



TEST REPORT

Report No.: G9674.01-201-44

Rendered to:

CMI ARCHITECTURAL PRODUCTS, INC.
Blaine, Minnesota

PRODUCT TYPE: Glazed Wall System (Site-built)

SERIES/MODEL: 450 DT System

SPECIFICATION: AAMA/WDMA/CSA 101/I.S.2/A440-11, *NAFS 2011 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights.*

| Title | Summary of Results |
|--|--|
| AAMA/WDMA/CSA 101/I.S.2/A440-11 | Class LC-PG30 Size Tested 96 x 96-FW |
| Design Pressure | ±1440 Pa (±30.09 psf) |
| Air Infiltration | <0.1 L/s/m ² (<0.01 cfm/ft ²) |
| Canadian Air Infiltration/Exfiltration Level | Fixed |
| Water Penetration Resistance Test Pressure | 960 Pa (20.06 psf) |

Test Completion Date: 08/14/2017

Reference must be made to Report No. G9674.01-201-44, dated 08/22/17 for complete test specimen description and detailed test results.

1.0 Report Issued To: CMI Architectural Products, Inc.
1630 101st Avenue NE, Suite 130
Blaine, Minnesota 55449

2.0 Test Laboratory: Architectural Testing, Inc., an Intertek company ("Intertek-ATI")
849 Western Ave. North
St. Paul, Minnesota 55117-5245
651-636-3835

3.0 Project Summary:

3.1 Product Type: Glazed Wall System (Site-built)

3.2 Series/Model: 450 DT System

3.3 Compliance Statement: Results obtained are tested values and were secured by using the designated test methods. The specimen tested successfully met the performance requirements for a **Class LC-PG30 Size Tested 96 x 96-FW** rating.

3.4 Test Dates: 07/27/2017 – 08/14/2017

3.5 Intertek-ATI Test Record Retention End Date: All test records for this report will be retained until August 14, 2021.

3.6 Test Location: Intertek-ATI test facility in St. Paul, Minnesota.

3.7 Test Sample Source: The test specimen was provided by the client. Representative samples of the test specimen 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 reported herein. Test specimen construction was verified by Intertek-ATI per the drawings located in Appendix C. Any deviations are documented herein or on the drawings.

3.9 List of Official Observers:

| <u>Name</u> | <u>Company</u> |
|------------------|----------------------------------|
| Geoffrey Helm | CMI Architectural Products, Inc. |
| Karl Lips-Eakins | Intertek-ATI |
| Steven Kenemer | Intertek-ATI |

4.0 Test Specifications:

AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights.

5.0 Test Specimen Description:

5.1 Product Sizes:

| Overall Area: 5.9 m ² (64.0 ft ²) | Width | | Height | |
|---|-------------|--------|-------------|--------|
| | millimeters | inches | millimeters | inches |
| Overall size | 2438 | 96 | 3428 | 96 |

5.2 Frame Construction:

| Frame Member | Material | Description |
|--------------|----------|--------------------------------|
| All | Aluminum | Extruded, poured and debridged |

| | Joinery Type | Detail |
|-------------|--------------|-------------------------|
| All corners | Butt | Two #12 x 1-1/4" screws |

5.3 Weatherstripping: No weatherstripping was utilized.

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

| Glass Type | Spacer Type | Interior Lite | Exterior Lite | Glazing Method |
|------------|------------------------|---------------|---------------|--|
| 1" IG | Stainless Steel Spacer | 1/4" Tempered | 1/4" Tempered | Glass set from exterior against glazing gasket with an aluminum stop snap-fit with gasket on exterior. |

| Location | Quantity | Daylight Opening | | Glass Bite |
|----------|----------|------------------|-----------------|------------|
| | | millimeters | inches | |
| Frame | 2 | 1133 x 2327 | 44-5/8 x 91-5/8 | 1/2" |

5.5 Drainage:

| Drainage Method | Size | Quantity | Location |
|-----------------|------|----------|---------------------------------------|
| Weep hole | 1/4" | 4 | Sill face, 13" from ends and mullion. |

5.0 Test Specimen Description: (Continued)

5.6 Hardware: No hardware was utilized.

5.7 Reinforcement: No reinforcement was utilized.

6.0 Installation:

The specimen was installed into a Spruce-Pine-Fir wood buck. The rough opening allowed for a 3/4" shim space. The exterior perimeter of the unit was sealed with Dow 795. Installation of the tested product was performed by the client.

| Location | Anchor Description | Anchor Location |
|----------|-------------------------------|--|
| Frame | #12 x 2-1/2" flag head screws | Jambs, 229 mm (9") from sill and 508 mm (20") on center. Sill pan fasteners mid-span and 406 mm (16") on center. |

7.0 Test Results: The temperature during testing was 26°C (78°F). The results are tabulated as follows:

| Title of Test | Results | Allowed | Note |
|--|---|---|---------|
| Air Leakage, Infiltration per ASTM E 283 at 75 Pa (1.57 psf) | <0.1 L/s/m ² (<0.01 cfm/ft ²) | 1.5 L/s/m ² (0.3 cfm/ft ²) max. | 1 |
| Air Leakage, Exfiltration per ASTM E 283 at 75 Pa (1.57 psf) | 0.0 L/s/m ² (0.00 cfm/ft ²) | 1.5 L/s/m ² (0.3 cfm/ft ²) max. | 1 |
| Air Leakage, Infiltration per ASTM E 283 at 300 Pa (6.27 psf) | <0.1 L/s/m ² (<0.01 cfm/ft ²) | 1.5 L/s/m ² (0.3 cfm/ft ²) max. | 1 |
| Air Leakage, Exfiltration per ASTM E 283 at 300 Pa (6.27 psf) | <0.1 L/s/m ² (<0.01 cfm/ft ²) | 1.5 L/s/m ² (0.3 cfm/ft ²) max. | 1 |
| Canadian Air Infiltration/Exfiltration Level | Fixed | N/A | |
| Water Penetration, per ASTM E 331 | N/A | N/A | 2 |
| Uniform Load Deflection, per ASTM E 330 | N/A | N/A | 2 |
| Uniform Load Structural, per ASTM E 330 | N/A | N/A | 2 |
| Forced Entry Resistance, per ASTM F 588, Type: D - Grade: 10 | Pass | No entry | |
| Optional Performance | | | |
| Water Penetration, per ASTM E 331 at 960 Pa (20.06 psf) | Pass | No leakage | |
| Uniform Load Deflection, per ASTM E 330 Deflections taken at mullion +1440 Pa (+30.09 psf) -1440 Pa (-30.09 psf) | 10.4 mm (0.41") 11.2 mm (0.44") | Report Only | 3, 4, 5 |
| Uniform Load Structural, per ASTM E 330 Permanent sets taken at mullion +2160 Pa (+45.14 psf) -2160 Pa (-45.14 psf) | 0.3 mm (0.01") 1.5 mm (0.06") | 9.7 mm (0.38") max. 9.7 mm (0.38") max. | 4, 5 |

7.0 Test Results: (Continued)

Note 1: The tested specimen meets (or exceeds) the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440 for air leakage resistance.

Note 2: The client opted to start at a pressure higher than the minimum required. Test results are reported under Optional Performance.

Note 3: The deflections reported met the L/175 deflection allowable criteria.

Note 4: Loads were held for 10 seconds.

Note 5: Tape and film were not used to seal against air leakage during structural testing.

Intertek-ATI will service this report for the entire test record retention period. Test records that are retained 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 INTERTEK-ATI:

Tony D. Gavin
Technician

Daniel A. Johnson
Director – Regional Operations

ADG/jb

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

Appendix-A: Alteration Addendum (1)

Appendix-B: Location of Air Seal (1)

Appendix-B: Drawings (8)

This report produced from controlled document template ATI 00438, issued 01/31/12.

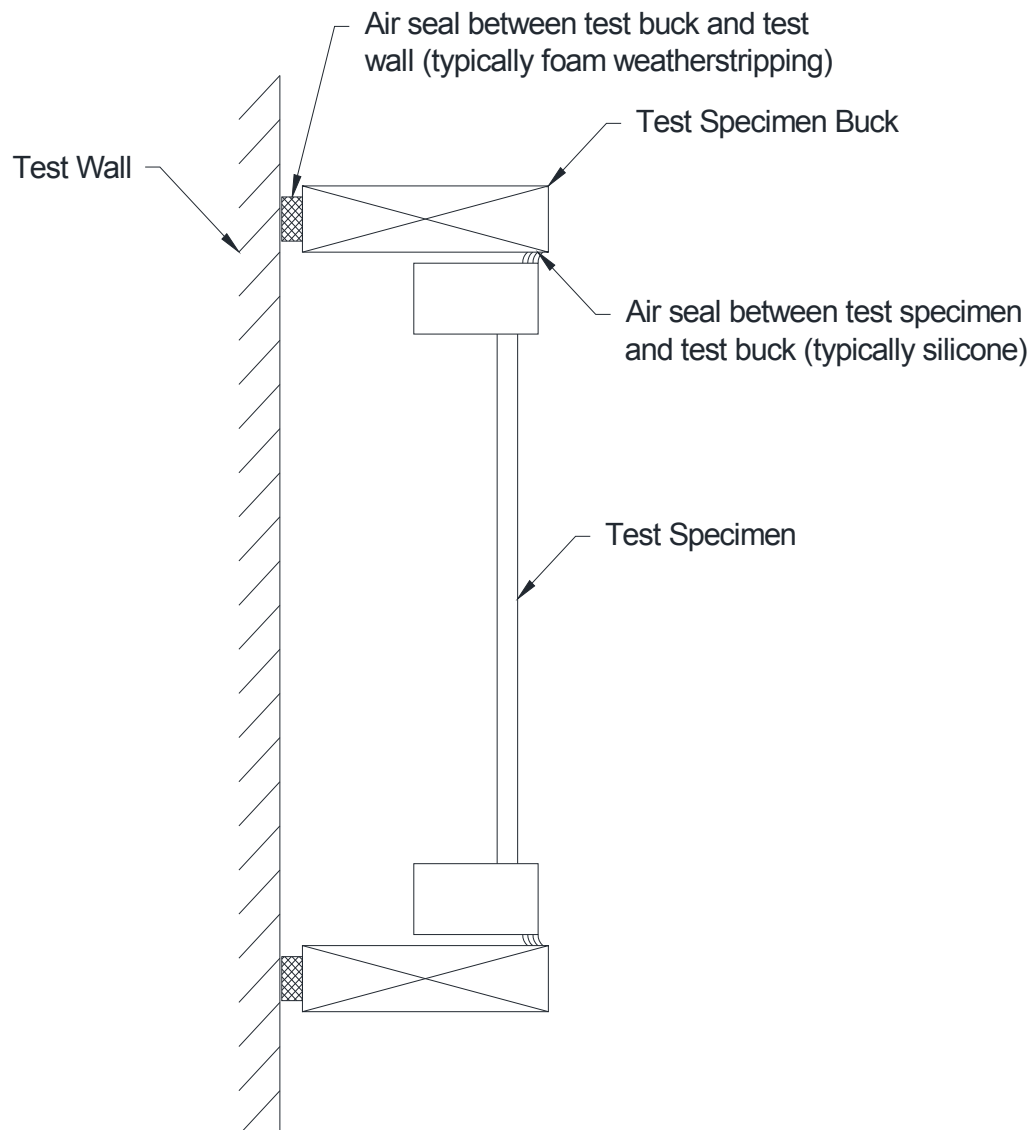
APPENDIX A

Alteration Addendum

- Alteration #1:** Date - 08/14/17
Cause for alteration – Water over sub sill.
Remedial action taken – Sealed bottom rail joint. Pass.
- Alteration #2:** Date - 08/14/17
Cause for alteration – Sill blew out negative load.
Remedial action taken – added fasteners mid span and 16" on center. Pass.

APPENDIX B

Location of Air Seal: The air seal between the test specimen and the test wall is detailed below. The seal is made of foam weatherstripping and is attached to the edge of the test specimen buck. The test specimen buck is placed against the test wall and clamped in place, compressing the weatherstripping and creating a seal.



APPENDIX C

Drawings



FULL SCALE



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# G-9674
Date 9/6/07 Tech TL

THIS PROFILE TO BE SILICONE COATED.

| | | | | | | |
|--------------------------------|--|--|---|----------|---------------------------------|---------------------------------|
| EXTRUSION CUT LENGTH TOLERANCE | | | 2 | 3-11-11 | ADDED CORD | DLS |
| 0 - 1.6" ±.060" | | | 1 | 12-20-07 | ADDED NOTE RE: SILICONE COATING | DLS |
| 1.6" - 2.5" ±.080" | | | No. | Date | Description | By |
| 2.5" - 4.0" ±.100" | | | TREMCO. 1451 Jacobson Ave Phone: 800-321-6357 SEALANT / WEATHERPROOFING DIVISION Ashland, Ohio 44805 U.S.A. Fax: 419-289-6645 | | | |
| 4.0" - 6.3" ±.130" | | | Customer: | | Customer Part No. | |
| 6.3" - 10.0" ±.160" | | | CMI | | 19-120 | |
| 10.0" - 16.0" ±.200" | | | Project: | | | |
| 16.0" - 25.0" ±.250" | | | Drawn by: E. TANGO | | Scale: 10X | Date: 6/13/2005 |
| 25.0" - 40.0" ±.400" | | | Compound: EPDM | | Designed F.C. *.188 | Drawing No. TR-13919E |
| 40.0" - 63.0" ±.500" | | | Durometer: 70 ±5 | | Area: | |
| 63.0" - 100.0" ±.630" | | | | | | |
| 100.0" - 160.0" ±.800" | | | | | | |
| +160.0" ±.500" | | | | | | |

The design of the gasket shown herein is the product of Tremco Incorporated. No reproduction or use of this design is authorized without the consent of Tremco Incorporated.

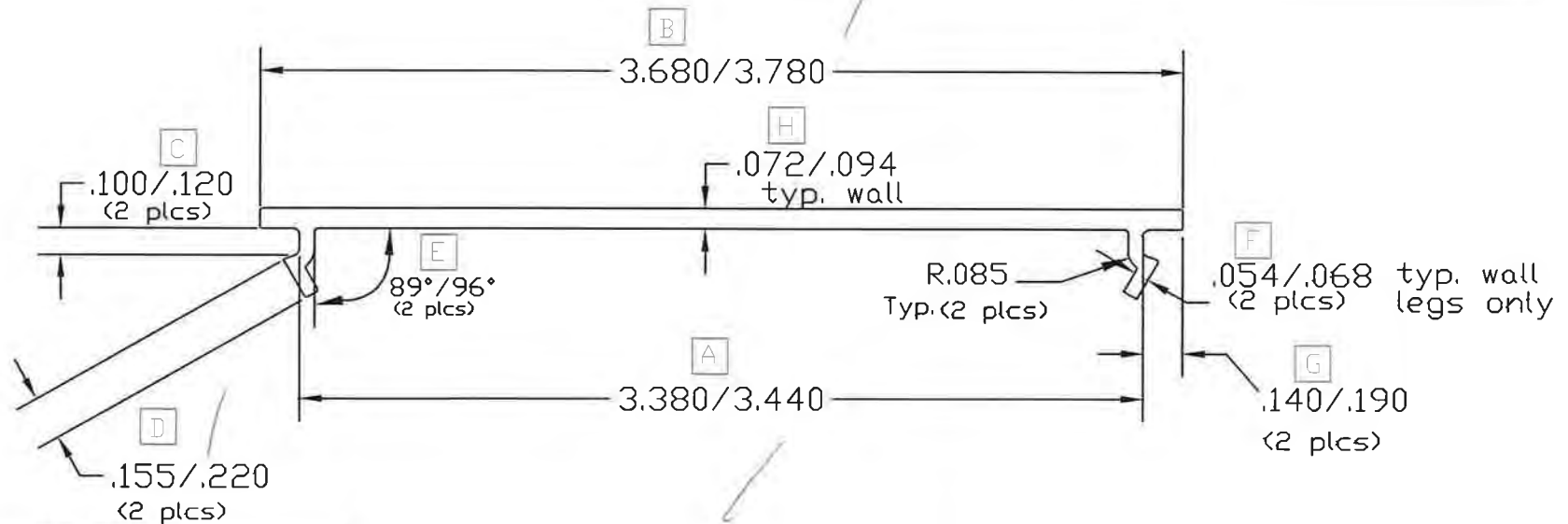
REGRIND DIE

Your signature on this print indicates your approval of design and dimensions as shown. Please sign and return as soon as possible. Die construction cannot proceed until approval is received.

Approved DECEMBER 20 09

Customer CMI

Per _____



REVISIONS

| NO. | DESCRIPTION | DATE | BY |
|-----|-----------------|----------|----|
| 1 | C WAS .100/.117 | 4/18/02 | JB |
| 1 | E WAS 88°/92° | 4/18/02 | JB |
| 1 | G WAS .150/.170 | 4/18/02 | JB |
| 1 | H WAS .075/.088 | 4/18/02 | JB |
| 2 | C WAS .100/.120 | 12/15/09 | JB |
| 2 | D WAS .160/.190 | 12/15/09 | JB |
| 2 | F WAS .055/.065 | 12/15/09 | JB |
| 2 | G WAS .150/.180 | 12/15/09 | JB |
| 2 | H WAS .075/.092 | 12/15/09 | JB |



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# G9674
Date 9/6/07 Tech TH

ASTRO PLASTICS
COVINGTON, GA ROSEMOUNT, MN

CMI
Open Back Filler

DATE 3/21/02

SCALE nts

DRAWN BY JB

DRAWING NO.

MATERIAL PVC Color: Black

APPRD. BY JB

AP 4588

CONFIDENTIAL THE DESIGN OF THE PARTS REPRESENTED BY THESE DRAWINGS IS PROPRIETARY TO ASTRO PLASTICS AND CANNOT BE REPRODUCED, COPIED, OR DISCLOSED WITHOUT THE EXPRESS WRITTEN CONSENT OF ASTRO PLASTICS. ASTRO PLASTICS WARRANTS THAT THE PARTS REPRESENTED HEREON WILL CONFORM TO THE SPECIFICATIONS INDICATED ON THESE DRAWINGS, BUT ASTRO PLASTICS MAKES NO WARRANTY, EXPRESSED OR IMPLIED, AND SPECIFICALLY DISCLAIMS INTENDED USE. COPYRIGHT © 2002 ASTRO PLASTICS



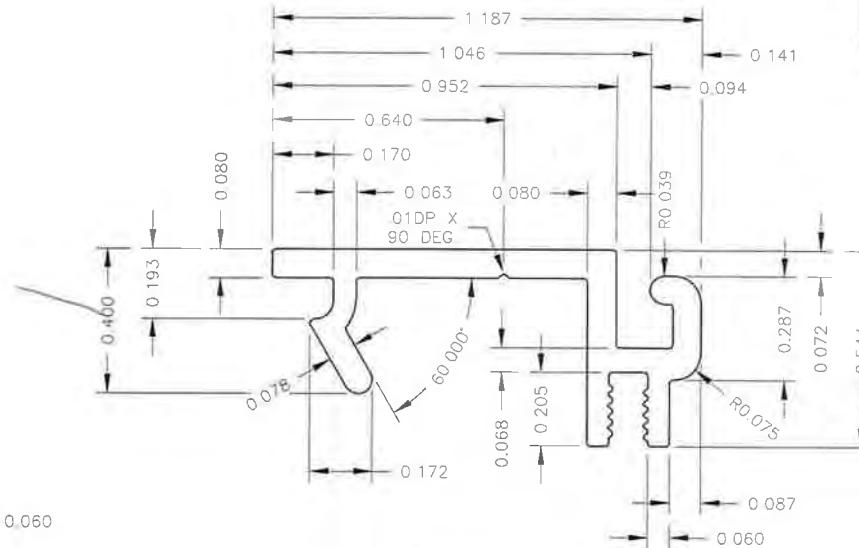
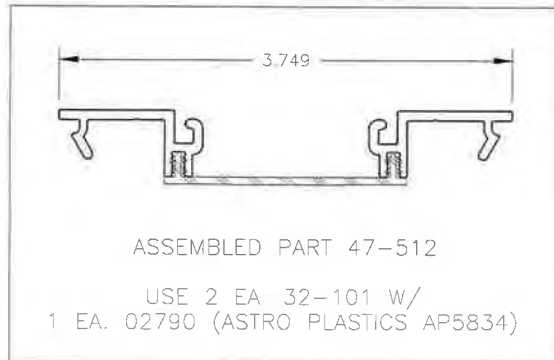
Architectural Testing

Test sample complies with these details.
Deviations are noted.

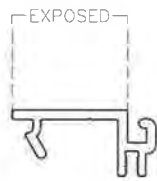
| PRINT REVISIONS | DATE |
|-----------------|------|
| | |
| | |
| | |
| | |

Report# 69674
Date 9/6/17 Tech JB

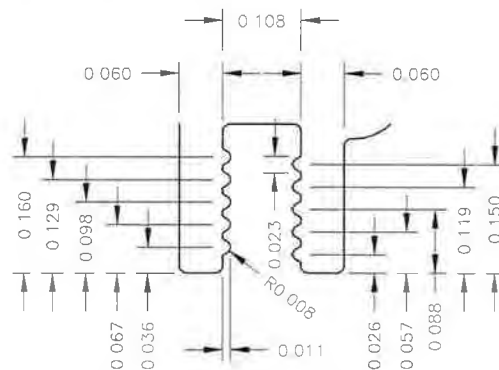
7839
Die Number
32-101
Customer Number



SCALE 3:1



ACTUAL SIZE



SCALE 6:1

STANDARD TOLERANCES APPLY UNLESS OTHERWISE NOTED

BREAK UNSPECIFIED CORNER 010 R TYPICAL WALL UNLESS OTHERWISE NOTED

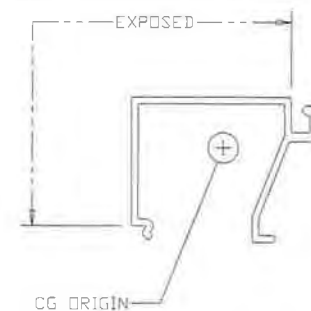
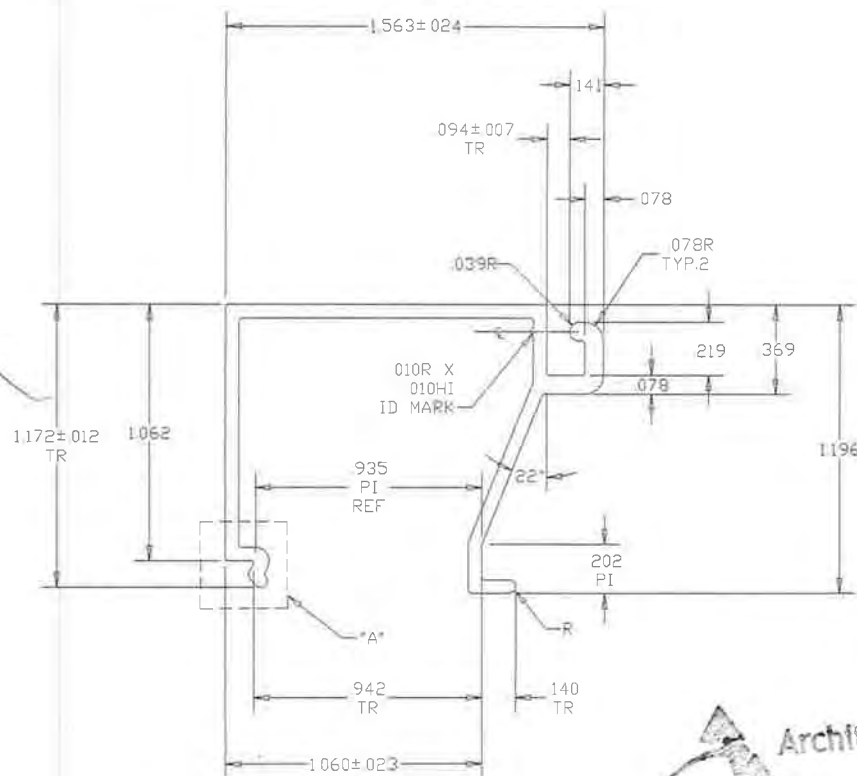
| ESTIMATED DIE DATA | | | |
|--------------------|---------|-------------|-------|
| ALLOY/TEMPER | 6063-T6 | WT/FT | 0.218 |
| AREA | 0.185 | CIRCLE SIZE | 5-6 |
| PERIMETER | 5.206 | FACTOR | |
| OUTSIDE PERIMETER | 5.206 | | |
| EXPOSED PERIMETER | 0.952 | SOLID | |

| LEGEND |
|------------|
| * = 0.31 R |
| Δ = 0.62 R |
| x = 1.25 R |
| ⊗ = 2.50 R |

| DIE REVISIONS | DATE |
|---------------|---------|
| NEW DIE | 3/13/17 |
| | |
| | |
| | |

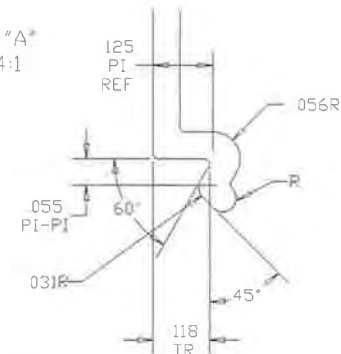
| | | |
|--|-----------------|----------------|
| Crown Extrusions, Inc. 122 Columbia Court N. Chaska, MN 55318 952-448-3533 Fax: 952-448-5328 | DIE # | 7839 |
| | SCALE | ACTUAL & NOTED |
| CUSTOMER CMI Architectural CMI Architectural Products, Inc. 20621 SD Highway 25 DeSmet, SD 57231-5827 605-854-3326 Fax: 605-854-3620 | DATE | 1-16-17 |
| | LAST REVISION | |
| PART NAME 450 DT VERTICAL FILLER | DRAWN | GLH |
| | CUSTOMER NUMBER | 32-101 |

| | | | | |
|--|---------------------------|---------------|------------------------|-----|
| Standard Aluminum Association tolerances apply unless otherwise noted. | | | DIE NUMBER | REV |
| CUST PART #: 46010-00 | TITLE BLOCK: REV A | | EUC | |
| CUST PART NAME: GLAZING STOP | CD4 AND TOL BLOCK REMOVED | | 103 | |
| PROPOSAL: | REL. DATE 10/13/04 MRW | ALLOY 6063-T6 | FINISH AE, PAINT, ANOD | |



ACTUAL SIZE

DETAIL "A"
SCALE 4:1



Test sample complies with these details.
Corrections are noted.

Drawn by 69674
Date 9/6/17 Tech 16

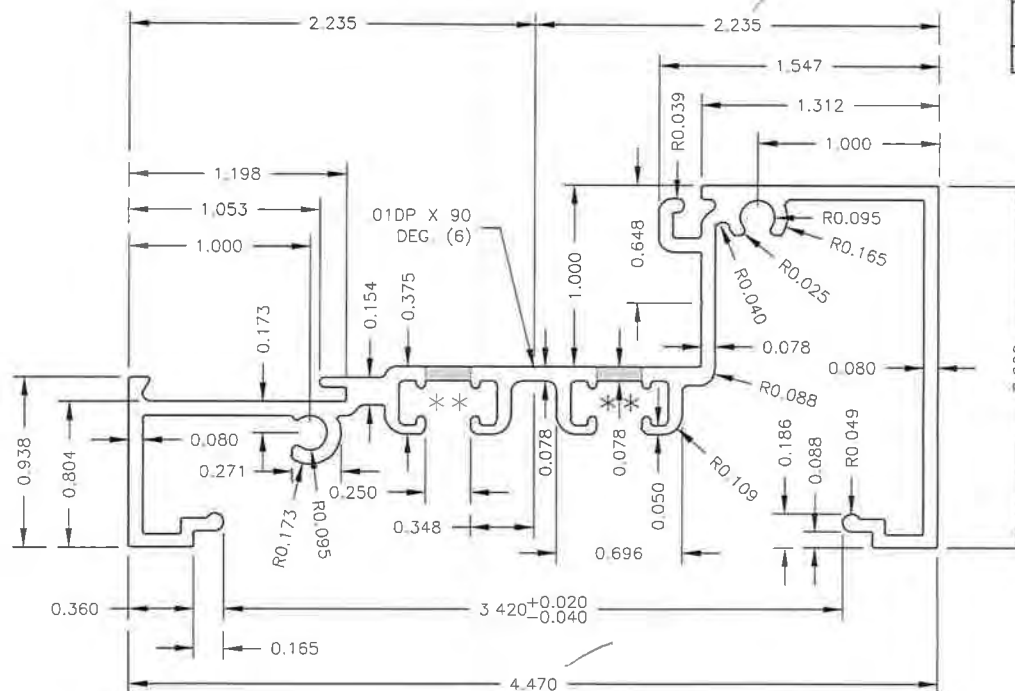
| Structural values estimated for reference only. | | | | | |
|---|---|----------------------|------|---|----------------------|
| Ix: | .0162 x 10 ⁶ mm ⁴ | .039 in ⁴ | Iy: | .0333 x 10 ⁶ mm ⁴ | .080 in ⁴ |
| Sx: | .825 x 10 ³ mm ³ | .050 in ³ | Sy: | 1.637 x 10 ³ mm ³ | .100 in ³ |
| CGx: | 19.69 mm | .775 in | CGy: | 20.35 mm | .801 in |

CRO-115

12343 CMI ARCHITECTURAL PRODS, INC.
608 4th STREET S.E.
P.O. BOX T
DE SMET SD 57231
THE WILLIAM L BONNELL CO
CAPITOL PRODUCTS CORPORATION
BON+L+CAMPO, LP BON+L+CANADA, INC
SUBSIDIARIES OF TREDEGAR INDUSTRIES, INC

| | | | | |
|--------------------|----------|-------------|-----------------|-----------------|
| UNSPECIFIED WALLS: | 1.42 mm | MASS: | .457 kg/m | .307 lb/ft |
| UNSPECIFIED RADII: | .056 in | EST PER: | 222.50 mm | 8.760 in |
| | .25R mm | OUT PER: | mm | in |
| | .010R in | EXP PER: | mm | in |
| DATE: | 10/7/4 | BUFF PER: | mm | in |
| DRAWN: | MRW | BUFF TURNS: | CLASS: | Solid |
| SCALE: | 2:1 | FACTOR: | 487 metric | 29 Imperial |
| THM BAR: | NO | C.C.D.: | 49.99 mm | 1.968 in |
| P&D CODE: | NO | P&D AREA: | mm ² | in ² |

| |
|-----------------|
| 7835 |
| Die Number |
| 47-501 |
| Customer Number |



| | |
|-----------------|---------------|
| DIE # | 7835 |
| SCALE | ACTUAL & NOTE |
| DATE | 1-16-17 |
| LAST REVISION | |
| DRAWN | GLH |
| CUSTOMER NUMBER | 47-501 |

| PRESS SIZE | |
|---------------|-------|
| LEGEND | |
| • | 031 R |
| ◊ | 062 R |
| ✱ | 125 R |
| ⊗ | 250 R |
| ✱ | |

| DE REVISIONS | | DATE |
|--------------|--|------|
| | | |
| | | |
| | | |
| | | |

| QTY | PART NAME | UNIT | PRICE | TOTAL |
|-----|-----------|-------|-------|-------|
| 1 | 1000 | 1000 | 1000 | 1000 |
| 2 | 2000 | 2000 | 2000 | 2000 |
| 3 | 3000 | 3000 | 3000 | 3000 |
| 4 | 4000 | 4000 | 4000 | 4000 |
| 5 | 5000 | 5000 | 5000 | 5000 |
| 6 | 6000 | 6000 | 6000 | 6000 |
| 7 | 7000 | 7000 | 7000 | 7000 |
| 8 | 8000 | 8000 | 8000 | 8000 |
| 9 | 9000 | 9000 | 9000 | 9000 |
| 10 | 10000 | 10000 | 10000 | 10000 |

450 DT SILL



Test sample complies with these details.
Deviation not noted.

Date 9/6/17 Tech TC

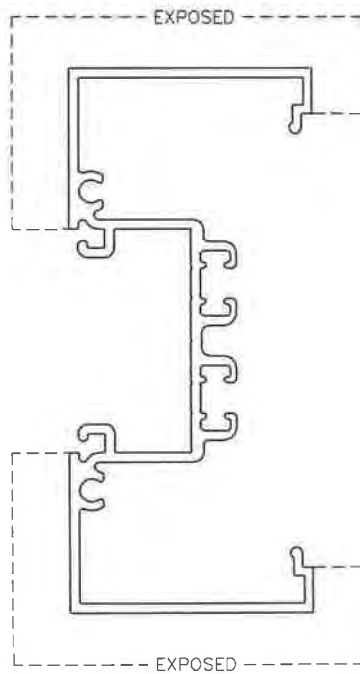
Tech 76

7836

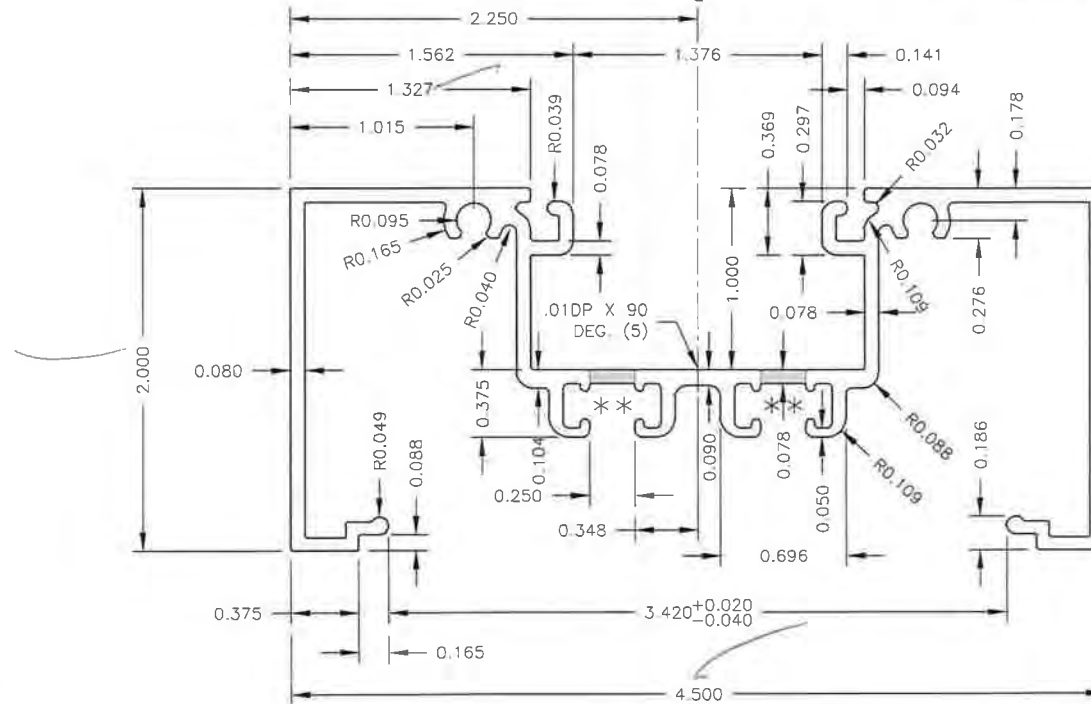
Die Number

47-502

Customer Number



ACTUAL SIZE



SCALE 1.5:1



= DE-BRIDGE FOR THERMAL BARRIER

BREAK UNSPECIFIED CORNER: .010 R.

TYPICAL WALL UNLESS OTHERWISE NOTED

| PRESS SIZE | |
|------------|-------|
| LEGEND | |
| • | 031 R |
| o | 062 R |
| x | 125 R |
| ⊗ | 250 R |

** POCKETS TO BE AZO-BRADED PRIOR TO FILLING WITH POLYURETHANE POLYMER THERMAL BARRIER.

STANDARD TOLERANCES APPLY UNLESS OTHERWISE NOTED



Crown Extrusions, Inc.
122 Columbia Court N.
Chaska, MN 55318
 952-448-3533 Fax: 952-448-5328

CUSTOMER

CH2M Architectural

CMI Architectural Products, Inc.
20621 SD Highway 25
DeSmet, SD 57231-5827
605-854-3326 Fax: 605-854-3620

| PART NAME |
|-----------|
|-----------|

450 DT HEAD / JAMB

| | |
|-------|------|
| DIE # | 7836 |
|-------|------|

SCALE
ACTUAL & NOTED

DATE 1-16-17

LAST REVISION

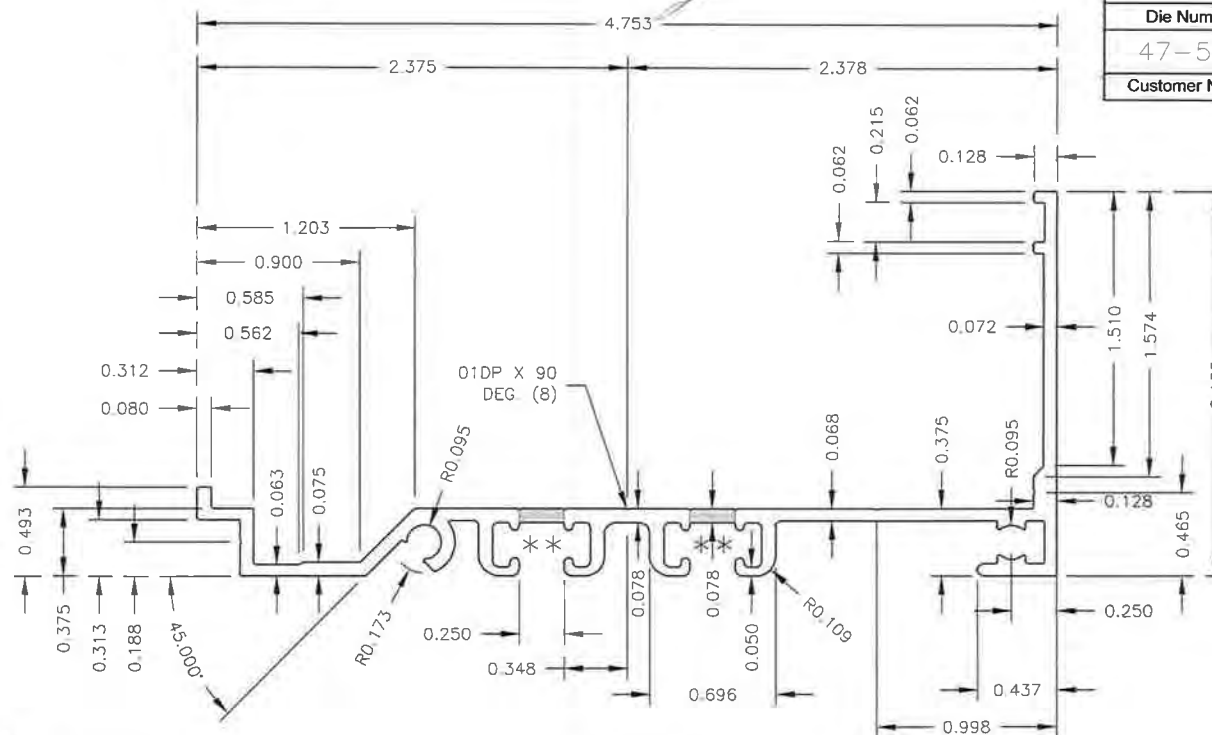
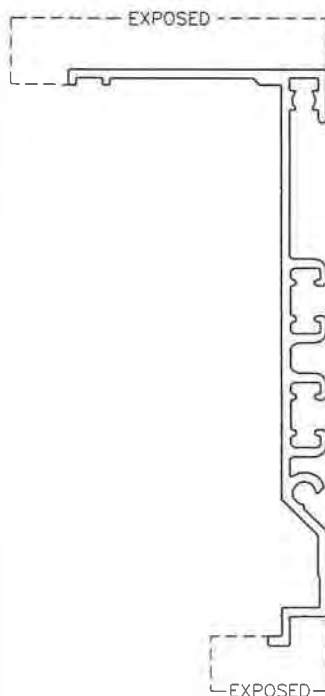
| | |
|-------|-----|
| DRAWN | GLH |
|-------|-----|

CUSTOMER NUMBER

47-502

| PRINT REVISIONS | DATE |
|-----------------|------|
| | |
| | |
| | |
| | |

| |
|-----------------|
| 7838 |
| Die Number |
| 47-535 |
| Customer Number |



Architectural Testing
 Test sample complies with these details.
 Deviations are noted.

SCALE 1.5:1

= DE-BRIDGE FOR THERMAL BARRIER

ACTUAL SIZE

Report# 69674
 Date 9/6/17 Tech RL

** POCKETS TO BE AZO-BRADED PRIOR TO FILLING WITH POLYURETHANE POLYMER THERMAL BARRIER.

STANDARD TOLERANCES APPLY UNLESS OTHERWISE NOTED

BREAK UNSPECIFIED CORNER: .010 R. TYPICAL WALL UNLESS OTHERWISE NOTED

| ESTIMATED DIE DATA | | | |
|--------------------|---------|-------------|-------|
| ALLOY/TEMPER | 6063-T6 | WT/FT | 0.873 |
| AREA | 0.742 | CIRCLE SIZE | 5-6 |
| PERIMETER | 20.116 | FACTOR | |
| OUTSIDE PERIMETER | 20.116 | | |
| EXPOSED PERIMETER | 3.063 | SOLID | |

Crown Extrusions, Inc.
 122 Columbia Court N.
 Chaska, MN 55318
 952-448-3533 Fax: 952-448-5328

CMI Architectural Products, Inc.
 20621 SD Highway 25
 DeSmet, SD 57231-5827
 605-854-3326 Fax: 605-854-3620

| | |
|-----------------|----------------|
| DIE # | 7838 |
| SCALE | ACTUAL & NOTED |
| DATE | 1-16-17 |
| LAST REVISION | |
| DRAWN | GLH |
| CUSTOMER NUMBER | 47-535 |

PART NAME 450 DT SUB-SILL

| PRESS SIZE | LEGEND | DIE REVISIONS | DATE |
|------------|--------|---------------|------|
| 0.31 R | | | |
| 0.62 R | | | |
| 1.25 R | | | |
| 2.50 R | | | |