



PERFORMANCE REPORT

Rendered to:

CROSS ALUMINUM PRODUCTS

PRODUCT TYPE: Aluminum Doors with Impact Glass

Report No.: 60508.01-201-44

Test Dates: 11/28/05

Through: 11/29/05

Report Date: 12/07/05

Expiration Date: 12/07/09

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PERFORMANCE REPORT

Rendered to:

CROSS ALUMINUM PRODUCTS
1770 Mayflower Road
Niles, Michigan 49120

Report No.: 60508.01-201-44
Test Dates: 11/28/05
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Project Summary: Architectural Testing, Inc. (ATI) was contracted by Cross Aluminum Products to perform testing on models: FL 400 VL 1, MS 400 VL 6, and WS 500 HD VL 6. Test specimen description and results are reported herein.

Test Procedure: The test specimens were evaluated in accordance with the following:

ASTM E 330-97, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

ASTM E 1886-02, Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.

ASTM E 1996-02, Standard Specification for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Storm Shutters Impacted by Wind Borne Debris in Hurricanes.

Test Specimen Description and Results Page#

Specimen #1: FL 400 F VL 1	2
Specimen #2: WS 500 HD VL 6	4
Specimen #3: MS 400 VL 6	7

Test Specimen Description:

Specimen #1: FL 400 F VL 1

Overall Size: 1003 mm (39-1/2") wide by 2178 mm (85-3/4") high

Panel Size: 902 mm (35-1/2") wide by 2115 mm (83-1/4") high

Test Specimen Description: (Continued)

Specimen #1: FL 400 F VL 1 (Continued)

Daylight Opening Size: 275 mm (10-7/8") wide by 794 mm (31-1/4") high

Finish: Interior and exterior was anodized aluminum.

Glazing Description: The glazing consists of 5 mm (3/16") clear tempered glass on exterior, 2.3 mm (0.09") Safety Plus II Interlayer with 25 mm (1") PET flap, and 3 mm (1/8") clear heat strengthened glass.

Panel Description: Heavy duty 1-3/4" tubular aluminum door construction.

Frame Construction: E-4500 Series Framing. (1-3/4" x 4-1/2" x 1/8")

Hardware:

<u>Description</u>	<u>Quantity</u>	<u>Location</u>
Select Products SL-11HD Gear Hinge (continuous)	1	Right Jamb
Von Duprin 98 Rim Panic 996L x 3-0 x 299F Steel Strike	1	Door panel
National Guard 424 ADA Compliant Threshold	1	Sill

Installation: The door was installed in a 2" by 10" wood buck and secured with 8 mm by 64 mm (5/16" by 2-1/2") hex head lag screws with an 8 mm (5/16") SAE flat washer. Jambs were anchored 152 mm (6") from corners and 375 mm (14-3/4") on center. The head was anchored 152 mm (6") from corners and 233 mm (9-11/64") on center. The perimeter was sealed to the buck using Dow Corning 995 silicone structural sealant.

Test Results:

The following results have been recorded:

Test Specimen #1: (FL 400 F VL 1)

ASTM E 330, Uniform Load Structural

<u>Title of Test - Test Method</u>	<u>Results</u>
Uniform Load Deflection per ASTM E 330 (Deflections were taken between the top hinge and lock on panel) (Loads were held for 60 seconds)	
3840 Pa (80.0 psf) (positive)	0.3 mm (0.01")
3840 Pa (80.0 psf) (negative)	8.1 mm (0.32")
Uniform Load Structural per ASTM E 330 (Permanent sets were taken between the top hinge and lock on panel) (Loads were held for 10 seconds)	
5760 Pa (120.0 psf) (positive)	<0.3 mm (<0.01")
5760 Pa (120.0 psf) (negative)	2.0 mm (0.08")

* Unit passed structural test.

ASTM E 1886, Missile Impact

Conditioning Temperature: 21 °C (70 °F)

Missile Weight: 4214 g (9.25 lbs)

Missile Length: 2413mm (7' 11")

Muzzle Distance from Test Specimen: 4.9m (16 ft.)

Impact #1: Missile Velocity: 15.3 m/s (50.2 fps)

Impact Area: Lower corner of glass

Observations: No holes or tears

Results: Pass

Impact #2: Missile Velocity: 15.1 m/s (49.6 fps)

Impact Area: Lower, hinge side, corner of door panel

Observations: No holes or tears

Results: Pass

Test Specimen Description:

Test Specimen #2: (WS 500 HD VL 6)

Overall Size: 1003 mm (39-1/2") wide by 2178 mm (85-3/4") high

Panel Size: 910 mm (35-7/8") wide by 2111 mm (83-1/8") high

Daylight Opening Size: Top Lite: 629 mm (24-3/4") wide by 883 mm (34-3/4") high
Bottom Lite: 629 mm (24-3/4") wide by 648 mm (25-1/2") high

Finish: Interior and exterior was anodized aluminum.

Glazing Description: The glazing consists of 5 mm (3/16") clear tempered glass on exterior, 2.3 mm (0.09") Safety Plus II Interlayer with 25 mm (1") PET flap, and 3 mm (1/8") clear heat strengthened glass.

Panel Description: Heavy duty, 5" wide stile and rail, glass door with 3/16" thick walls.

Frame Construction: E-4500 Series Framing. (1-3/4" x 4-1/2" x 1/8")

Hardware:

<u>Description</u>	<u>Quantity</u>	<u>Location</u>
Select Products SL-11HD Gear Hinge (continuous)	1	Right Jamb
Von Duprin 98 Rim Panic 996L x 3-0 x 299F Steel Strike	1	Door panel
National Guard 424 ADA Compliant Threshold	1	Sill

Installation: The door was installed in a 2" by 10" wood buck and secured with 8 mm by 64 mm (5/16" by 2-1/2") hex head lag screws with an 8 mm (5/16") SAE flat washer. Jambs were anchored 152 mm (6") from corners and 375 mm (14-3/4") on center. The head was anchored 152 mm (6") from corners and 233 mm (9-11/64") on center. The perimeter was sealed to the buck using Dow Corning 995 silicone structural sealant.

Test Results:

The following results have been recorded:

Test Specimen #2 (WS 500 HD VL 6)

ASTM E 330, Uniform Load Structural

<u>Title of Test - Test Method</u>	<u>Results</u>
Uniform Load Deflection per ASTM E 330 (Deflections were taken between the top hinge and lock on panel) (Loads were held for 60 seconds)	
3840 Pa (80.0 psf) (positive)	3.3 mm (0.13")
3840 Pa (80.0 psf) (negative)	10.9 mm (0.43")
Uniform Load Structural per ASTM E 330 (Permanent sets were taken between the top hinge and lock on panel) (Loads were held for 10 seconds)	
5760 Pa (120.0 psf) (positive)	1.0 mm (0.04")
5760 Pa (120.0 psf) (negative)	0.8 mm (0.03")

* Unit passed structural test.

ASTM E 1886, Missile Impact

Conditioning Temperature: 21 °C (70 °F)
Missile Weight: 4214 g (9.25 lbs)
Missile Length: 2413mm (7' 11")
Muzzle Distance from Test Specimen: 4.9m (16 ft.)

Impact #1: Missile Velocity: 15.5 m/s (50.9 fps)

Impact Area: Center of glass, top lite
Observations: No holes or tears
Results: Pass

Impact #2: Missile Velocity: 15.2 m/s (50.0 fps)

Impact Area: Upper left corner of glass, top lite
Observations: No penetrations, there was a 50 mm (2") tear at impact point
Results: Pass

Test Results: (Continued)

Test Specimen #2 (WS 500 HD VL 6) (Continued)

ASTM E 1886, Air Pressure Cycling

Design Pressure: ± 3840 Pa (± 80.0 psf)

POSITIVE ACTING

Design Pressure $+3840$ Pa (80.0 psf)

<u>Pressure Range (psf)</u>	<u>Number of Cycles</u>	<u>Average Cycle Time (seconds)</u>
0.2P – 0.5P	3500	1.84
0.0P – 0.6P	300	2.28
0.5P – 0.8P	600	2.08
0.3P – 1.0P	100	2.62

Observations: No holes or tears in glass, door remained locked.

NEGATIVE ACTING

Design Pressure -3840 Pa (-80.0 psf)

<u>Pressure Range (psf)</u>	<u>Number of Cycles</u>	<u>Average Cycle Time (seconds)</u>
0.3P – 1.0P	50	1.93
0.5P – 0.8P	1050	1.74
0.0P – 0.6P	50	2.16
0.2P – 0.5P	3350	1.75

Observations: No holes or tears in glass, door remained locked. Following test, the unit was operated and re-locked successfully.

Result: Pass

Test Specimen Description:

Test Specimen #3 (MS 400 VL 6)

Overall Size: 1003 mm (39-1/2") wide by 2178 mm (85-3/4") high

Panel Size: 902 mm (35-1/2") wide by 2115 mm (83-1/4") high

Daylight Opening Size: Top Lite: 679 mm (26-3/4") wide by 895 mm (35-1/4") high
Bottom Lite: 679 mm (26-3/4") wide by 718 mm (28-1/4") high

Finish: Interior and exterior was anodized aluminum.

Glazing Description: The glazing consists of 5 mm (3/16") clear tempered glass on exterior, 2.3 mm (0.09") Safety Plus II Interlayer with 25 mm (1") PET flap, and 3 mm (1/8") clear heat strengthened glass.

Panel Description: 4" medium stile and rail, glass door with 1/8" thick walls.

Frame Construction: E-4500 Series Framing. (1-3/4" x 4-1/2" x 1/8")

Hardware:

<u>Description</u>	<u>Quantity</u>	<u>Location</u>
Select Products SL-11HD Gear Hinge (continuous)	1	Right Jamb
Von Duprin 98 Rim Panic 996L x 3-0 x 299F Steel Strike	1	Door panel
National Guard 424 ADA Compliant Threshold	1	Sill

Installation: The door was installed in a 2" by 10" wood buck and secured with 8 mm by 64 mm (5/16" by 2-1/2") hex head lag screws with an 8 mm (5/16") SAE flat washer. Jambs were anchored 152 mm (6") from corners and 375 mm (14-3/4") on center. The head was anchored 152 mm (6") from corners and 233 mm (9-11/64") on center. The perimeter was sealed to the buck using Dow Corning 995 silicone structural sealant.

Test Results:

The following results have been recorded:

Test Specimen #3 (MS 400 VL 6)

ASTM E 330, Uniform Load Structural

<u>Title of Test - Test Method</u>	<u>Results</u>
Uniform Load Deflection per ASTM E 330 (Deflections were taken between the top hinge and lock on panel) (Loads were held for 60 seconds)	
3840 Pa (80.0 psf) (positive)	0.3 mm (0.01")
3840 Pa (80.0 psf) (negative)	12.7 mm (0.50")
Uniform Load Structural per ASTM E 330 (Permanent sets were taken between the top hinge and lock on panel) (Loads were held for 10 seconds)	
5760 Pa (120.0 psf) (positive)	0.3 mm (0.01")
5760 Pa (120.0 psf) (negative)	3.0 mm (0.12")

* Unit passed structural test.

ASTM E 1886, Missile Impact

Conditioning Temperature: 21 °C (70 °F)
Missile Weight: 4214 g (9.25 lbs)
Missile Length: 2413mm (7' 11")
Muzzle Distance from Test Specimen: 4.9m (16 ft.)

Impact #1: Missile Velocity: 15.1 m/s (49.6 fps)
Impact Area: Lower left corner of glass, top lite
Observations: No holes or tears
Results: Pass

Impact #2: Missile Velocity: 15.2 m/s (50.0 fps)
Impact Area: Center of door panel, between glass
Observations: No structural damage
Results: Pass

Test Results: (Continued)

Test Specimen #3 (MS 400 VL 6) (Continued)

ASTM E 1886, Air Pressure Cycling

Design Pressure: ± 3840 Pa (± 80.0 psf)

POSITIVE ACTING

Design Pressure $+3840$ Pa (80.0 psf)

<u>Pressure Range (psf)</u>	<u>Number of Cycles</u>	<u>Average Cycle Time (seconds)</u>
0.2P – 0.5P	3500	1.73
0.0P – 0.6P	300	1.82
0.5P – 0.8P	600	2.01
0.3P – 1.0P	100	2.11

Observations: No holes or tears in glass, door remained locked.

NEGATIVE ACTING

Design Pressure -3840 Pa (-80.0 psf)

<u>Pressure Range (psf)</u>	<u>Number of Cycles</u>	<u>Average Cycle Time (seconds)</u>
0.3P – 1.0P	50	2.22
0.5P – 0.8P	1050	2.08
0.0P – 0.6P	50	2.34
0.2P – 0.5P	3350	2.09

Observations: No holes or tears in glass, door remained locked. Following test, the unit was operated and re-locked successfully.

Result: Pass

Test Equipment:

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

Missile(s): 2 by 4 Southern Pine

Timing Device: Electronic Beam Type

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

Deflection Measuring Device: Linear transducers

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.

Drawing Reference: The referenced drawings have been checked by ATI, and are representative of the samples tested.

A copy of this report will be retained by ATI for a period of four 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.

For ARCHITECTURAL TESTING, INC.



Digitally Signed by: Karl Lips-Eakins

Karl Lips-Eakins
Technician



Digitally Signed by: Daniel A. Johnson

Daniel A. Johnson
Director, Regional Operations

KLE:mb

Attachments (pages):

Appendix-A: Drawings (11)