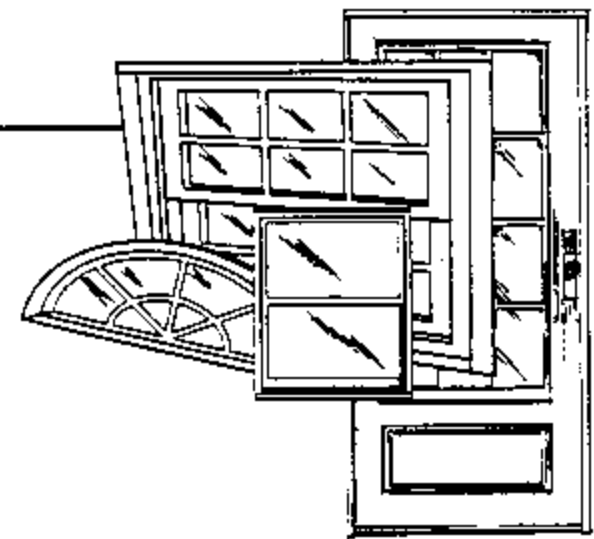


CERTIFIED TESTING LABORATORIES

Architectural Division • 7252 Narcoossee Rd. • Orlando, FL 32822
(407) 384-7744 • Fax (407) 384-7751
Web Site: www.ctlarch.com
E-mail: ctlarch.com



Report No.: CTLA716WB

DC Not. No.:01023

Date: July 16, 2001

CTL Certification # 99-0105.02

Test Dates: June 2, 2001

Test Requested By - Galaxy Window & Door
1900 N. Andrews Ave. Ext.
Unit A
Pompano Beach, Fl 33069
Phone 954.978.2400 Facsimile 954.978.2403

Tests Conducted: PA201, PA202 & PA 203 (with no deviations)

Design Pressures:

Specimen 1 (PA 202) + 60.0 psf. - 65.0 psf.
Specimens 2 & 3 (PA 201 /203) + 60.0 psf. - 65.0 psf.

(1) DESCRIPTION OF SERIES

Model Designation "Tropical Force Series" Extruded Vinyl Single Hung / Fixed Frame Muller Unit

Overall Size: Specimens 1, 2 & 3 (Frame) 115.25" wide x 76.00" high x 3.25" deep

Configuration: $\frac{O}{X}$ O $\frac{O}{X}$

No. & Size of Sash: All Specimens Two (2) Operable 35.375" wide x 38.0" high

(2) MATERIAL CHARACTERISTICS

Frame Material: Extruded Vinyl Lineals by P H Tech Inc.

Don M. S.E.
7/19/01

Frame Construction Single Hung:

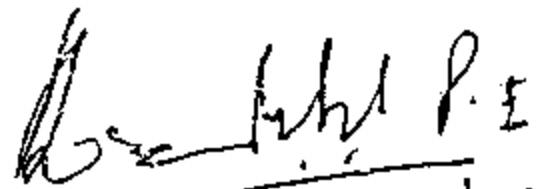
The 3.25" wide x 2.5" high main frame is constructed from rigid PVC lineal. The sill height is 2.5". The outer wall is a maximum 0.083" and the inner cavity walls are a maximum 0.044" thickness. The main frame utilizes a rigid PVC block measuring 0.175" thick x 1.053" wide x 2.221" long glued to the main frame for reinforcement at each anchor location. The lower exterior cavities on both horizontal and vertical frames are reinforced with a continuous steel channel measuring 0.508" wide x 0.375" high with 0.058" wall thickness and terminated a minimum of 0.25" from each end. The corners are mitered and fusion welded. The meeting rail is rigid PVC lineal measuring 1.947" high and 1.49" deep. The exterior walls are a maximum 0.075" thick and the inner cavity walls are a maximum 0.036" thick. The meeting rail is reinforced with a continuous two piece galvanized steel section, (no. 31 in BOM – 0.061" wall thickness and 0.613" high x 0.925" deep and inserted within and no. 32 in BOM - 0.051" wall thickness and 0.566" high x 0.50" deep). These reinforcements are terminated 1.75" from each end of the meeting rail to allow for the meeting rail anchor. The steel meeting rail anchor (no.39 in BOM) is inserted into each end of the meeting rail and secured with two (2) no. 10 x ½" quadrex screw and attached to the main frame at each end with two (2) no. 10 x ½" quadrex screws.

Frame Construction Fixed Frame:

The 3.25" wide x 1.846" high frame is constructed from rigid PVC lineal. The outer wall is a maximum 0.083" and the inner cavity walls are a maximum 0.044" thickness. The frame utilizes a rigid PVC block measuring, 0.175" thick x 1.053" wide x 2.221" long glued to the frame for reinforcement at each anchor location. The lower exterior cavity on both horizontal and vertical frames are reinforced with a continuous steel channel measuring 0.508" wide x 0.375" high with 0.058" wall thickness and terminated a minimum of 0.25" from each end. The frame corners are mitered and fusion welded. The single hung units were milled to the fixed lite with two (2) aluminum extruded mull posts 4.067" wide x 0.125" thick x 76.0" long. The mull posts were not attached to the wooden test buck at the top and bottom. The single hung units were secured to the mull posts with twenty (20) #10 x 0.75" Phillips pan head screws, ten (10) in each jamb from the top down at 3.0", 6.0", 15.0", 27.0", 34.5", 40.5", 49.0", 61.0", 70.0" and head screws, fifteen (15) in each jamb from the top down at 3.0", 6.0", 15.0", 23.0", 27.0", 30.0", 34.0", 37.0", 41.0", 45.0", 49.0", 53.0", 61.0", 70.0" and 73.0".

Sash Construction:

The stile and rail sash is constructed from extruded vinyl lineal. The perimeter stiles and rails are identical extrusions measuring 1.49" deep x 1.66" high. The outer wall is a maximum 0.083" thick and the inner cavity walls are 0.044" thick. The stiles, meeting rail and bottom rail are reinforced with a steel reinforcement terminated a minimum 0.25" from each end (no.31 in BOM- 0.061" wall thickness and 0.613" high x 0.925" deep). Each of the exterior sash corners is reinforced with (no.29 in BOM – sash corner brace, 0.079" thick stainless steel, 0.569" wide and the horizontal leg is 4.79" and the vertical leg is 4.379" secured with two (2) # 8 x 5/8" PFH screw on the vertical legs and two (2) # 6 x 1.25" PFH screws on the horizontal legs). The sash-meeting rail utilizes two sash-retaining bars (no.11 in BOM – 0.185" thick galvanized steel x 0.554" wide x 5.345" long attached with the screws used to secure the meeting rail sash corner braces). The bottom sash rail has two pivot bars (item no. 36 – 0.197" thick galvanized steel x 0.566" wide and 5.28" long attached with the screws used to secure the bottom rail sash corner braces).


7/19/01

Sash Construction: Cont.

The sash is retained within the frame by means of sash retainers (no. 11 in BOM – 0.175” thick x 0.847” high extruded vinyl) one inserted into the frame on each vertical and one inserted into the head frame. The sash sill cover (no. 7 in BOM – 1.733” high x 2.84” deep) retains the sash at the sill.

Glazing:

Glazing Material –

Specimens 1 & 2

15/32” (0.472”) Sentry Glass Plus Tempered Glass Laminated by Dhubak
(0.125” ext. side temp – 0.045” PVB – 0.007” PET – 0.045” PVB – 0.250” int. side temp)
as stated by the manufacturer

Note:

1. Exterior layer of glass was stepped back 1/2” around perimeter to allow for direct glazing of interlayer to the appropriate frame or sash members.
2. Glazing Bug (Permanent Identification) verified prior to testing.

Glazing Method -

Exterior wet glazed with Pecora 896 as stated by the manufacturer, 0.5” bite on glass, 0.079” thick average area of silicone. Interior side of glass glazed with extruded PVC glass stop (no. 2 in BOM, 0.675” high x 0.750” deep) and fixed lite stop measured .0675” high x 0.902” deep. The interior stop was friction fit into the active sash and fixed top frame without sealants.

<u>Daylight Opening:</u>	Specimens 1, 2 & 3	
	Single Hung Window	Fixed Sash – 32.8125” wide x 34.125” high Operable Sash – 31.75” wide x 34.125” high
	Fixed Frame Window	Fixed Lite -34.625” wide x 72.75” high

(3) INSTALLATION:

Screws and Method of Attachment:

Specimens 1, 2 & 3	Forty-six (46) #10 x 1.25” PFH screw
Head Frame –	Eighteen (18) located left to right @ 3.0”, 6.0”, 15.0”, 23.0”, 32.0”, 35.0”, 41.5”, 44.5”, 50.5”, 58.5”, 67.5”, 70.5”, 76.5”, 79.5”, 88.5”, 96.5”, 105.5” and 108.5”.
Vertical Frames –	Ten (10) each vertical located from the top down @ 3.0”,6.0”, 15.0”, 27.0”, 34.5”, 40.5”, 49.0”, 61.0”, 70.5” and 73.0”.
Sill Frame -	Eighteen (18) located left to right @ 3.0”, 6.0”, 15.0”, 23.0”, 32.0”, 35.0”, 41.5”, 44.5”, 50.5”, 58.5”, 67.5”, 70.5”, 76.5”, 79.5”, 88.5”, 96.5”, 105.5” and 108.5”.

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Weather-stripping:

All Specimens

- Q-lon QEZ 376 – 0.355” foam compression flap, one (1) on inner edge of operable bottom sash rail.
- Q-lon Q300T190 – 0.300” high foam compression, one (1) row continuous around exterior perimeter of operable sash and one (1) row continuous on inner edge of stiles and sash meeting rail.
- Hi-Fin HFS70187 – 0.125” pile fin with extended polypropylene flap one (1) row continuous around exterior face of operable sash.

Hardware:

All Specimens

- (2) Truth # 17-32 Trimline locks located 9.5” from each end of the sash meeting rail and secured with two (2) #6 x 1-1/2” PFH screws, the keepers were secured to the fixed meeting rail with two (2) #6 x 1-1/4” PFH screws.
- (2) Caldwell Ultra-lift spiral balance attached each side of frame 1.75” from the top with a #8 x 2.0 grabber drywall screw.

Weepholes:

Each Single Hung – Four (4) weepholes in each single hung frame sill, measuring 0.125” x 1.5” and Located 3.5” from each end at 0.625” and 1.875” on center from the bottom of the frame.

Muntins: None

Reinforcement:

- Forty-six (46) Rigid PVC block measuring 0.175” thick x 1.053” wide x 2.221” long glued to the main frame for reinforcement at each anchor location.
- Twelve (12) Main frame reinforcement - The lower exterior cavities on both horizontal and vertical frames are reinforced with a continuous steel channel measuring 0.508” wide x 0.375” high with 0.058” wall thickness and terminated a minimum of 0.25” from each end.
- Two (2) Meeting rail reinforcement – The meeting rails are reinforced with a two piece galvanized steel section, (no. 31 in BOM – 0.061” wall thickness and 0.613” high x 0.925” deep and inserted within and no. 32 in BOM - 0.051” wall thickness and 0.566” high x 0.50” deep).
- Four (4) Sash stile reinforcement – The stiles are reinforced with a galvanized steel section terminated a minimum 0.25” from each end (no.31 in BOM- 0.061” wall thickness and 0.613” high x 0.925” deep).
- Four (4) Sash rail reinforcement - The rails are reinforced with a galvanized steel section terminated a minimum 0.25” from each end (no.31 in BOM- 0.061” wall thickness and 0.613” high x 0.925” deep).
- Eight (8) Sash corner brace - Each of the exterior sash corners are reinforced with (no.29 in BOM – sash corner brace, 0.079” thick stainless steel, 0.569” wide and the horizontal leg is 4.79” and the vertical leg is 4.379” secured with two (2) # 8 x 5/8” PFH screw on the vertical legs and two (2) # 6 x 1.25” PFH screws on the horizontal legs).

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7/19/07

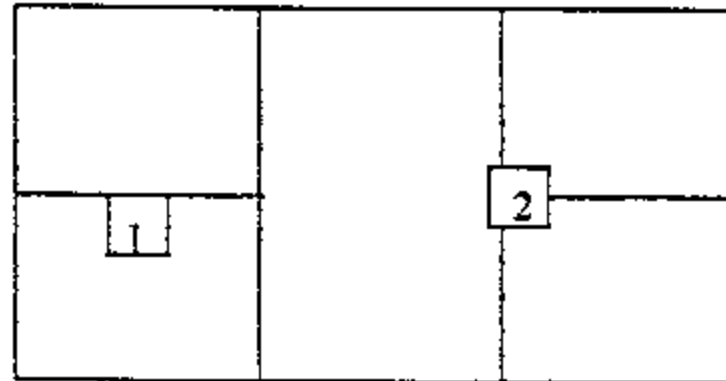
Sealant: Latex caulking as needed to seal unit into rough opening. Additionally latex caulking was used to seal the interior and exterior sides of the units to the mullion.

Screen: None

(4) SEQUENCE OF TESTS PERFORMED:

**Test Sequence: PA 202
Air Infiltration**

Deflection Gauge Locations



1. 1/2 Test Pressure Positive
2. 1/2 Test Pressure Negative
3. Design Pressure Positive
4. Design Pressure Negative
5. Water Infiltration Positive Direction
6. Full Test pressure Positive
7. Full Test Pressure Negative
8. Forced Entry

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Deflection was measured with two (2) CDI 5" dial indicators: location #1-SN 971649614 and location #2-SN 002644132

AIR INFILTRATION

Air Infiltration Tests were conducted in accordance with DCBCCD PA 202-94

Air at 1.57 psf	Actual	Allowable
Specimen 1	0.05 CFM/SQ FT	0.34 CFM/SQ FT

WATER INFILTRATION TEST

Water Infiltration Test was conducted in accordance with DCBCCD PA 202 - 94

(Conducted after 1/2 test and design loads were performed in positive and negative directions.)

Specimen 1	Water @ 9.0 psf for 15 min.	Result: Passed
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No water penetration was observed.

Robert P. E.
 7/19/07

STATIC AIR PRESSURE TESTS

Static Tests were conducted in accordance with DCBCCD PA 202-94

Specimen 1

Design Loads + 60.0 psf, - 65.0 psf.

Range of test	time	actual load	deflection	perm. set
Positive loads	(seconds)	psf		
1/2 Test	30	45.00		
Design	30	60.00	(2) 0.277"	0.012"
Test	30	90.00	(1) 0.915"	0.105"
			(2) 0.912"	0.167"
Range of test	time	actual load	deflection	perm. set
Negative loads	(seconds)	psf		
1/2 Test	30	48.75		
Design	30	65.00	(2) 0.310"	0.016"
Test	30	97.50	(1) 0.892"	0.045"
			(2) 0.932"	0.052"

Location (1) - Max. allowable Perm. Set after test load (0.4% of 33.125" span) = 0.1325.

Location (2) - Max. allowable Deflection at design load (76.0"/180 span) = 0.422.

Location (2) - Max. allowable Perm. Set after test load (0.4% of 76.0" span) = 0.304.

FORCED ENTRY TEST

Force Entry Resistance	AAMA 1302.5-76	Measured	Allowed
<u>Specimen # 1</u>			
Paragraph A		0"	1/2"
Paragraph B		0"	1/2"
Paragraph C		0"	1/2"
Paragraph D,E,F		0"	1/2"
Paragraph G		0"	1/2"

At conclusion of testing the windows opened and operated in a manner that was considered not unreasonable.

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7/29/01

IMPACT TEST – LARGE MISSILE

Impact tests were conducted in accordance with DCBCCD PA 201-94.

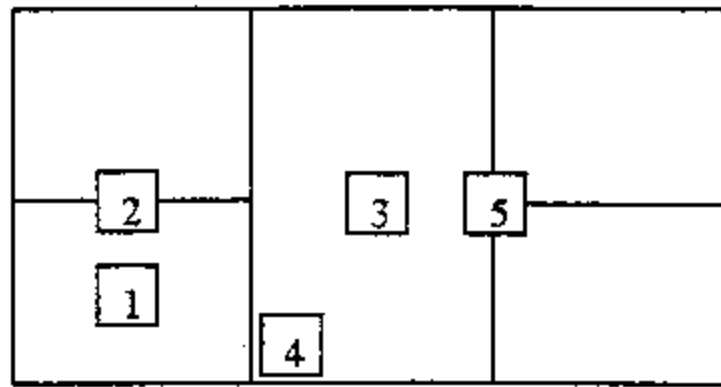
Note:

X measurement from left edge of test specimen.

Y measurement from top edge of test specimen.

Type and weight of missile: # 2 Southern Yellow Pine 2 x 4, Length approx. 89-1/4" & 9 lb.

Specimen 2



0 0 0
X X

Specimen 2

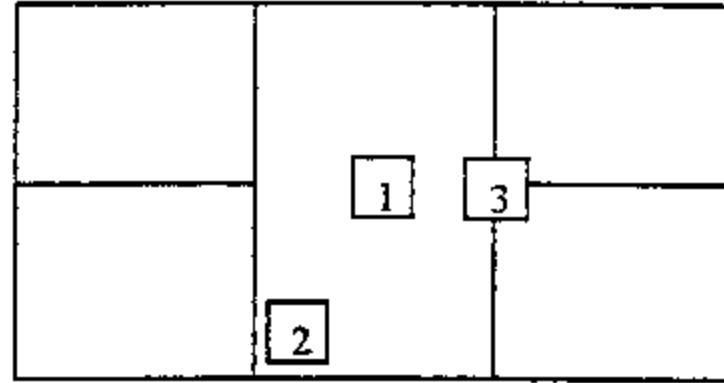
Impact No.	Impact Loc.	Speed Ft/Sec.	X Meas.	Y Meas.
1.	1	50.9	18.5"	55.5"
2.	2	50.0	18.5"	37.25"
3.	3.	50.1	57.5"	37.0"
4.	4.	50.2	47.0"	69.0"
5.	5.	50.7	76.5"	39.5"

None of the impacts penetrated the specimens and the specimens remained locked.

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7/19/01

Impact Large Missile Con't.

Specimen 3



Specimen 3

Impact No.	Impact Loc.	Speed Ft/Sec.	X Meas.	Y Meas.
1.	1	50.6	57.5"	38.5"
2.	2	50.3	49.0"	68.5"
3.	3.	50.5	76.5"	37.0"

None of the impacts penetrated the specimens and the specimens remained locked.

FATIGUE LOADING TEST

Cycle tests were conducted in accordance with DCBCCD PA 203

Specimen 2

Design Load + 60.0 psf, -65.0 psf

<u>Range of test</u>	<u>actual load psf</u>		<u># of cycles</u>	<u>cycles/min</u>
Positive loads				
+2 - .5	12	30	3500	55
+0 - .6	0	36	300	55
+.5 - .8	30	48	600	55
+.3 - 1.0	18	60	100	55

Negative Loads

<u>Range of test</u>	<u>actual load psf</u>		<u># of cycles</u>	<u>cycles/min</u>
-3 - 1.0	19.5	65	50	55
-5 - .8	32.5	52	1050	55
-0 - .6	0	39	50	55
-2 - .5	13	32.5	3350	55

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7/19/00

9000 cycles completed

Fatigue Loading Test Con't.

Specimen 3

Design Load + 60.0 psf, -65.0 psf

<u>Range of test</u>	<u>actual load psf</u>		<u># of cycles</u>	<u>cycles/min</u>
Positive loads				
+2 - .5	12	30	3500	55
+0 - .6	0	36	300	55
+5 - .8	30	48	600	55
+3 - 1.0	18	60	100	55

Negative Loads

<u>Range of test</u>	<u>actual load psf</u>		<u># of cycles</u>	<u>cycles/min</u>
-3 - 1.0	19.5	65	50	55
-5 - .8	32.5	52	1050	55
-0 - .6	0	39	50	55
-2 - .5	13	32.5	3350	55

9000 cycles completed

(5) DRAWINGS TO BE SUBMITTED:

Submittal drawings numbered as listed and marked with the CTL stamp are a part of this report.

1. L2134 sheets 1 through 10 of 10
2. L2134A sheet 1 of 1
3. Q-lon QEZ 376 spec sheet
4. Caldwell Roller Tilt
5. HFS70187 Hi-Fin seal
6. CTLA-716WB sheet 1 of 1

Comment: Nominal 2 mil polyethylene film was used to seal against air leakage during structural loads. The film was used in a manner that did not influence the test results.

Remarks: The results obtained and reported apply only to the specimens tested.

Detailed drawings were available for laboratory records and comparison to the test specimen at the time of this report. A copy of this report along with representative sections of the test specimen will be retained by CTL for a period of ten (10) years. The results obtained apply only to the specimen tested.

This test report does not constitute certification of this product, but only that the above test results were obtained using the designated test methods and they indicate compliance with the performance requirements (paragraphs as listed) of the above referenced specifications.

CTL assumes that all information provided by the client is accurate and that the physical and chemical properties of the components are as stated by the manufacturer.

Handwritten signature and date:
7/19/07

Observers:

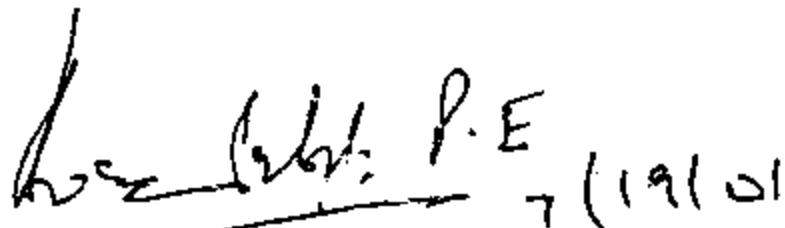
Paul Gatto – Galaxy Window & Door
Chris Gould – Galaxy Window & Door
Rick Wright – R.W. Building Consultants, Inc., Consultant

Dade County Witness:

Not present

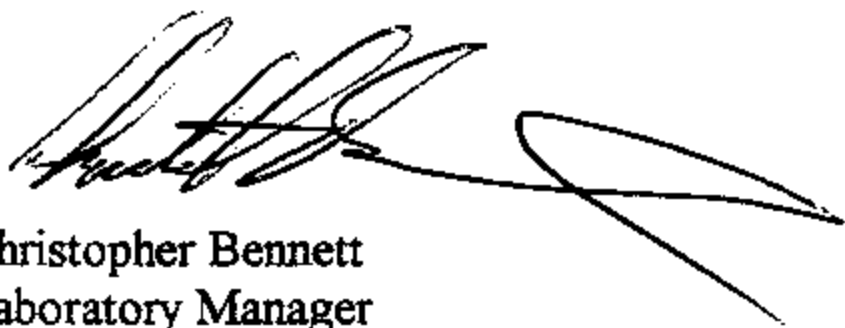
All Tests Witnessed by:

Ramesh Patel, P.E.
Chris Bennett, CTL
Ted Scanlon, CTL



Ramesh Patel, P.E.
Florida Reg. # 20224

Certified Testing Laboratories, Inc.



Christopher Bennett
Laboratory Manager
Architectural Division

Cc: Galaxy Window & Door (4)
Rick Wright (2)
File