Architectural Testing

**ASTM E 1886 and ASTM E 1996**
**TEST REPORT**

**Report No.**: B2775.02-701-18

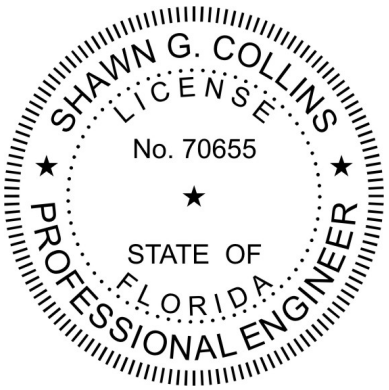
**Rendered to**:

PRL ARCHITECTURAL ALUMINUM PRODUCTS
City of Industry, California

**PRODUCT TYPE**: Dry Glazed Center Set Aluminum Storefront
**SERIES/MODEL**: 250

**This report contains in its entirety:**

**Cover Page**: 1 page
**Report Body**: 7 pages
**Sketches**: 1 page
**Drawings**: 7 pages




2011.09.23 08:24:21 -04'00'

**Test Dates**: 08/29/11
**Through**: 08/30/11
**Report Date**: 09/23/11
**Test Record Retention End Date**: 08/30/15

4 Rancho Circle
Lake Forest, CA 92630
phone: 949-460-9600
fax: 949-460-9601
www.archtest.com

**1.0 Report Issued To**: PRL Architectural Aluminum Products
14760 Don Julian Road
City of Industry, California 91746

**2.0 Test Laboratory**: Architectural Testing, Inc.
4 Rancho Circle
Lake Forest, California 92630
949.460.9600

**3.0 Project Summary**:

**3.1 Product Type**: Dry Glazed Center Set Aluminum Storefront

**3.2 Series/Model**: 250

**3.3 Compliance Statement**: Results obtained are tested values and were secured by using the designated test method(s). The samples tested met the performance requirements set forth in the referenced test procedures for a +1676/-2873 Pa (+35/-60 psf) Design Pressure with missile impacts corresponding to Missile Level D and Wind Zone 3 for a basic protection rating.

**3.4 Test Dates**: 08/29/2011 - 08/30/2011

**3.5 Test Location**: Architectural Testing, Inc's test facility in Lake Forest, California. Calibration of test equipment was performed by Architectural Testing in accordance with AAMA 205-01 "In-Plant Testing Guidelines for Manufacturers and Independent Laboratories".

**3.6 Test Sample Source**: The test specimen was provided by the client. Representative samples of the test specimen(s) will be retained by Architectural Testing for a minimum of four years from the test completion date.

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

**3.8 List of Official Observers**:

| Name | Company |
|---|---|
| Frank Fisher | PRL Architectural Aluminum Products |
| John S. Mayfield | Architectural Testing, Inc. |

## 4.0 Test Specification(s):

ASTM E 1886-05, *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 1996-05, *Standard Specification for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Storm Shutters Impacted by Wind Borne Debris in Hurricanes.*

## 5.0 Test Specimen Description:

### 5.1 Product Sizes:

**Test Specimens #1 - #3:**

| **Overall Area:** 9.2 $m^2$ (99.4 $ft^2$) | **Width** | | **Height** | |
|---|---|---|---|---|
| | **millimeters** | **inches** | **millimeters** | **inches** |
| Overall size | 3708 | 146 | 2489 | 98 |

### 5.2 Frame Construction:

| Frame Member | Material | Description |
|---|---|---|
| Vertical mullion half | Extruded aluminum | Snapped into the adjacent vertical mullion member Reference attached drawing # 250WJ |
| Pocket Filler | Extruded aluminum | Reference attached drawing # 250F |
| Head/Sill | Extruded aluminum | Reference attached drawing # 250 HM |
| Jamb | Extruded aluminum | Reference attached drawing # 250WJ |
| Glazing stop | Extruded aluminum | Snapped in at the exterior perimeter of each lite and secured using one (1) #12 x 2" sheet metal screw (# 250 GS) |
| Glazing Gasket | Neoprene | Kerf mounted into the glazing stop, full perimeter at the interior and exterior of each lite (# 999VY06) |

| | Joinery Type | Detail |
|---|---|---|
| All corners | Square cut | Screw spline construction |

**5.0 Test Specimen Description**: (Continued)

**5.3 Weatherstripping**: No weatherstripping was utilized.

**5.4 Glazing**:

| Glass Type | Overall Glass Thickness | Glazing Method |
|---|---|---|
| Laminated | 1" I.G. | Dry Glazed with compression gasket at the interior and exterior |

| Exterior Lite | Spacer | Interior Lite | | |
|---|---|---|---|---|
| 3/16" Heat Strengthened | 3/8" aluminum box | 3/16" Heat Strengthened | 0.060" DuPont SentryGlas® | 3/16" Heat Strengthened |

| Daylight Opening | | Glass Bite |
|---|---|---|
| millimeters | inches | |
| 1168 x 2388 | 46" x 94" | 1/2" |

**5.5 Drainage**:

| Drainage Method | Size | Quantity | Location |
|---|---|---|---|
| Weep Holes | 1" x 1/8" | 2/lite | 6" on center from the ends through the exterior face of the glazing stop |

**5.6 Hardware**: No hardware was utilized.

**5.7 Reinforcement**: No reinforcement was utilized.

**6.0 Installation**:

The specimen was installed into an aluminum test buck. The rough opening allowed for a 1/8" shim space. The exterior perimeter of the window was sealed with duct tape.

| Location | Anchor Description | Anchor Location |
|---|---|---|
| Head/Sill | #12 x 1-1/2" hex head sheet metal screw | Two (2) located at 3" o.c. from each vertical and one (1) located at 6" o.c. from each vertical at the head and sill |
| Jambs | #10 x 1-1/2" hex head sheet metal screw | Secured through the glazing pocket located 6" o.c. from the ends and 12" o.c. thereafter. |

**7.0 Test Results**: The results are tabulated as follows:

**ASTM E 1886, *Large Missile Impact***

**Conditioning Temperature**: 26°C (79°F)
**Missile Weight**: 4173 g (9.20 lbs)
**Missile Length**: 2.4 m (94")
**Muzzle Distance from Test Specimen**: 4.9 m (16 ')

**Test Unit #1**: Orientation within ±5° of horizontal

| **Impact #1**: Missile Velocity: 15.2 m/s (50.0 fps) | |
|---|---|
| **Impact Area**: | Center of left lite |
| **Observations**: | Missile penetrated the interior plane of the glazing causing an approximate 2" x 4" rupture in the glass. |
| **Results**: | Pass |

**Test Unit #2**: Orientation within ±5° of horizontal

| **Impact #1**: Missile Velocity: 15.3 m/s (50.2 fps) | |
|---|---|
| **Impact Area**: | Bottom left corner of center lite |
| **Observations**: | Missile penetrated the interior plane of the glazing causing an approximate 2" x 4" rupture in the glass. |
| **Results**: | Pass |

**Test Unit #3**: Orientation within ±5° of horizontal

| **Impact #1**: Missile Velocity: 15.7 m/s (51.4 fps) | |
|---|---|
| **Impact Area**: | Top right corner of right lite |
| **Observations**: | Missile penetrated the interior plane of the glazing causing an approximate 2" x 4" rupture in the glass. (See Note #2) |
| **Results**: | Pass |

***Note 1**: See Architectural Testing Sketch #1 for impact locations.*
***Note 2**: Impact #1 to Test Unit #3 does not meet the tolerances set forth in section 11.2.1 of ASTM E 1886-05. In the opinion of this laboratory, this impact meets the intent of the referenced standards.*

**7.0 Test Results**: (Continued)

**ASTM E 1886, *Air Pressure Cycling***

**Test Unit** #1, #2, & #3
**Design Pressure**: +1676/-2873 Pa (+35/-60 psf)

**POSITIVE PRESSURE**

| Pressure Range Pa (psf) | Number of Cycles | Average Cycle Time (seconds) | Maximum Deflection at Indicator mm (inches) | | |
|---|---|---|---|---|---|
| | | | #1 | #2 | #3 |
| 335 to 838 (7.0 to 17.5) | 3500 | 2.41 | 0.8 (0.03) | 6.4 (0.25) | 0.8 (0.03) |
| 0 to 1005 (0 to 21.0) | 300 | 2.82 | 0.8 (0.03) | 7.1 (0.28) | 0.8 (0.03) |
| 838 to 1341 (17.5 to 28.0) | 600 | 2.52 | 1.5 (0.06) | 11.4 (0.45) | 1.5 (0.06) |
| 503 to 1676 (10.5 to 35.0) | 100 | 2.98 | 1.5 (0.06) | 14.2 (0.56) | 1.5 (0.06) |
| | | | **Permanent Set mm (inches)** | | |
| | | | 0.5 (0.02) | 2.5 (0.10) | 0.5 (0.02) |

**NEGATIVE PRESSURE**

| Pressure Range Pa (psf) | Number of Cycles | Average Cycle Time (seconds) | Maximum Deflection at Indicator mm (inches) | | |
|---|---|---|---|---|---|
| | | | #1 | #2 | #3 |
| 862 to 2873 (18.0 to 60.0) | 50 | 2.99 | 6.6 (0.26) | 24.9 (0.94) | 6.6 (0.26) |
| 1436 to 1915 (30.0 to 48.0) | 1050 | 2.90 | 5.3 (0.21) | 19.3 (0.76) | 5.3 (0.21) |
| 0 to 1724 (0 to 36.0) | 50 | 3.38 | 4.1 (0.16) | 15.0 (0.59) | 4.1 (0.16) |
| 575 to 1436 (12.0 to 30.0) | 3350 | 2.54 | 3.8 (0.15) | 13.2 (0.52) | 3.8 (0.15) |
| | | | **Permanent Set mm (inches)** | | |
| | | | 2.3 (0.09) | 3.0 (0.12) | 2.3 (0.09) |

***Observations**: No additional damage or deglazing was observed.*

**Result**: Pass

***Note**: See Architectural Testing Sketch #1 for indicator locations. Test Specimens #1, #2, and #3 were cycled in a common chamber, as a mulled assembly.*

***General Note**: Upon completion of testing, the specimens met the requirements of Section 7.1.1.1 of ASTM E 1996, for basic protection.*

**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

**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.

The service life of this report will expire on the stated Test Record Retention End Date, at which time such materials as drawings, data sheets, samples of test specimens, copies of this report, and any other pertinent project documentation, shall be discarded without notice.

If test specimen contains glazing, no conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimen(s) can be made. 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 Architectural Testing, Inc.

For ARCHITECTURAL TESTING, Inc.

Digitally Signed by: John S. Mayfield

John S. Mayfield
Project Manager

Digitally Signed by: Shawn G. Collins

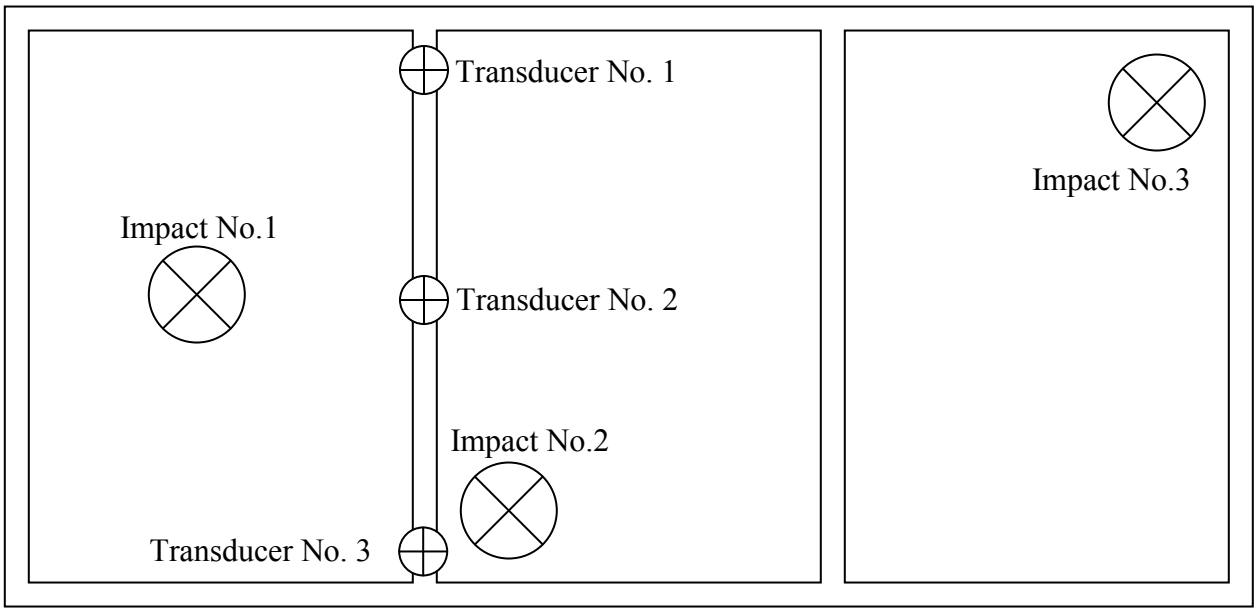
Shawn G. Collins, P.E.
Laboratory Support Engineer

JM:bu

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix-A: Sketches (1)
Appendix-C: Drawings (7)

# Appendix A

## Sketches




*Sketch # 1: Impact and Linear Transducer Locations*

# Appendix B
# Drawings

## PRL 2" x 4 1/2" center set storefront 250 series

Bill of Material

| PRL part number | manufacturer | description | qty required | size | |
|---|---|---|---|---|---|
| 250WJ | PRL proprietary | vertical mullion half | 4 | H | 98" |
| 250F | PRL proprietary | vertical mullion half | 2 | H | 98" |
| 250HM | PRL proprietary | horizontal mullion half | 6 | W DLO | 46" |
| 250GS | PRL proprietary | glazing stop | 6 | W DLO -1/32" | 45 31/32" |
| 999VY06 | PRL proprietary | glazing gasket | 6 | W DLO +3/4" | 46 3/4" |
| 999VY06 | PRL proprietary | glazing gasket | 6 | H DLO +3/4" | 94 3/4" |
| | generic | assembly screws 250HM to vertical mullions | 2 per joint | #10 x 1" SMS | 32 |
| | generic | anchor screws #12 X 1 1/2" SMS | 2 each side of vertical | | 32 |
| | generic | glazing stop screw #12 x 1 1/2" SMS | 1 per stop | | 6 |
| | | insulated glass width | 3 | W DLO +1" | |
| | | insulated glass height | 3 | H DLO +1" | |

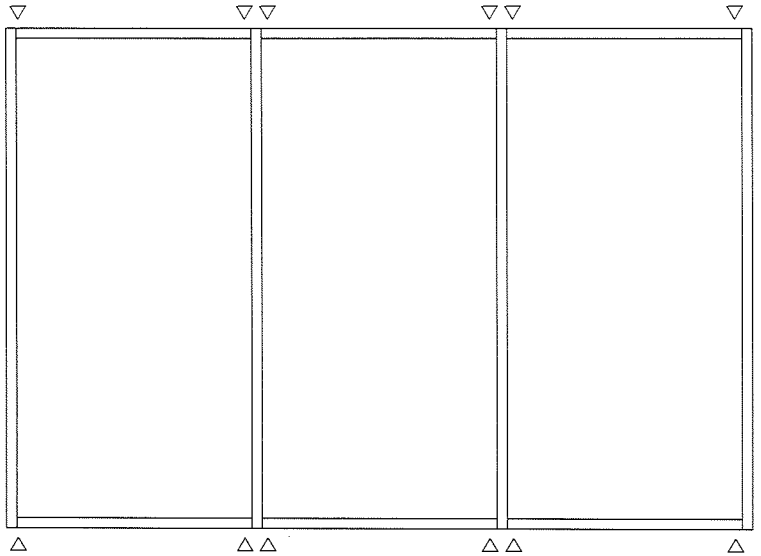
W = width
H = height
DLO = day light opening

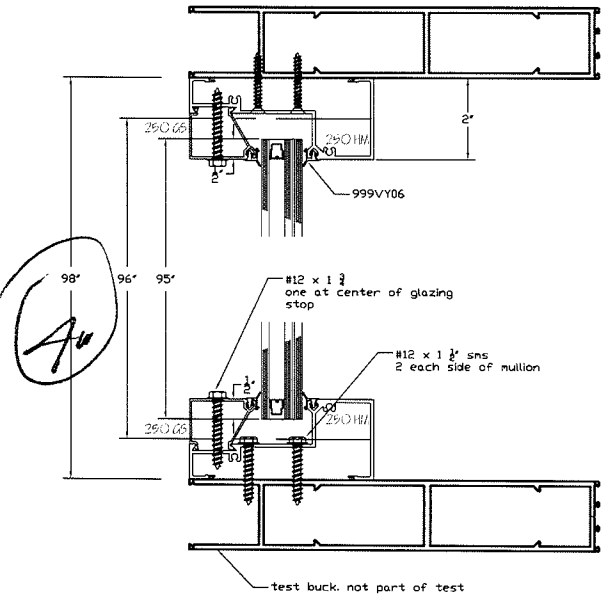
Architectural Testing

Test sample complies with these details
Deviations are noted.

Report# B2775.02

Date 9/6/11 Tech



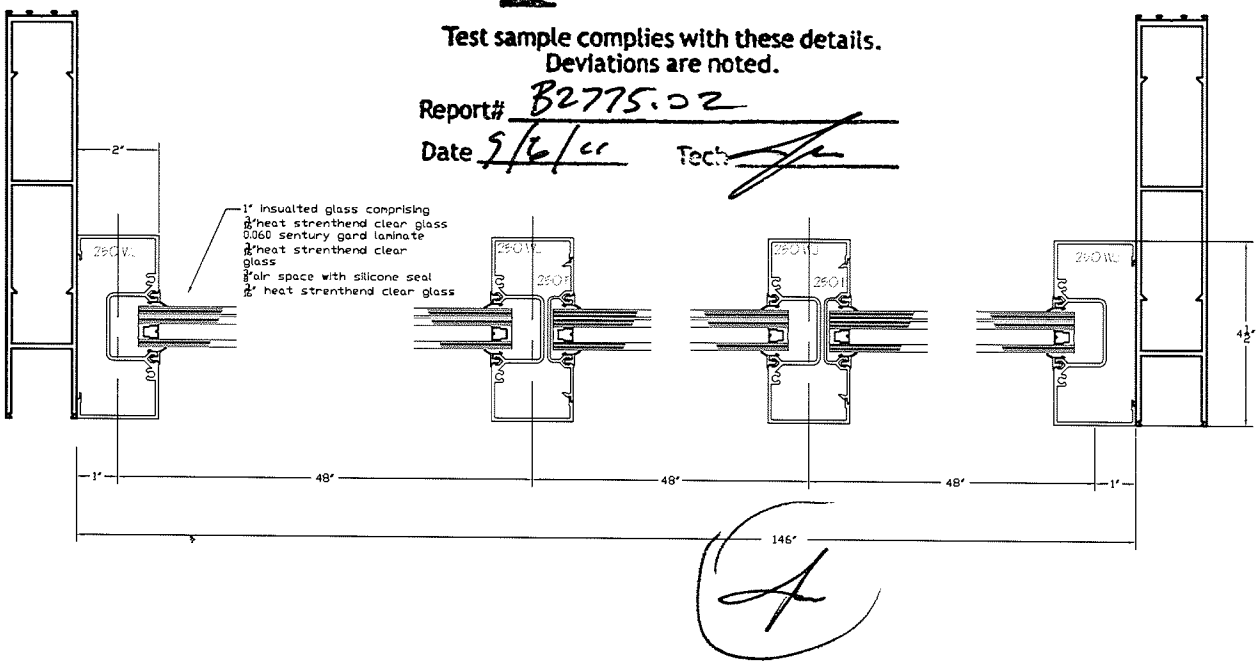



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# B2775.02

Date 5/6/11 Tech



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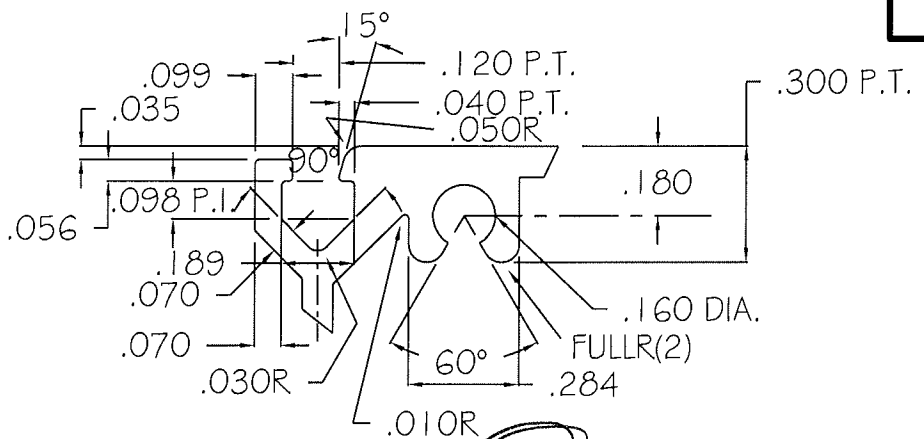
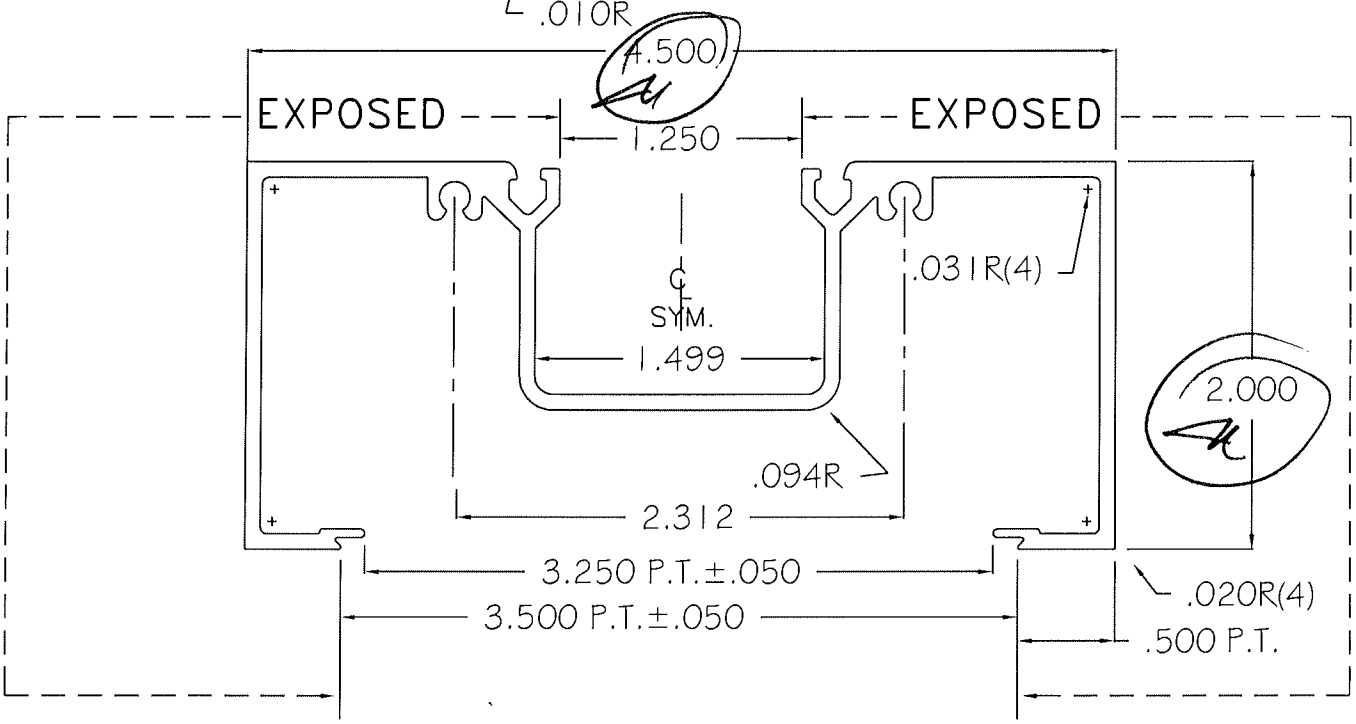
DIE NO. 2075



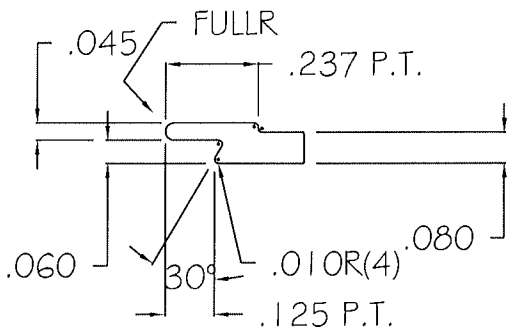




**Architectural Testing**

Test sample complies with these details.
Deviations are noted.

Report# B2775.02

Date 9/6/11 Tech




UNLESS OTHER WISE NOTED .080 TYP. WALL

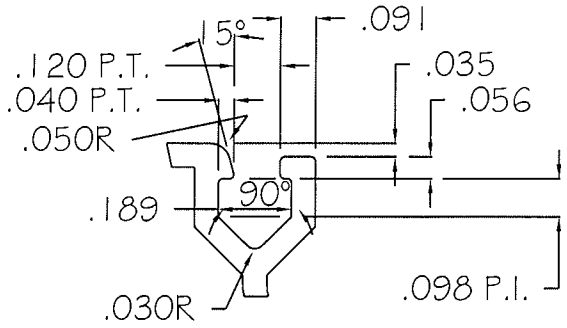
UNMARKED CORNERS .020 R.

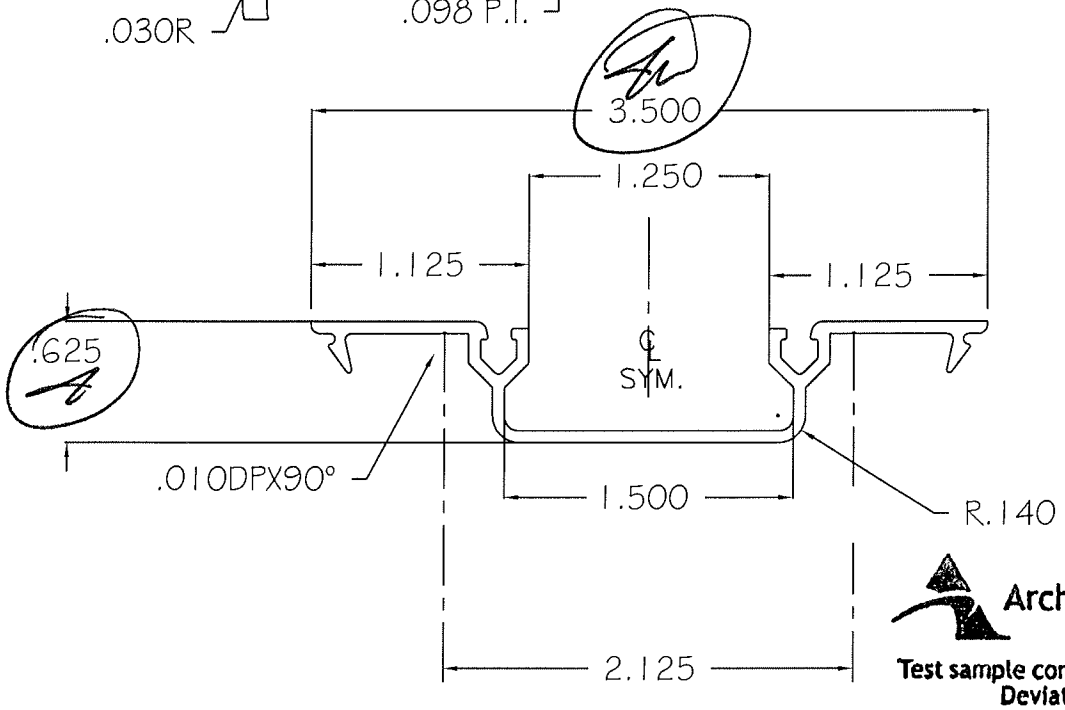
| REVISION | CUSTOMER: PRL | | |
|---|---|---|---|
| | | | |
| | | | |

| | | | |
|---|---|---|---|
| MAT.'L 6063-T5 | HOLES | ✳ CRITICAL DIM. | PRL ALUMINUM INC. |
| AREA 1.059 | BACKER | ⊛ SPECIAL TOOL | 14760 DON JULIAN RD. |
| WT. / FT 1.271 | BOLSTER | | INDUSTRY CA. 91746 |
| PERI. 25.882 | W/P | DRAWN: OLDS 042 | TEL. ( 877 ) 775-2586 PRL-ALUM |
| FACTOR 20 | EXT. RATIO | DATE: 11-4-07 | FAX ( 877 ) 274-8800 |
| C.C.D. 4.5-5 | CLASS SOLID | SCALE FULL | PART NAME: WALL JAMB |
| | | | PART # 250WJ |

UNLESS OTHERWISE SPECIFIED STANDAR ALUMINUM ASSOCIATION TOLERANCES APPLY

DIE NO. 2071



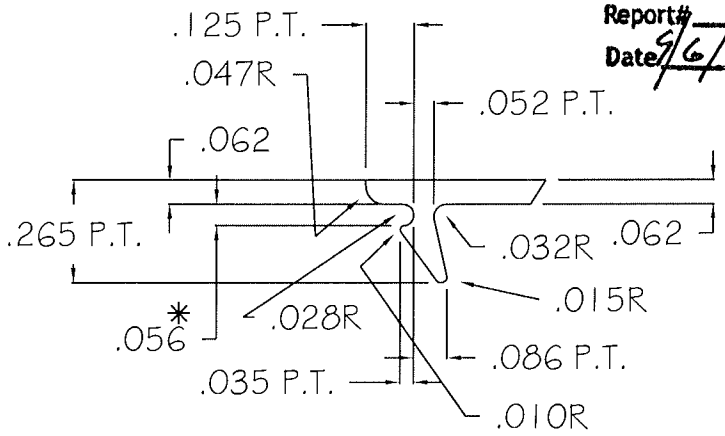




Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# B2775.02

Date 9/6/2011 Tech




UNLESS OTHER WISE NOTED .062 TYP. WALL

UNMARKED CORNERS .020 R.

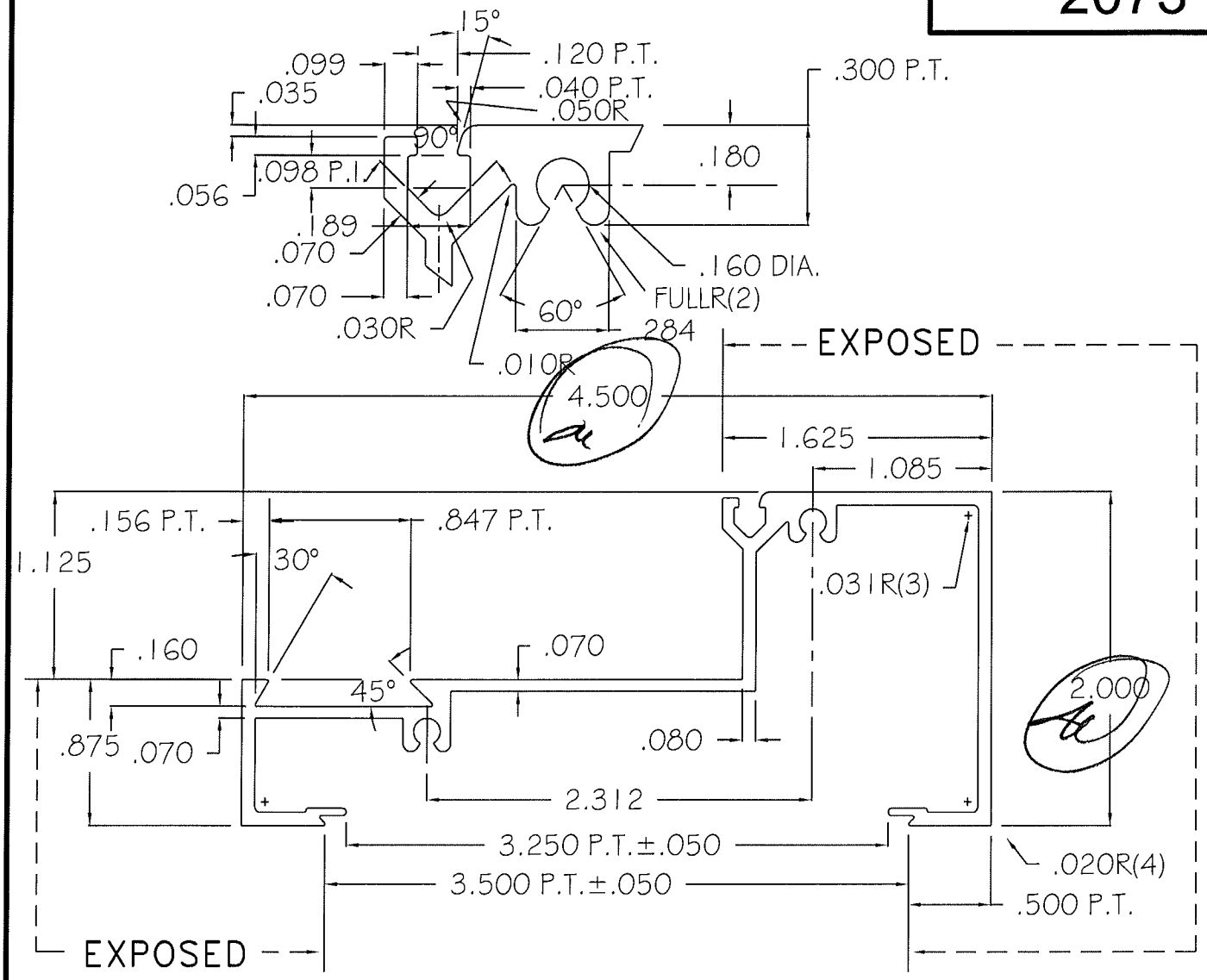
| REVISION | | |
|---|---|---|
| | CUSTOMER: PRL ALUMINUM INC | |
| | Revised as of 9-12-08 | |

PRL ALUMINUM INC.
14760 DON JULIAN RD.
INDUSTRY CA. 91746
TEL. ( 877 ) 775-2586
PRL-ALUM
FAX ( 877 ) 274-8800

| | | | |
|---|---|---|---|
| MAT.'L 6063-T5 | HOLES | * CRITICAL DIM. | |
| AREA .343 | BACKER | ⊛ SPECIAL TOOL | |
| WT. / FT .412 | BOLSTER | | |
| PERI. 11.08 | W/P | DRAWN: AJ | |
| FACTOR 26.89 | EXT. RATIO | DATE: 9-12-08 | PART NAME: Filler |
| C.C.D. 3.5-4 | CLASS SOLID | SCALE FULL | PART # 250F |

UNLESS OTHERWISE SPECIFIED STANDAR ALUMINUM ASSOCIATION TOLERANCES APPLY

DIE NO. 2073

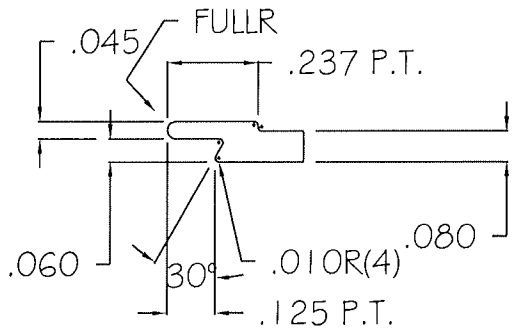



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# B2775.02

Date 9/4/2008 Tech




UNLESS OTHER WISE NOTED .080 TYP. WALL

UNMARKED CORNERS .020 R.

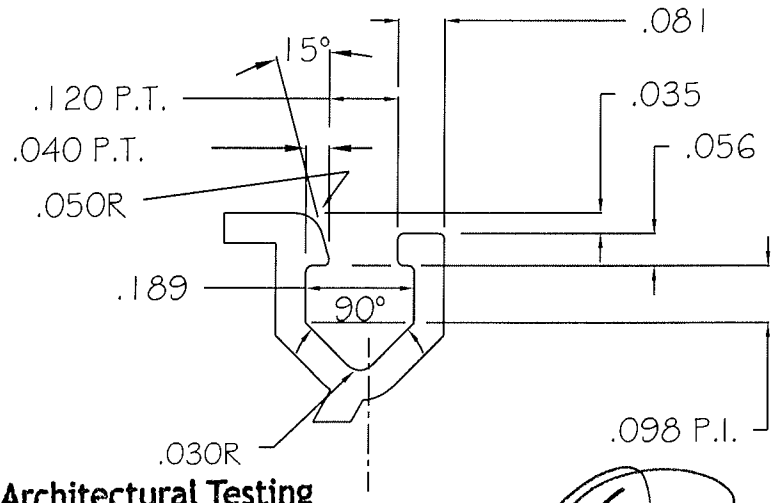
REVISION

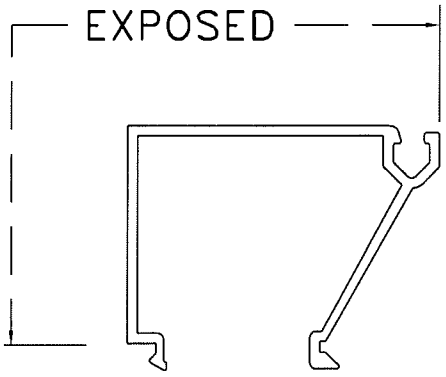
CUSTOMER: PRL

| | | | |
|---|---|---|---|
| MAT.'L 6063-T5 | HOLES | * CRITICAL DIM. | PRL ALUMINUM INC. |
| AREA .847 | BACKER | ⊛ SPECIAL TOOL | 14760 DON JULIAN RD. |
| WT./FT 1.016 | BOLSTER | | INDUSTRY CA. 91746 |
| PERI. 21.536 | W/P | DRAWN: AJ | TEL. (877) 775-2586 PRL-ALUM |
| FACTOR 21 | EXT. RATIO | DATE: 3-6-08 | FAX (877) 274-8800 |
| C.C.D. 4.5-5 | CLASS SOLID | SCALE FULL | PART NAME: HORIZONTAL |
| | | | PART # 250HM |

UNLESS OTHERWISE SPECIFIED STANDAR ALUMINUM ASSOCIATION TOLERANCES APPLY

DIE NO. 2072



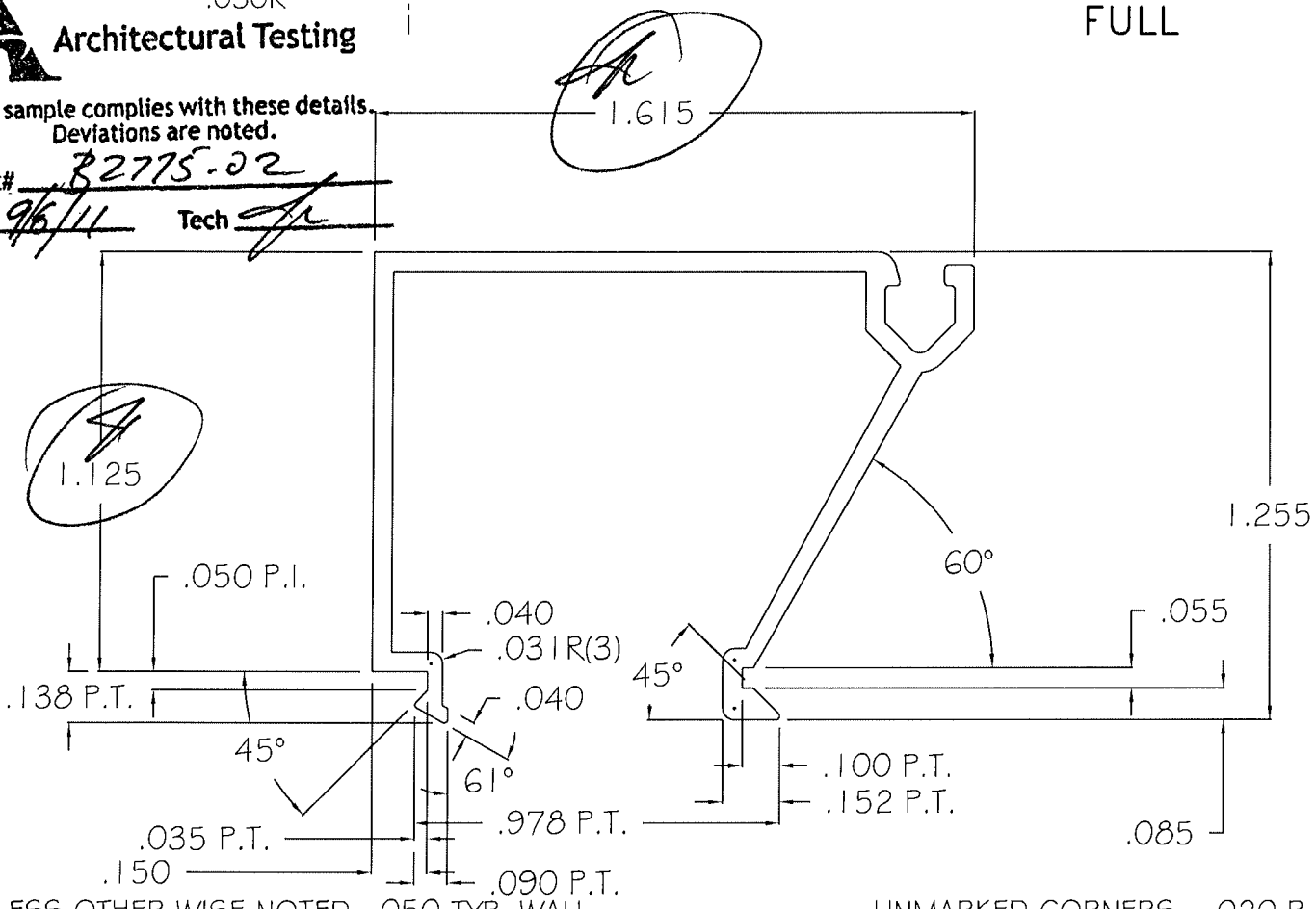




Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# 82775-02

Date 9/6/11 Tech




UNLESS OTHER WISE NOTED .050 TYP. WALL

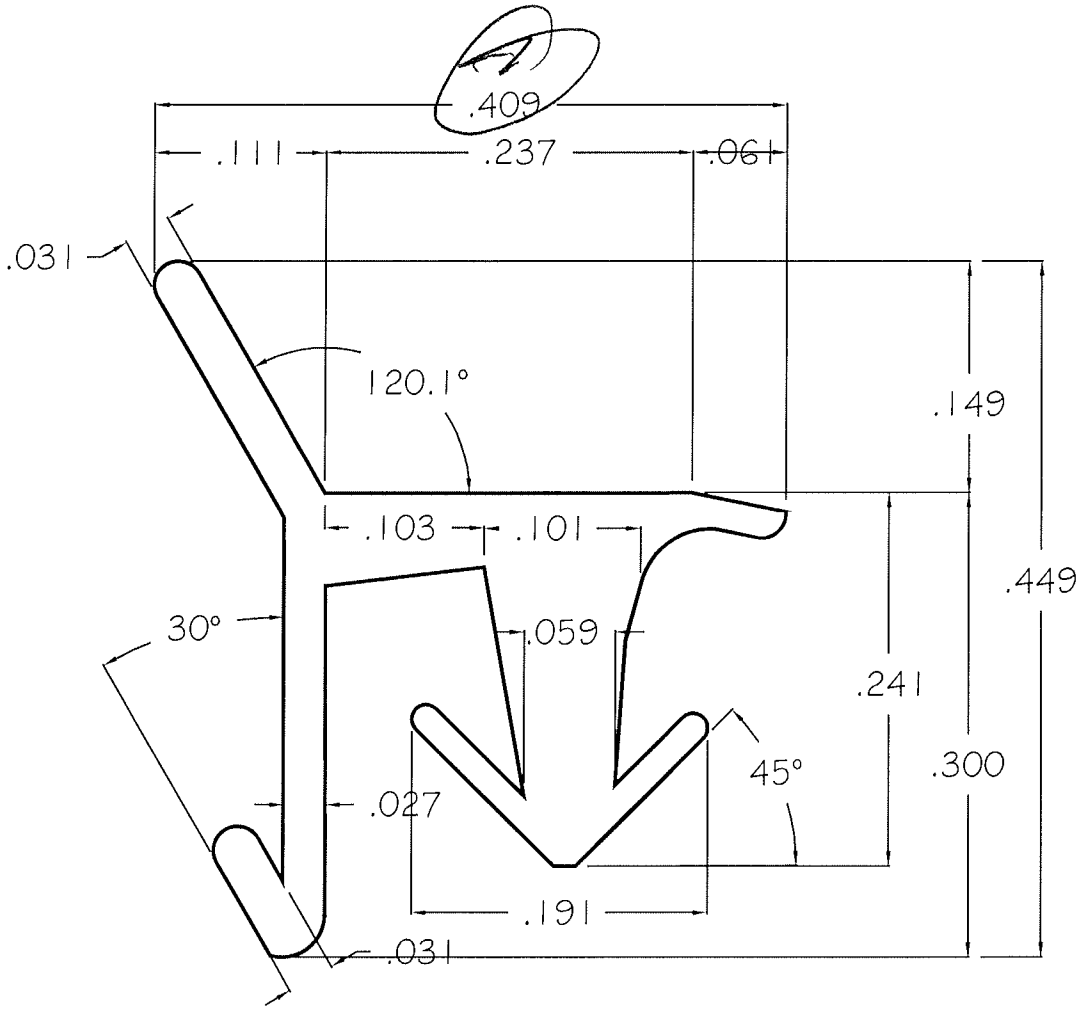
UNMARKED CORNERS .020 R.

| REVISION | CUSTOMER: PRL | | |
|---|---|---|---|
| | | | PRL ALUMINUM INC. 14760 DON JULIAN RD. INDUSTRY CA. 91746 TEL. ( 877 ) 775-2586 PRL-ALUM FAX ( 877 ) 274-8800 |
| MAT.'L 6063-T5 | HOLES | * CRITICAL DIM. ⊗ SPECIAL TOOL | |
| AREA .239 | BACKER | | |
| WT. / FT .287 | BOLSTER | | |
| PERI. 9.230 | W/P | DRAWN: AJ | |
| FACTOR 32 | EXT. RATIO | DATE: 3-6-08 | PART NAME: GLASS STOP |
| C.C.D. 1.5-2 | CLASS SOLID | SCALE 2X | PART # 250GS |

DIE NO.



full scale




8 X scale

Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# 32-915.02

Date 9/6/11 Tech

PRL ALUMINUM INC.
14760 DON JULIAN RD.
INDUSTRY CA. 91746
TEL. ( 877 ) 775-2586
PRL-ALUM
FAX ( 877 ) 274-8800

PART NAME: glazing gasket

PART # 999VY06