendix A.
	Setting Blocks	Dimensions: 24mm x 24mm x 3mm 4 setting blocks – 2 located under glass unit 65mm from corner of glazing, 1 along each side of glazed unit at midpoint
Glazing:	Overall Thickness	¾" thick (19mm) 2 glass lites – each 3mm clear annealed
	Spacer:	1/2" (12.7mm) Bayform thermally broken, desiccant filled aluminum with polysulfide seal
Weather-stripping	Sash:	2 – PolyChlor #2763 bulb seals running continuously and meeting at the top middle. Exterior bulb seal notched 3/8" at both bottom corners for drainage.
Drainage:	Sash:	See appendix A for drawing
Hardware:	Hinge:	2 – "Securistyle" DS14 standard duty hinges Fastened to frame using 4 - #8 x ¾" flat head zinc head screws and to sash using 3 - #8 x ¾" flat head zink head screws.
	Lock:	2 – "Enterlock Window Fasteners" #830.0W.RH lock handle Fastened to frame using 2 - #8 x ¾" zinc flat head screws.
	Keeper / Strike Plate:	2 – "Enterlock Window Fasteners" #2631.0W.4 strike plates Snapped into sill. Located 9" from each corner.
	Snubber:	Speck Tool Ltd., Part #DBS-15 Fastened with 2 #8 x ¾" flat head screws
	Insect Screen	Not supplied with test specimen

See appendix A for cross section, assembly, and dimensional specifications.

Test Specifications:

Air Tightness Test: CSA A440-00, Clause 10.2, Test Method: ASTM E283

	Laboratory Conditions	Standard Conditions
Temperature	24.7 C	20.8 C
Pressure	101.6 kPa	101.3 kPa
Air Density	1.189 kg/m^3	1.202 kg/m^3
Air Density Ratio = 0.995		

CL_{op} = Crack length of operable portion = 3.59m
$Q_{op/A3}$ = Maximum air leakage of operable portion for A3 rating = 0.55 (m3/h)/m

Infiltration Results (positive pressure) @ 75 Pa

Adjusted Total Air Flow (Q_t)	0.846 ft^3/min
Adjusted Extraneous Air Flow (Q_e)	0.666 ft^3/min
Metered Air Flow @ 75 Pa[1] (1.57 psf)	0.304 m^3/h
Crack Length	3.59 m
Air Infiltration @ 75 Pa[1] (1.57 psf)	**0.085 (m^3/h)/m**

Exfiltration Results (negative pressure) @ -75 Pa

Adjusted Total Air Flow (Q_t)	1.164 ft^3/min
Adjusted Extraneous Air Flow (Q_e)	0.945 ft^3/min
Metered Air Flow @ 75 Pa[1] (1.57 psf)	0.372 m^3/h
Crack Length	3.59 m
Air Exfiltration @ 75 Pa[1] (1.57 psf)	**0.103 (m^3/h)/m**

Window Air Rating Average

Air Infiltration Rate	0.085 (m^3/h)/m
Air Exfiltration Rate	0.103 (m^3/h)/m
Average Rate	**0.094 (m^3/h)/m**
Rating	**A3**

Notes: [1] +/- 2.5 Pa Instrument Precision

Alterations during Testing:

A second sample was submitted with identical construction and hardware.
Result: Air leakage rating improved from A2 to A3.

Water Tightness Test: CSA A440-00, Clause 10.3, Test Method: ASTM E547

Testing performed in accordance with ASTM E547 – 00. Window installed according to the manufacturers instructions for field installation in the test chamber with all operable lites in the closed and latched position. Insect screens were not supplied with the sample.

Test Results:

Pressure Differential	Time	Comments	Rating
400 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	
400 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	
400 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	
400 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	PASS B4
500 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	
500 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	
500 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	
500 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	PASS B5
600 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	
600 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	
600 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	
600 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	PASS B6
700 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	
700 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	
700 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	
700 Pa	5 minutes with pressure 1 minute no pressure	No water leakage	PASS B7

Alterations during Test:

None

The test specimen obtained a B7 Rating

Wind Load Resistance Test: CSA A440-00, Clause 10.4, Test Method: ASTM E330

Testing was performed in accordance with the procedure outlined in ASTM E330 – 02. No conclusions of any kind regarding the adequacy or inadequacy of the glass in the test specimen are to be drawn from this test. Ambient conditions in the lab were 24 degrees Celsius, 101 kPa. Deflection measurements were taken at the center position of the sash stile and at 17" to the top and bottom of the midpoint. All measurements are in inches.

Try for C3 Rating:
Deflection Test: 1200 Pa (inward direction)

Dial Position	Initial Reading	Pressurized Deflection	Final Reading	Deflection
Top	0.239	0.266	0.239	0.027
Midpoint	0.720	0.799	0.721	0.079
Bottom	0.361	0.394	0.360	0.033

Deflection Test: -1200 Pa (outward direction)

Dial Position	Initial Reading	Pressurized Deflection	Final Reading	Deflection
Top	0.231	0.203	-	0.028
Midpoint	0.706	0.610	-	0.096
Bottom	0.353	0.318	-	0.035

Maximum allowable deflection = L/125 = 0.272"

Blow-Out Test:

Pressure (Pa)	Time (s)
1500	60
0	60
3000	10
0	60
-1500	60
0	60
-3000	10

After pressure was released, window showed no signs of breakage, permanent deformation or operational malfunction.

Alterations during Test:

None

The test specimen obtained a C3 Rating

Try for C4 Rating:
Deflection Test: 1600 Pa (inward direction)

Dial Position	Initial Reading	Pressurized Deflection	Final Reading	Deflection
Top	0.238	0.268	0.239	0.030
Midpoint	0.722	0.830	0.724	0.108
Bottom	0.362	0.398	0.364	0.036

Deflection Test: -1600 Pa (outward direction)

Dial Position	Initial Reading	Pressurized Deflection	Final Reading	Deflection
Top	0.229	0.194	0.035	0.229
Midpoint	0.701	0.542	0.700	0.159
Bottom	0.352	0.307	0.351	0.045

Maximum allowable deflection = L/125 = 0.272"

Blow-Out Test:

Pressure (Pa)	Time (s)
2000	60
0	60
4000	10
0	60
-2000	60
0	60
-4000	10

After pressure was released, window showed no signs of breakage, permanent deformation or operational malfunction.

Alterations during Test:

None

The test specimen obtained a C4 Rating

Safety Drop – Vertical Sliding Windows: CSA A440-00, Clause 10.5:

Not Applicable.

Blocked Operation Test: CSA A440-00, Clause 10.6:

Not Applicable

Sash Strength and Stiffness: CSA A440-00, Clause 10.7:

Not Applicable

Sash Strength and Stiffness: CSA A440-00, Clause 10.8:

The window was mounted in a suitable test frame with the sash opened to 45 degrees and blocked in that position to prevent movement in a closing direction. The deflection measuring device was placed at the outer corner of the operable lite on the opposite side from the blocking. A downward vertical force of 15 N was applied at the midpoint of the bottom sash rail by means of a hook and weights. The weight was removed and the deflection gauge was used to take a zero reading. The downward force was then increased to 60 N and a deflection reading was taken after 60 seconds while the weight was still being applied.

Deflection = 17.9 mm
Maximum deflection allowed = 18 mm

After the weight was removed the window was examined and showed no signs of distortion, failure, distress of components or operational malfunction.

The test specimen PASSED the Sash Strength and Stiffness Test.

Ease of Operation Test: CSA A440-00, Clause 10.9:

The window was mounted in a test frame and the operable lite was moved from the fully closed to the fully open position and back three times to ensure that the lite was operating freely. See Table 9 of CSA A440-00 for test requirements.

Opening Direction:
Force to Initiate Motion = 2.1 lb
Force to Maintain Motion = 14.4 lb

Closing Direction:
Force to Initiate Motion = 2.5 lb
Force to Maintain Motion = 5.0 lb
Force to operate handles = 3.9 lb

Alterations during Testing:

None

The test specimen PASSED the Ease of Operation Test

Insect Screen Strength CSA A440-00, Clause 10.10:

Insect Screens were not supplied with the test specimen.

Sash Pull-Off CSA A440-00, Clause 10.11:

Testing was performed in accordance with Clause 11.11 of CSA A440-00.

Weight = 265 N (59.6 lb) applied to midpoint of top rail member for 60 seconds.
Maximum allowable mid-span sash deflection = 7.1 mm (75% of net glazing engagement)

Location	Load	Deflection
Top Rail	265 N	1.1 mm

The test specimen PASSED the Sash Pull-Off Test

Condensation Resistance: CSA A440-00, Clause 10.12

This test was not performed at the request of the manufacturer.

Resistance to Forced Entry: CSA A440-00, Clause 10.13:

Testing was performed in accordance with Clause 11.13 of CSA A440-00.

No entry was gained during the specified time of hand and tool manipulation performed prior to and following the application of the following loads on the hardware:

Time (T1) = 5 minutes
Time (T2) = 5 minutes
Load (L1) = 666 N (150 lb)
Load (L2) = 333 N (75 lb)
Load (L3) = 111 N (25 lb)

Test B1 = Pass
Test B2 = Pass
Test B3 = Pass

Alterations during test:

None

The test specimen obtained a F1 rating.

Deadload Deflection: CSA A440-00, Clause 10.14

Not Applicable

Energy Rating: CSA A440-00, Clause 10.15

This test was not performed at the request of the manufacturer.

Window Ratings – Tables of Minimum Requirements from CSA-A440-00 Windows

Table 1: Air Tightness

Window Rating	Maximum Air Leakage Rate (m^3/h)/m
Storm	8.35 (max)
	5.00 (min)
A1	2.79
A2	1.65
A3	0.55
Fixed	0.25

Table 2: Water Tightness

Window Rating		
For use in small buildings	**For use in other buildings**	**Pressure Differential (Pa)**
Storm	--	0
B1	B1	150
B2	B2	200
B3	B3	300
	B4	400
	B5	500
	B6	600
	B7	700

Table 3: Wind Load Resistance

Window Rating		Pressure Differential, Pa	
For use in small buildings	**For use in other buildings**	**Deflection**	**Blowout**
		Sash (L/125)	
Storm	--	--	750
C1	C1	500	1500
C2	C2	750	2000
C3	C3	1200	3000
	C4	1600	4000
	C5	2000	5000

Comments/Conclusion: (Include tests subcontracted, variances from test methods, statement of compliance, statement of estimated uncertainty, opinions and interpretations used and their basis. Attach extra pages as necessary: No of pages attached _____)

Quality Auditing Institute Ltd., with lab facilities located in Port Moody, British Columbia, performed testing in accordance with CSA A440-00 on a representative sample of Oasis Windows 400 Series Awning Window.

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

See Table 3 for a summary of the test results and window ratings.

Person(s) Authorizing Report:

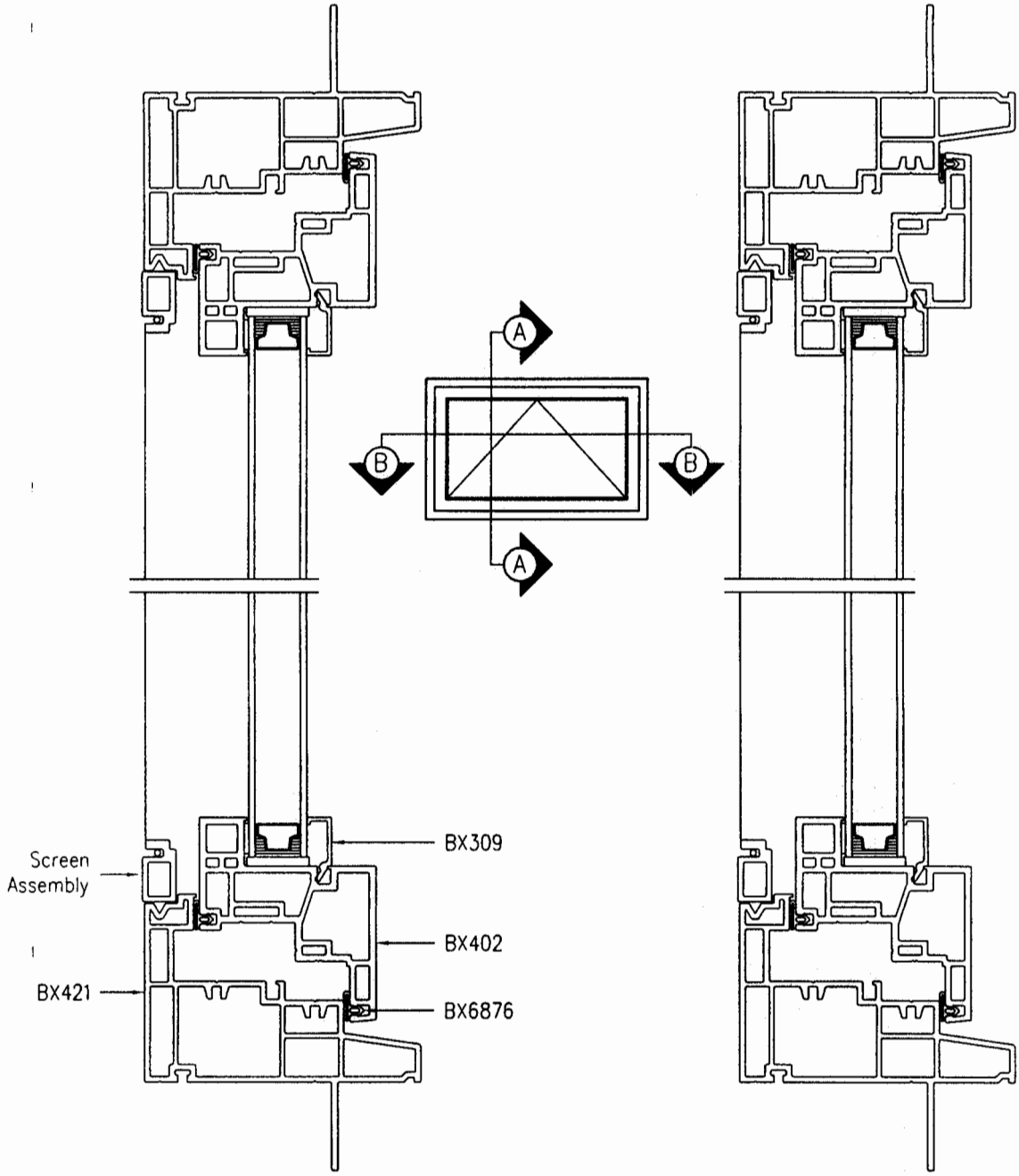
Name (Signature)	KENT ADAMSON Name (Printed)	MANAGER Title	12/09/06 (dd/mm/yy)

Reviewed by:

Name (Signature)	BEN BARKER Name (Printed)	MANAGER Title	12/09/06 (dd/mm/yy)

APPENDIX A

Component Specifications
400 Series Awning Window



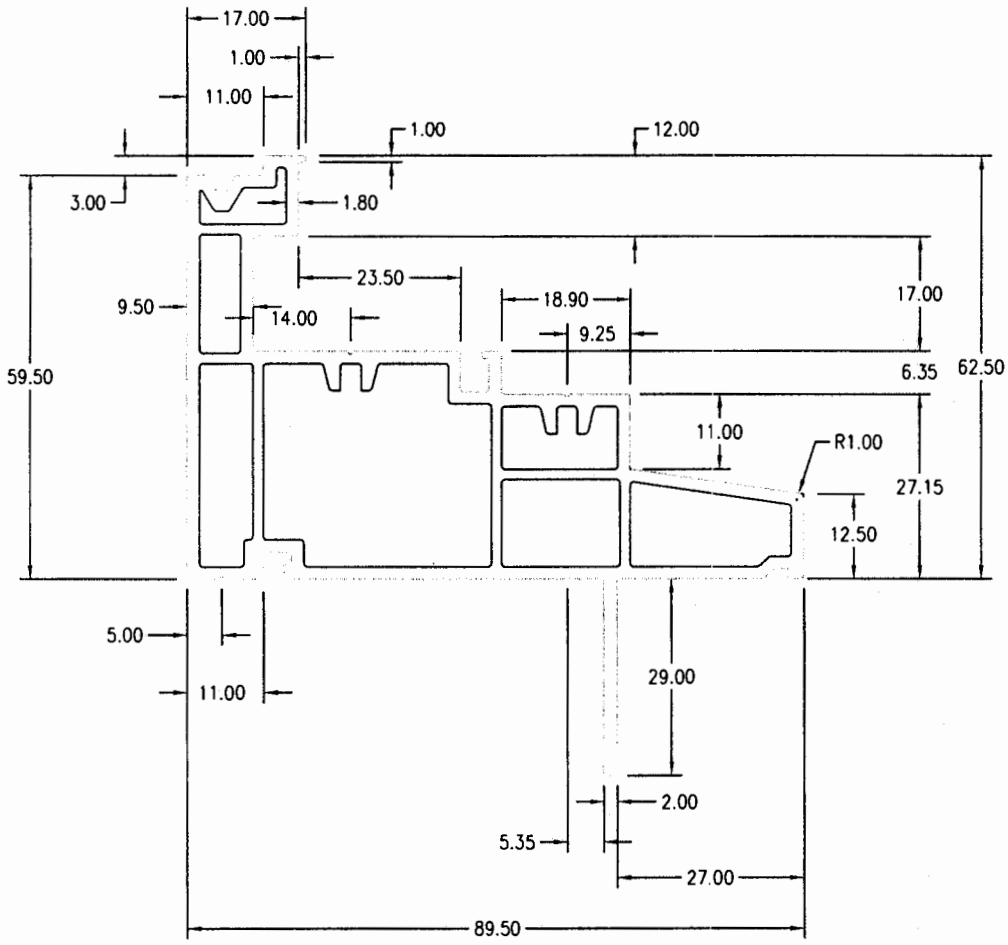
Vertical Section A–A

Horizontal Section A–A

Berlinex Inc.
4350 – 68 Avenue
Edmonton, Alberta T6B 2P3
Canada

Approved for:
Function:
Dimension:
Viability:
Date:

Part Number:	BX421
Description:	400 Awning Window Assembly
Dwg No./Dwn By:	400 Series Awning / D.Feil
Date / Revision:	May 16/2006/01
Drawing Size:	NTS
Ext. Wall Thks.:	
Int. Wall Thks.:	
Not Spec. Radii:	
Area:	
Weight:	

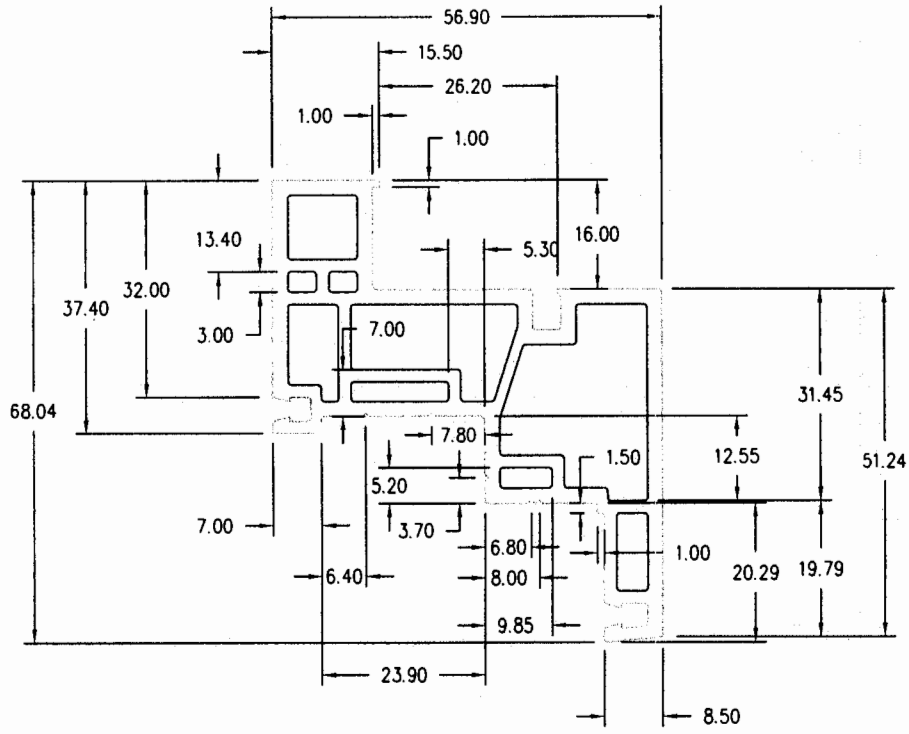


Ext. Wall Thks.:	1.8 mm
Int. Wall Thks.:	1.5 mm
Not Spec. Radii:	0.5 mm
Overall Area:	
Overall Weight:	
Rigid Weight:	-
Flex Weight:	-

BERLINEX
4350 - 68 AVENUE
EDMONTON, ALBERTA T6B 2P3
CANADA

R01	CHANGE NAME FROM BX401 TO BX421	MAR 7/06
	REVISIONS	DATE

Part Number:	BX421
Description:	MAINFRAME
Dwg No./Dwn By:	BX421
Date / Revision:	March 7/2006/ REV 01
Drawing Size:	SCALE 1:1



Berlinex Inc.
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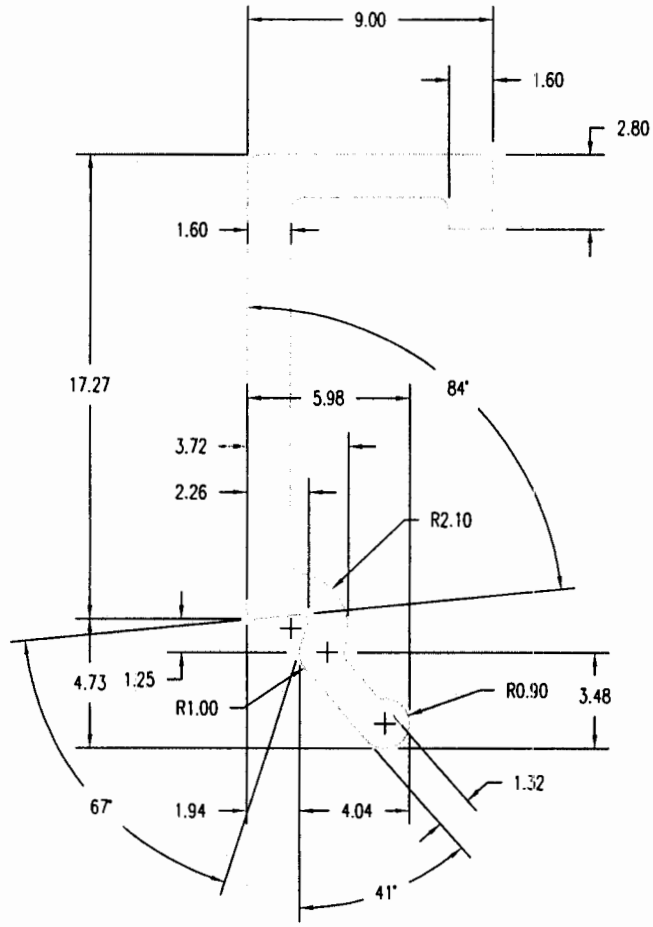
Edmonton, Alberta T6B 2P3
Canada

Approved for:	
Function:	
Dimension:	
Viability:	
Date:	

Part Number:	BX402
Description:	SASH
Dwg No./Dwn By:	BX402 / D.Feil
Date / Revision:	April 13/2004/01
Drawing Size:	SCALE 1:1
Ext. Wall Thks.:	2.2 mm
Int. Wall Thks.:	1.8 mm
Not Spec. Radii:	0.5 mm
Area:	
Weight:	



Scale 1:1

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4350 - 68 Avenue
Edmonton, Alberta T6B 2P3
Canada

Approved for:	
Function:	
Dimension:	
Viability:	
Date:	

Part Number:	BX309
Description:	3/4" Glazing Bead
Dwg No./Dwn By:	BX309 / D.Feil
Date / Revision:	October 09/2001/02
Drawing Size:	SCALE 4:1 unless otherwise specified
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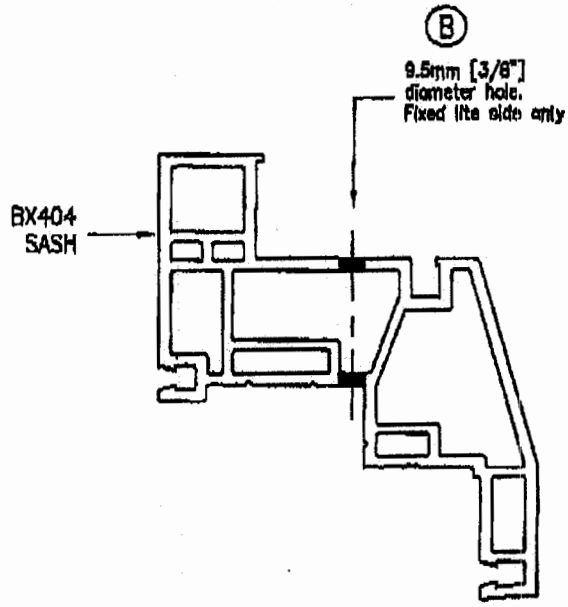
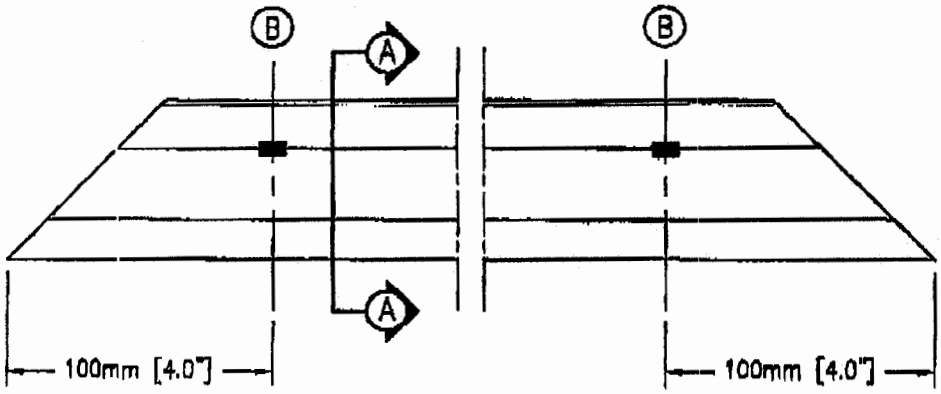
Int. Wall Thks.:	
Not Spec. Radii:	
Area:	
Weight:	

Quality Auditing Institute Ltd.

Test Report



Section A–A



VEKA CANADA 4350 – 68 AVENUE EDMONTON, ALBERTA T6B 2P3 CANADA	NOTE: The copyright in this drawing is the property of VEKA Canada and neither the drawing nor any part of it, nor any information contained therein, shall be reproduced or disclosed to any third party other than for the purpose of the use of the company product.	Part Number:	BX404
		Description:	400 Series Drainage – Operable – (OASIS)
		Dwg No./Dwn By:	400_Drainage–sash / D.Feil
		Date / Revision:	August 28/2006/01
		Drawing Size:	NTS