

**ASTM F1642-04 / GSA TS01 TEST REPORT**

**Rendered to:**

3M Company - St. Paul, Minnesota

**PRODUCT TYPE:**

Fragment Retention Film on 1/4" Single Pane Glass

**SERIES/MODEL:**

3M™ Scotchshield™ Ultra S600 Safety and Security Window Film with  
3M™ Impact Protection Adhesive Film Attachment System

**This report contains in its entirety:**

**Cover Page:** 1 page  
**Summary of Results:** 1 page  
**Report Body:** 13 pages  
**Test Facility:** 1 page  
**Pressure-Time Plots:** 14 pages  
**Photographs:** 12 pages  
**Drawings:** 6 pages

**Report No.:** D8962.02-119-12  
**Test Completion Date:** 09/10/14  
**Report Date:** 10/30/14  
**Test Record Retention Date:** 09/10/18

### Summary of Results

Specimen No.	Glass Type	Film Attachment Type	Average Peak Reflected Pressure	Average Positive Phase Impulse	Average Positive Phase Duration	GSA Performance Condition	ASTM F1642 Hazard Rating	ASTM F2912-11 System Rating
1	1/4" Tempered	IPA <sup>1</sup>	6.62 psi	42 psi-msec	12.59 msec	2	No Hazard	No Hazard (H1)
2		IPA <sup>1</sup>	6.98 psi	42 psi-msec	12.70 msec	2	No Hazard	
3		IPA <sup>1</sup>	6.50 psi	43 psi-msec	13.44 msec	2	No Hazard	
4		IPA <sup>1</sup>	9.47 psi	62 psi-msec	15.31 msec	5	High Hazard	N/A
5	1/4" Annealed	IPA <sup>1</sup>	7.07 psi	42 psi-msec	12.89 msec	2	Minimal Hazard	Minimal Hazard (H2)
6		IPA <sup>1</sup>	7.04 psi	45 psi-msec	13.54 msec	2	Minimal Hazard	
7		IPA <sup>1</sup>	6.72 psi	44 psi-msec	12.39 msec	2	Minimal Hazard	

<sup>1</sup> IPA = 3M™ Impact Protection Adhesive, 1/2" overlap on film and frame

Reference must be made to Report No. D8962.02-119-12, dated 10/30/14 for complete test specimen description and detailed test results.

**1.0 Report Issued To:** 3M Renewable Energy Division  
3M Center, Building 235, E-330-3D-02  
St. Paul, Minnesota 55144

**2.0 Test Laboratory:** Architectural Testing, Inc.  
130 Derry Court  
York, Pennsylvania 17406  
717-764-7700

### **3.0 Project Summary:**

**3.1 Product Type:** Fragment Retention Film on 1/4" Single Pane Glass

**3.2 Series/Model:** 3M™ Scotchshield™ Ultra S600 Safety and Security Window Film with 3M™ Impact Protection Adhesive

**3.3 Compliance Statement:** Results obtained are tested values and were secured by using the designated test methods. 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 specimens tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

**3.4 Test Dates:** 07/14/2014 - 09/10/2014

**3.5 Test Facility:** Architectural Testing, Inc.'s shock tube is housed in a 10,000 square foot state-of-the-art test facility located in York, Pennsylvania. Blast loadings are produced on the specimen to simulate the effects of a high explosive charge at a specified standoff distance. Shock waves are generated by the sudden rupturing of a thin aluminum membrane. The shock wave expands as it travels down the tube, and impacts the target with a specific positive pressure and impulse. A photograph of the shock tube is provided in Figure #1 of Appendix A.

**3.6 Test Sample Source:** The test specimens were provided by the client. Representative samples of the test specimens 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 specimens reported herein. Test specimen construction was verified by Architectural Testing per the drawings located in Appendix D. Any deviations are documented herein or on the drawings.

**3.8 Data Acquisition:** In accordance with ASTM F1642-04 and GSA TS01, four reflective pressure transducers are utilized to record data at a 1MHz sample rate. Two reflective pressure transducers are located on the specimen holder at the top and right side (when viewed from the interior). A third pressure transducer is located on the shell to the exterior of the specimen, and a fourth is located in the witness chamber, directly to the interior of the specimen holder. A sketch of the specimen holder and corresponding reflective pressure sensor locations are provided in Figure #2 of Appendix A.

**3.9 List of Official Observers:**

<u>Name</u>	<u>Company</u>
Isaiah W. Gebhart	Architectural Testing, Inc.
Steven A. Neff	Architectural Testing, Inc.
Travis A. Hoover	Architectural Testing, Inc.
Joseph A. Reed, P.E.	Architectural Testing, Inc.
Emily C. Riley	Architectural Testing, Inc.

**4.0 Test Specifications:**

ASTM F1642-04, *Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loading*

ASTM F2912-11, *Standard Specification for Glazing and Glazing Systems Subject to Airblast Loadings*

GSA-TS01-2003, *US General Services Administration Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings*

**5.0 Test Specimen Description:** The following descriptions apply to all specimens.

**5.1 Product Sizes:** same as .01 except:

Measured Dimensions	Width (inches)	Height (inches)
Overall size	39-1/2	51-1/2
Fixed Day Lite Opening	36	48

**5.2 Frame Construction:**

Frame Member	Material	Description
Head, sill and jambs	Aluminum	Extruded
Glass Stop	Aluminum	Extruded, snaps into place on sill frame member to secure the glazing

	Joinery Type	Detail
All corners	Square Cut	Butted and secured using extruded aluminum shear blocks (Reference Drawing 3M window test fixture with IPA drawing detail D, P/N 45-101)
Jambs	N/A	The jambs were secured to each shear block at the sill end using four #10 x 2" long Phillips self-tapping pan head screws and were secured to each shear block at the head end using one #10 x 5/8" long Phillips flat head screw
Head	N/A	The head was secured to the shear blocks at each end using four #10 x 2" long Phillips self-tapping pan head screws
Sill	N/A	The sill was secured to the shear blocks at each end using one #10 x 5/8" Phillips flat head screws

## 5.0 Test Specimen Description: (Continued)

**5.3 Glazing:** All specimens utilized 1/4" thick clear glass with a 6 mil micro-layered safety and security film adhered to the interior surface of the glass. The glass was channel glazed and secured at the exterior sill using extruded aluminum glazing stops. The glass was set against a kerf-mounted rubber gasket with a 1/2" glazing bite. The filmed glass was anchored to the interior side of the frame using a continuous bead of 3M™ Impact Protection Adhesive (IPA), a structural sealant wet glaze style film attachment (Reference Drawing Assy\_Window\_C).

**Test Specimens #1 - #4:** Tempered Glass

**Test Specimens #5 - #7:** Annealed Glass

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

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

**6.0 Installation:** The specimens were placed directly into the shock tube test frame.

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

**Test Specimen #1:**

<b>Description</b>	<b>Results</b>
Ambient Temperature	82°F
Glazing Temperature	83°F
<b>ASTM Hazard Rating</b>	<b>No Hazard</b>
<b>GSA Performance Condition</b>	<b>2</b>

<b>Peak Positive Pressure</b>	
Top Pressure	6.78 psi
Right Pressure	6.94 psi
Shell Pressure	6.14 psi
<b>Average Pressure</b>	6.62 psi
Witness Chamber Pressure	0.25 psi

<b>Peak Positive Phase Duration</b>	
Top Duration	13.69 msec
Right Duration	14.01 msec
Shell Duration	10.06 msec
<b>Average Duration</b>	12.59 msec

<b>Peak Positive Phase Impulse</b>	
Top Impulse	43 psi*msec
Right Impulse	42 psi*msec
Shell Impulse	42 psi*msec
<b>Average Impulse</b>	42 psi*msec

<b>Glazing Response</b>	
Lite	Fractured
Glazing Pullout Length and Location	None
Glazing Tearing	None

<b>Witness Chamber Results</b>
No debris was observed.

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

**7.0 Test Results:** (Continued)

**Test Specimen #2:**

<b>Description</b>	<b>Results</b>
Ambient Temperature	82°F
Glazing Temperature	83°F
<b>ASTM Hazard Rating</b>	<b>No Hazard</b>
<b>GSA Performance Condition</b>	<b>2</b>

<b>Peak Positive Pressure</b>	
Top Pressure	6.98 psi
Right Pressure	6.92 psi
Shell Pressure	6.41 psi
<b>Average Pressure</b>	<b>6.77 psi</b>
Witness Chamber Pressure	0.65 psi

<b>Peak Positive Phase Duration</b>	
Top Duration	12.29 msec
Right Duration	12.80 msec
Shell Duration	12.99 msec
<b>Average Duration</b>	<b>12.70 msec</b>

<b>Peak Positive Phase Impulse</b>	
Top Impulse	43 psi*msec
Right Impulse	42 psi*msec
Shell Impulse	42 psi*msec
<b>Average Impulse</b>	<b>42 psi*msec</b>

<b>Glazing Response</b>	
Exterior Lite	Fractured
Glazing Pullout Length and Location	None
Glazing Tearing	None

<b>Witness Chamber Results</b>
No debris was observed.

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.



**7.0 Test Results:** (Continued)

**Test Specimen #3:**

<b>Description</b>	<b>Results</b>
Ambient Temperature	78°F
Glazing Temperature	76°F
<b>ASTM Hazard Rating</b>	<b>No Hazard</b>
<b>GSA Performance Condition</b>	<b>2</b>

<b>Peak Positive Pressure</b>	
Top Pressure	6.46 psi
Right Pressure	6.68 psi
Shell Pressure	6.35 psi
<b>Average Pressure</b>	<b>6.50 psi</b>
Witness Chamber Pressure	0.28 psi

<b>Peak Positive Phase Duration</b>	
Top Duration	12.87 msec
Right Duration	13.78 msec
Shell Duration	13.66 msec
<b>Average Duration</b>	<b>13.44 msec</b>

<b>Peak Positive Phase Impulse</b>	
Top Impulse	43 psi*msec
Right Impulse	43 psi*msec
Shell Impulse	43 psi*msec
<b>Average Impulse</b>	<b>43 psi*msec</b>

<b>Glazing Response</b>	
Exterior Lite	Fractured
Glazing Pullout Length and Location	None
Glazing Tearing	None

<b>Witness Chamber Results</b>	
No debris was observed.	

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

## 7.0 Test Results: (Continued)

### Test Specimen #4:

Description	Results
Ambient Temperature	80°F
Glazing Temperature	78°F
<b>ASTM Hazard Rating</b>	<b>High Hazard</b>
<b>GSA Performance Condition</b>	<b>5</b>

Peak Positive Pressure	
Top Pressure	10.04 psi
Right Pressure	9.69 psi
Shell Pressure	8.68 psi
<b>Average Pressure</b>	<b>9.47 psi</b>
Witness Chamber Pressure	0.53 psi

Peak Positive Phase Duration	
Top Duration	14.64 msec
Right Duration	15.53 msec
Shell Duration	15.59 msec
<b>Average Duration</b>	<b>15.31 msec</b>

Peak Positive Phase Impulse	
Top Impulse	62 psi*msec
Right Impulse	62 psi*msec
Shell Impulse	62 psi*msec
<b>Average Impulse</b>	<b>62 psi*msec</b>

Glazing Response	
Exterior Lite	Fractured
Glazing Pullout Length and Location	None
Glazing Tearing	None

Witness Chamber Results
A large quantity of fragments was found on the witness chamber floor past the 1M mark. Several fragment indents were found on the witness panel with 1 perforation at 38" from the floor

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

**7.0 Test Results:** (Continued)

**Test Specimen #5:**

<b>Description</b>	<b>Results</b>
Ambient Temperature	88°F
Glazing Temperature	89°F
<b>ASTM Hazard Rating</b>	<b>Minimal Hazard</b>
<b>GSA Performance Condition</b>	<b>2</b>

<b>Peak Positive Pressure</b>	
Top Pressure	7.21 psi
Right Pressure	7.44 psi
Shell Pressure	6.55 psi
<b>Average Pressure</b>	<b>7.07 psi</b>
Witness Chamber Pressure	0.91 psi

<b>Peak Positive Phase Duration</b>	
Top Duration	12.94 msec
Right Duration	12.91 msec
Shell Duration	12.80 msec
<b>Average Duration</b>	<b>12.89 msec</b>

<b>Peak Positive Phase Impulse</b>	
Top Impulse	42 psi*msec
Right Impulse	42 psi*msec
Shell Impulse	41 psi*msec
<b>Average Impulse</b>	<b>42 psi*msec</b>

<b>Glazing Response</b>	
Exterior Lite	Fractured
Glazing Pullout Length and Location	None
Glazing Tearing	1/2" at sill corner

<b>Witness Chamber Results</b>
A dusting of glass was deposited on the witness chamber floor back to the 1M mark

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

**7.0 Test Results:** (Continued)

**Test Specimen #6:**

<b>Description</b>	<b>Results</b>
Ambient Temperature	78°F
Glazing Temperature	78°F
<b>ASTM Hazard Rating</b>	<b>Minimal Hazard</b>
<b>GSA Performance Condition</b>	<b>2</b>

<b>Peak Positive Pressure</b>	
Top Pressure	7.19 psi
Right Pressure	7.48 psi
Shell Pressure	6.45 psi
<b>Average Pressure</b>	<b>7.04 psi</b>
Witness Chamber Pressure	0.37 psi

<b>Peak Positive Phase Duration</b>	
Top Duration	13.30 msec
Right Duration	14.14 msec
Shell Duration	13.18 msec
<b>Average Duration</b>	<b>13.54 msec</b>

<b>Peak Positive Phase Impulse</b>	
Top Impulse	45 psi*msec
Right Impulse	45 psi*msec
Shell Impulse	45 psi*msec
<b>Average Impulse</b>	<b>45 psi*msec</b>

<b>Glazing Response</b>	
Lite	Fractured
Glazing Pullout Length and Location	None
Glazing Tearing	1" at upper right corner and 3/4" at center

<b>Witness Chamber Results</b>
A dusting of glass was deposited on the witness chamber floor back to the 1M mark

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

**7.0 Test Results:** (Continued)

**Test Specimen #7:**

<b>Description</b>	<b>Results</b>
Ambient Temperature	77°F
Glazing Temperature	75°F
<b>ASTM Hazard Rating</b>	<b>Minimal Hazard</b>
<b>GSA Performance Condition</b>	<b>2</b>

<b>Peak Positive Pressure</b>	
Top Pressure	7.02 psi
Right Pressure	6.93 psi
Shell Pressure	6.21 psi
<b>Average Pressure</b>	<b>6.72 psi</b>
Witness Chamber Pressure	0.42 psi

<b>Peak Positive Phase Duration</b>	
Top Duration	13.86 msec
Right Duration	14.65 msec
Shell Duration	8.65 msec
<b>Average Duration</b>	<b>12.38 msec</b>

<b>Peak Positive Phase Impulse</b>	
Top Impulse	44 psi*msec
Right Impulse	44 psi*msec
Shell Impulse	44 psi*msec
<b>Average Impulse</b>	<b>44 psi*msec</b>

<b>Glazing Response</b>	
Exterior Lite	Fractured
Glazing Pullout Length and Location	None
Glazing Tearing	3/4" at the lower left corner, 1-1/4" at the upper left corner

<b>Witness Chamber Results</b>
No debris was observed.

Pressure time plots are presented in Appendix B. Pre-test and post-test photographs are provided in Appendix C.

Architectural Testing 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 Architectural Testing, Inc. for the entire test record retention period.

Results obtained are tested values and were secured using the designated test methods. 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 specimens tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.:

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Emily C. Riley - Project Manager  
Structural Systems Testing

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Joseph A. Reed, P.E. - Director  
Engineering

ECR:jar/jas

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

- Appendix A: Test Facility (1)
- Appendix B: Pressure Time Plots (14)
- Appendix C: Photographs (12)
- Appendix D: Drawings (6)

### Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	10/30/14	N/A	Original report issue

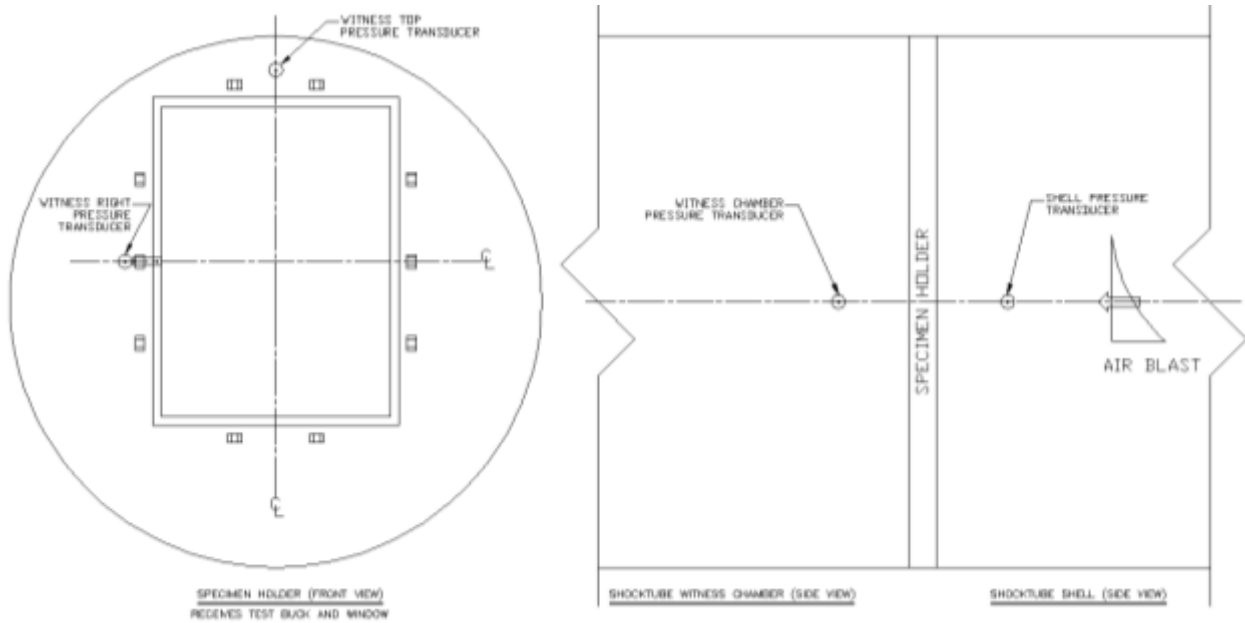
## **APPENDIX A**

### **Test Facility**





**Figure #1**  
**Shock Tube and Test Facility**



**Figure #2**  
**Pressure Sensor Locations**

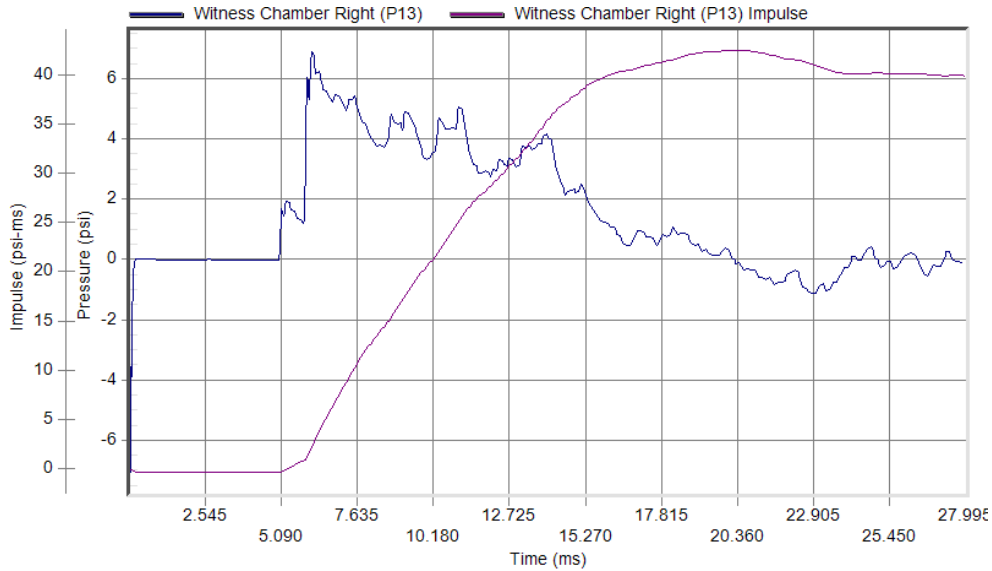


Report No.: D8962.01-119-12  
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Test Record Retention Date: 09/10/18

## **APPENDIX B**

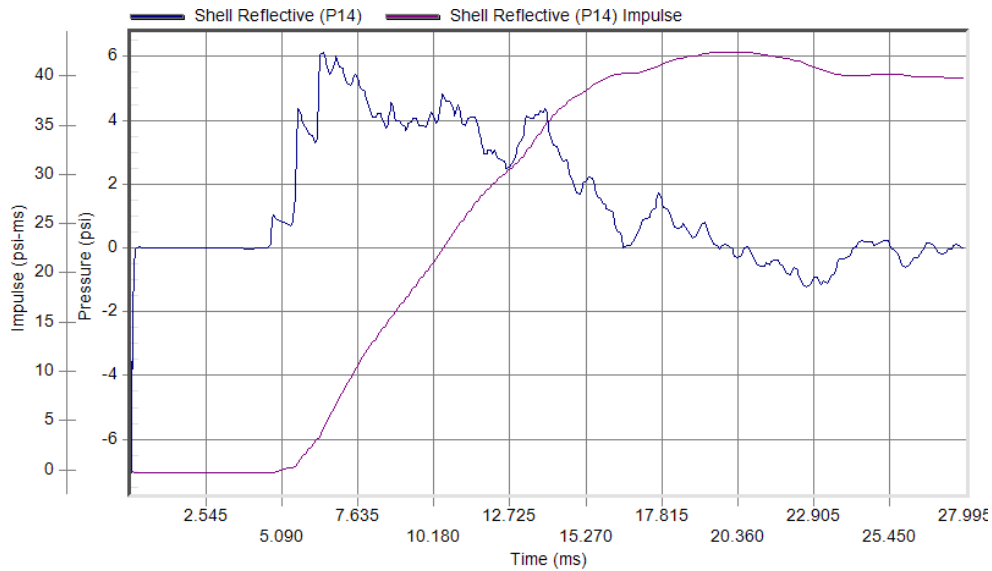
### **Pressure Time Plots**

### Specimen #1



Peak Pressure: 6.94 psi at 6.16 ms  
Duration: 14.01 ms

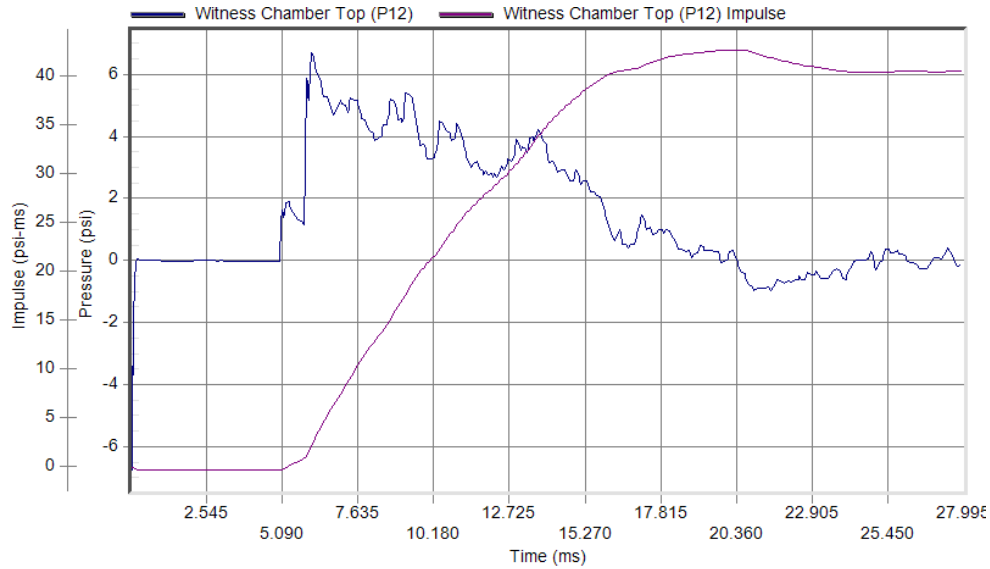
Test Date: 7/15/2014  
Test Time: 9:32 am



Peak Pressure: 6.14 psi at 6.46 ms  
Duration: 10.06 ms

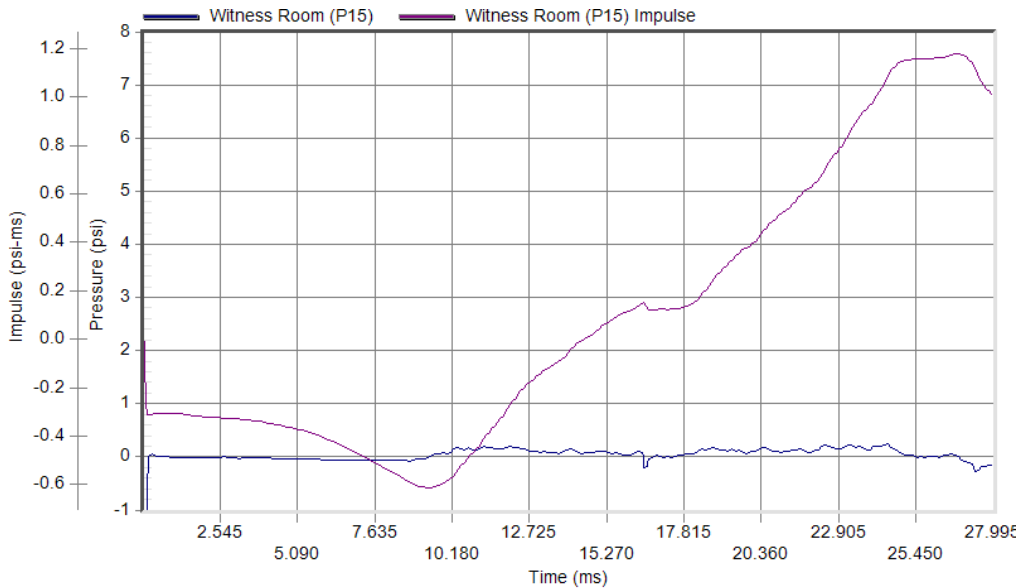
Test Date: 7/15/2014  
Test Time: 9:32 am

### Specimen #1: (Continued)



Peak Pressure: 6.78 psi at 6.12 ms  
Duration: 13.69 ms

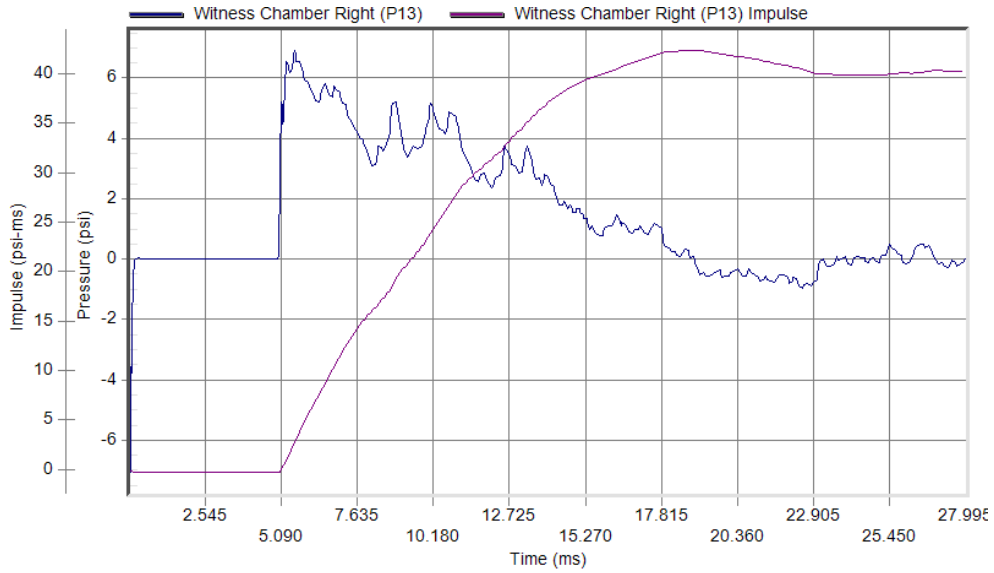
Test Date: 7/15/2014  
Test Time: 9:32 am



Peak Pressure: 0.25 psi at 24.46 ms  
Duration: 0.97 ms

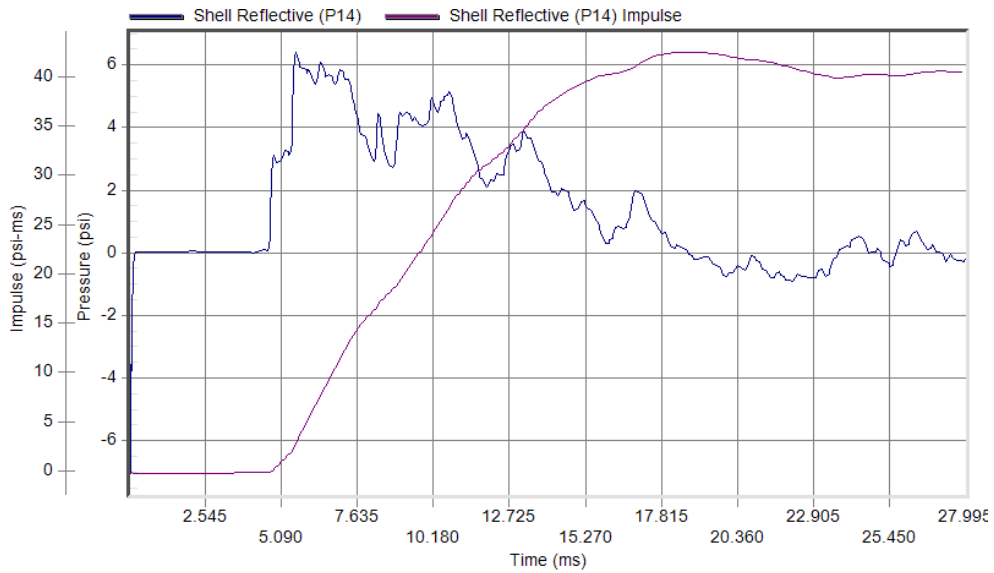
Test Date: 7/15/2014  
Test Time: 9:32 am

### Specimen #2



Peak Pressure: 6.92 psi at 5.56 ms  
Duration: 12.80 ms

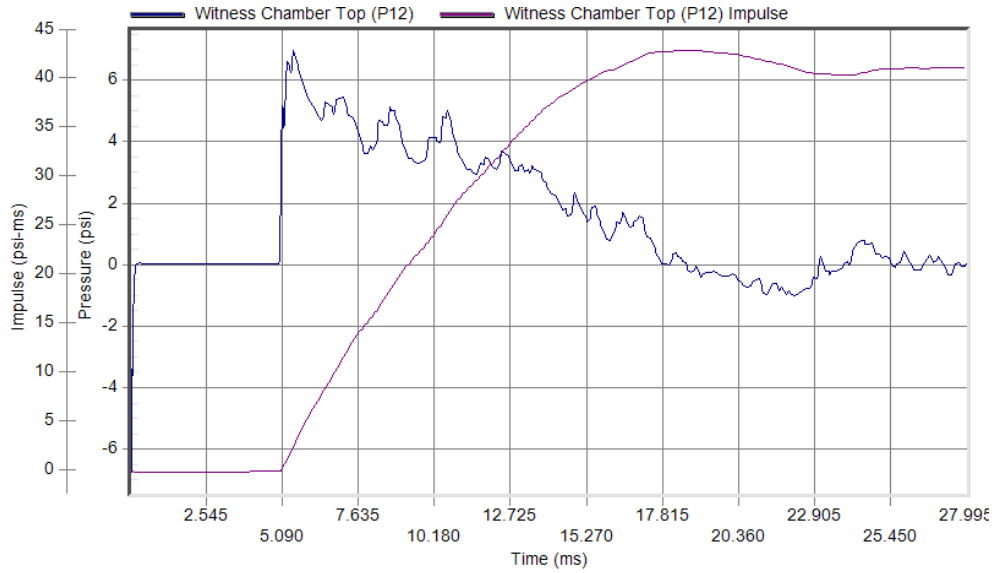
Test Date: 7/16/2014  
Test Time: 2:40 pm



Peak Pressure: 6.41 psi at 5.61 ms  
Duration: 12.99 ms

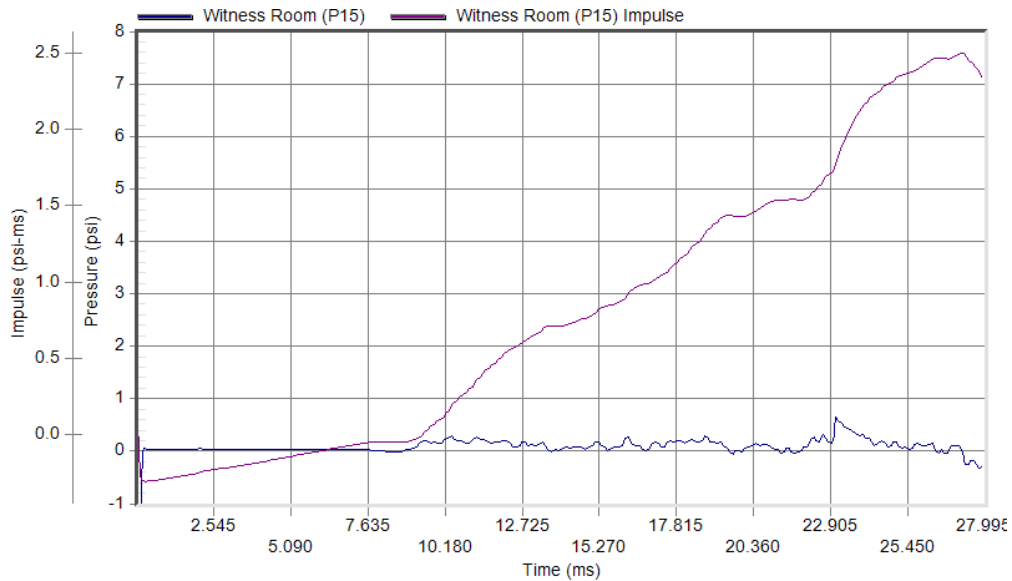
Test Date: 7/16/2014  
Test Time: 2:40 pm

### Specimen #2: (Continued)



Peak Pressure: 6.98 psi at 5.48 ms  
Duration: 12.29 ms

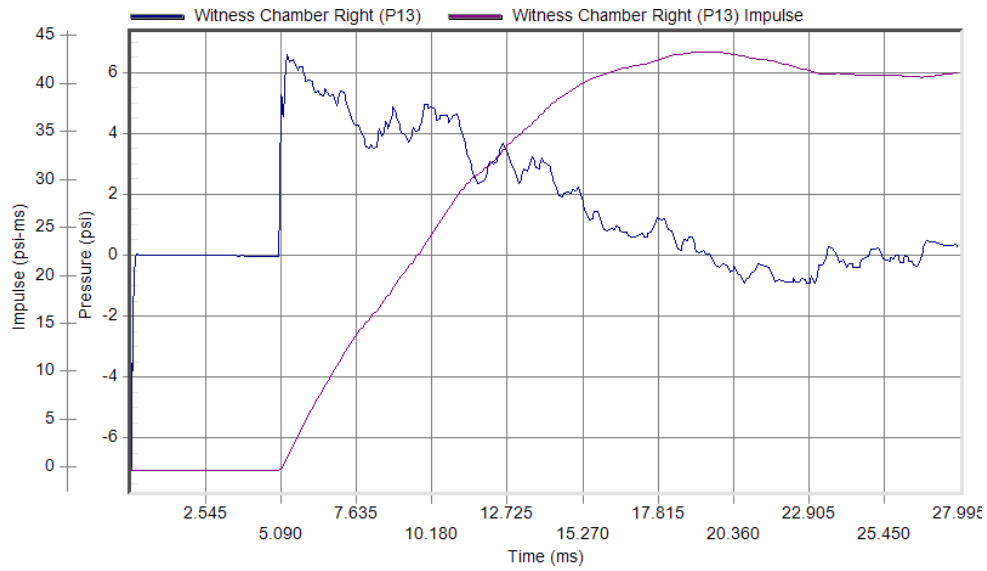
Test Date: 7/16/2014  
Test Time: 2:40 pm



Peak Pressure: 0.65 psi at 23.11 ms  
Duration: 3.28 ms

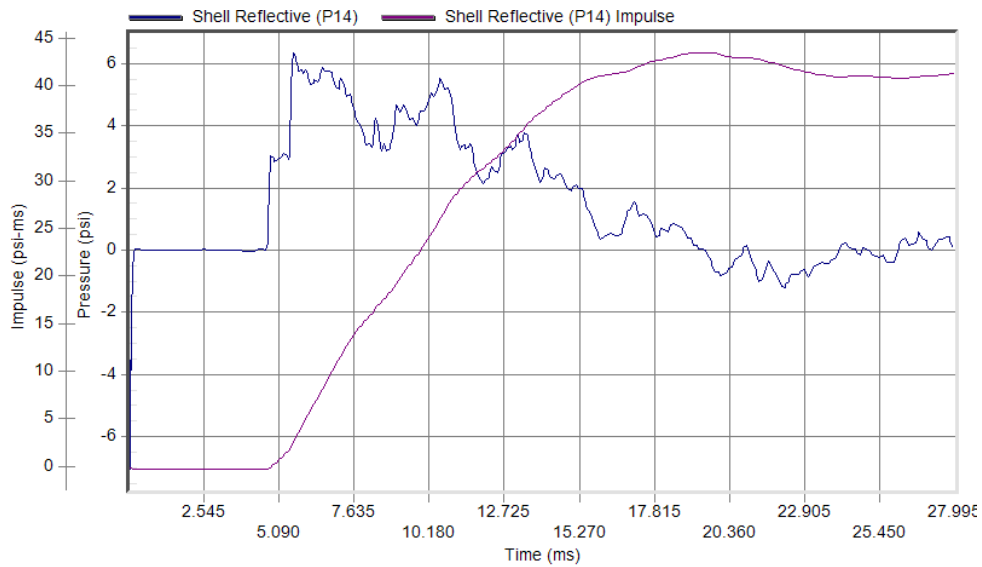
Test Date: 7/16/2014  
Test Time: 2:40 pm

### Specimen #3



Peak Pressure: 6.68 psi at 5.32 ms  
Duration: 13.78 ms

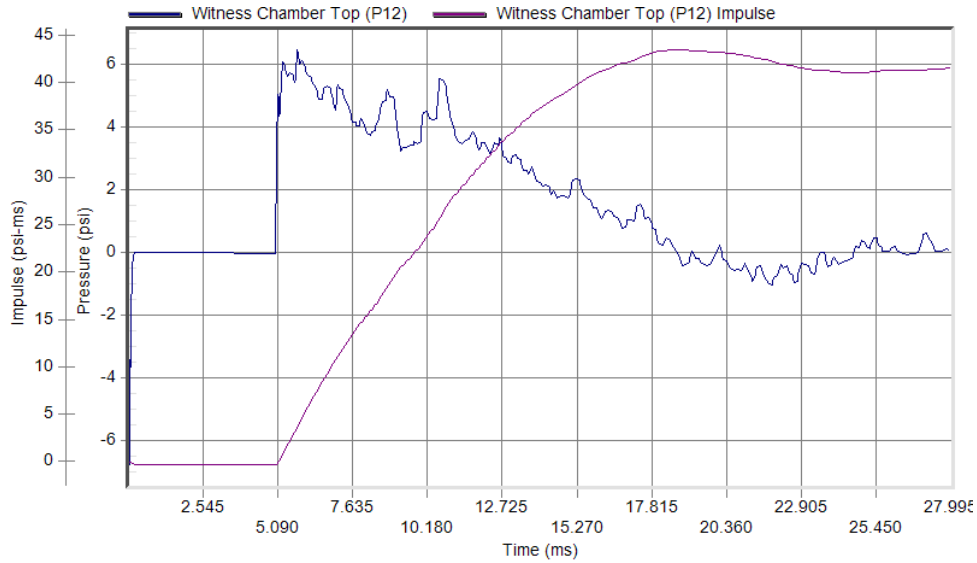
Test Date: 9/8/2014  
Test Time: 12:10 pm



Peak Pressure: 6.35 psi at 5.63 ms  
Duration: 13.66 ms

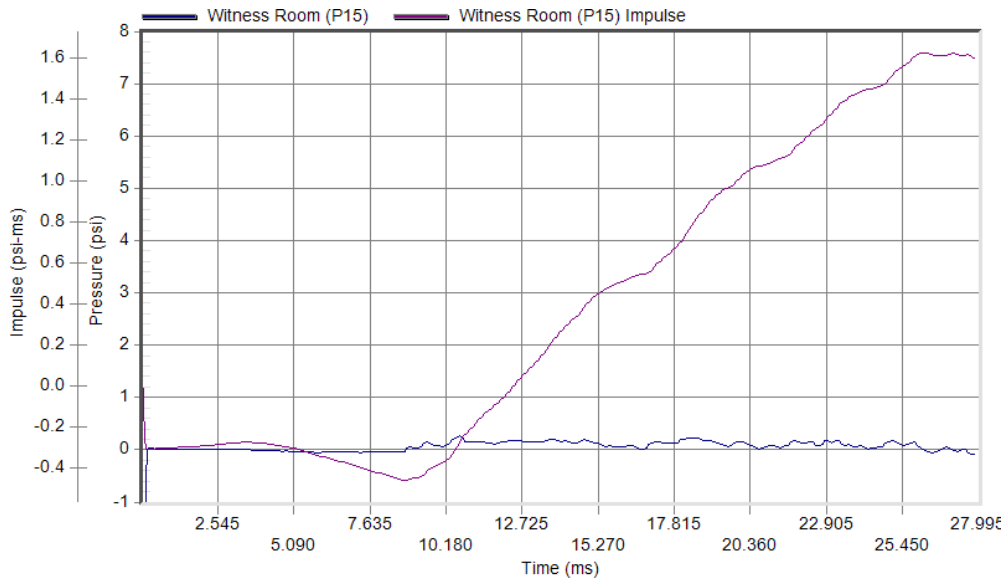
Test Date: 9/8/2014  
Test Time: 12:10 pm

### Specimen #3: (Continued)



Peak Pressure: 6.46 psi at 5.78 ms  
Duration: 12.87 ms

Test Date: 9/8/2014  
Test Time: 12:10 pm

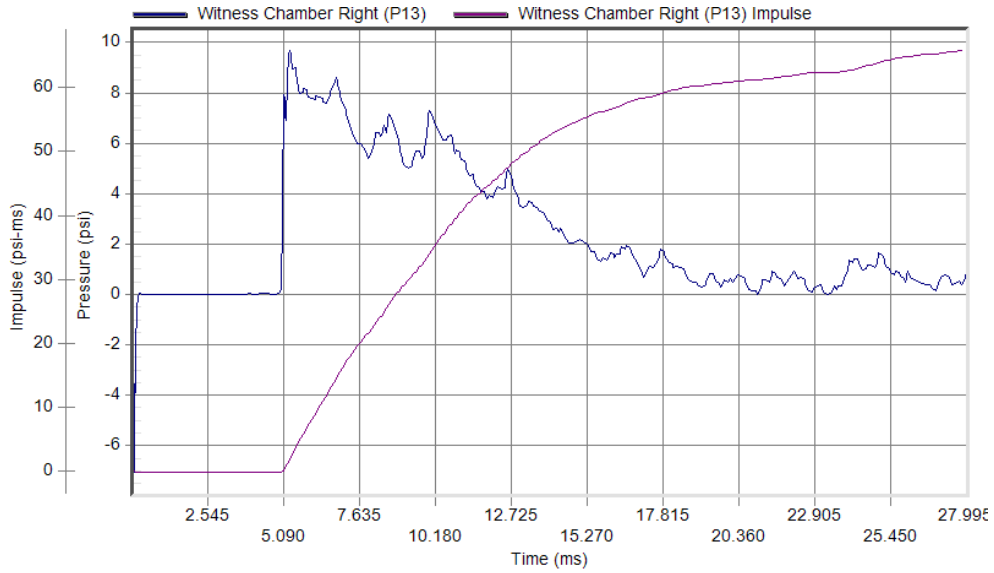


Peak Pressure: 0.28 psi at 10.67 ms  
Duration: 9.95 ms

Test Date: 9/8/2014  
Test Time: 12:10 pm

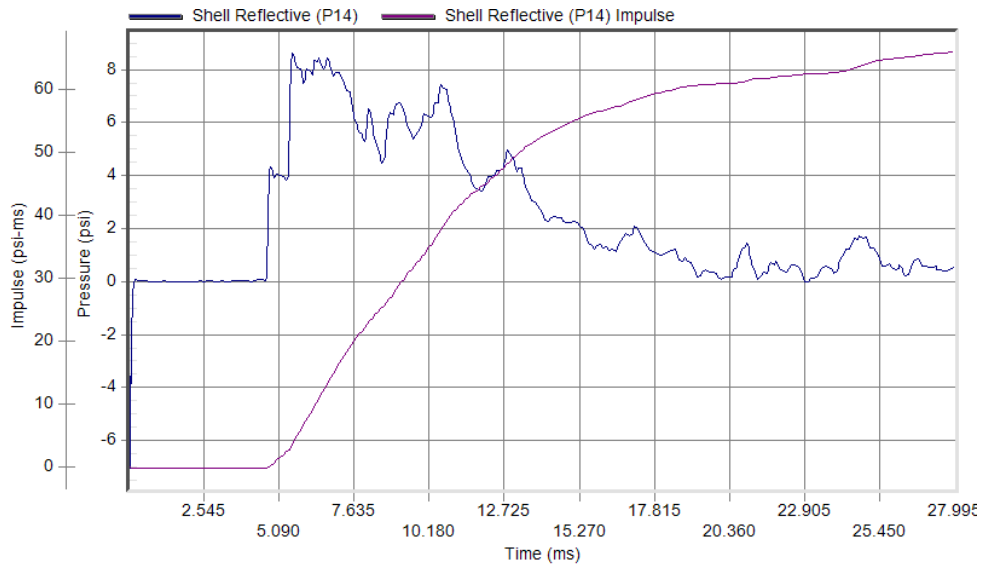


### Specimen #4:



Peak Pressure: 9.69 psi at 5.29 ms  
Duration: 15.53 ms

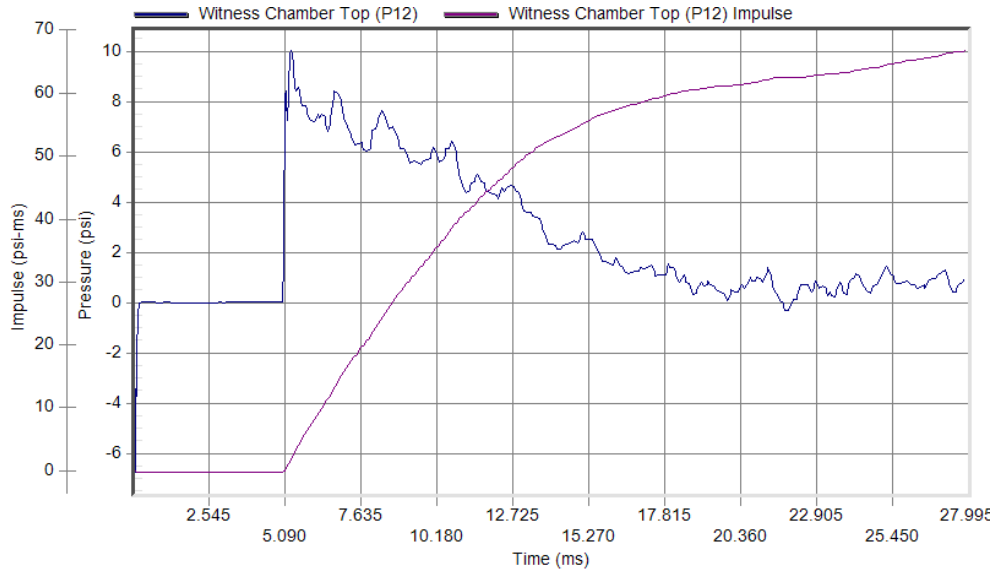
Test Date: 9/10/2014  
Test Time: 11:25 am



Peak Pressure: 8.68 psi at 5.59 ms  
Duration: 15.74 ms

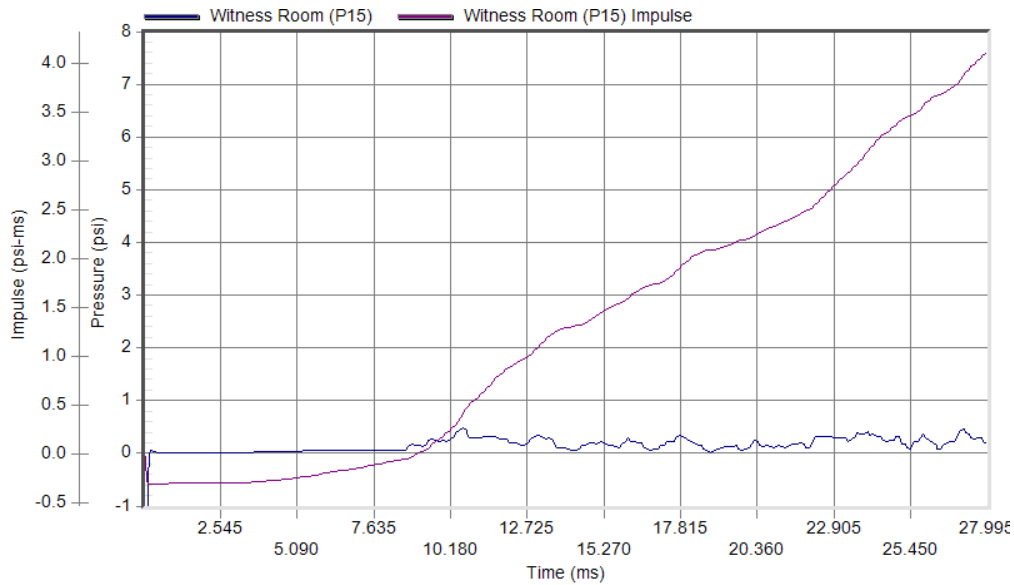
Test Date: 9/10/2014  
Test Time: 11:25 am

### Specimen #4: (Continued)



Peak Pressure: 10.04 psi at 5.30 ms  
Duration: 14.64 ms

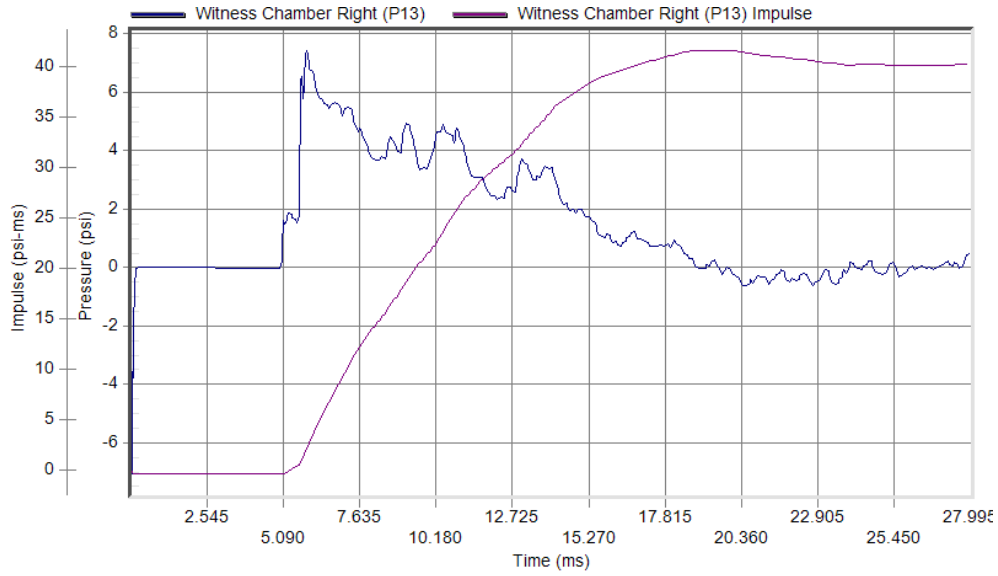
Test Date: 9/10/2014  
Test Time: 11:25 am



Peak Pressure: 0.53 psi at 10.62 ms  
Duration: 8.15 ms

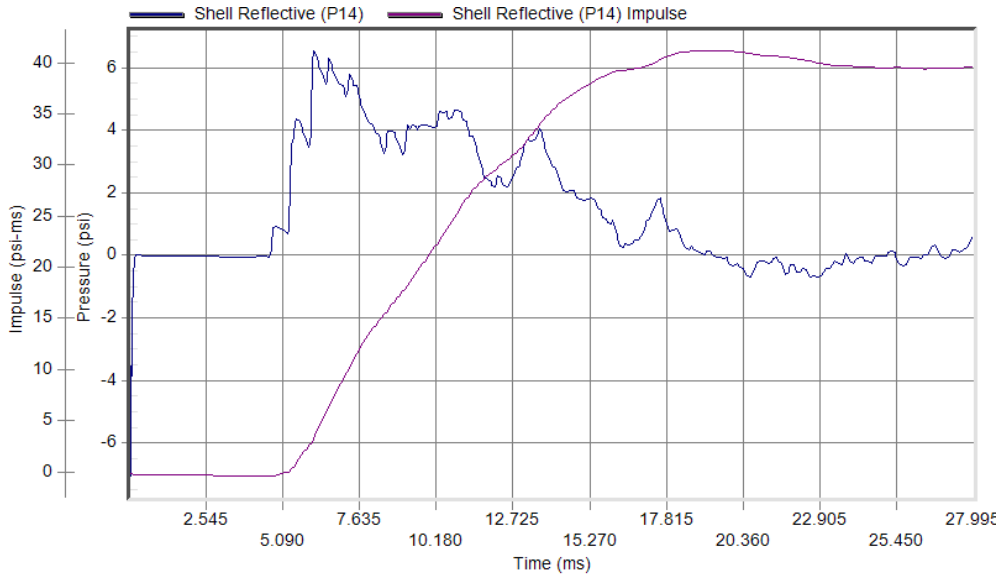
Test Date: 9/10/2014  
Test Time: 11:25 am

### Specimen #5:



Peak Pressure: 7.44 psi at 5.89 ms  
Duration: 12.91 ms

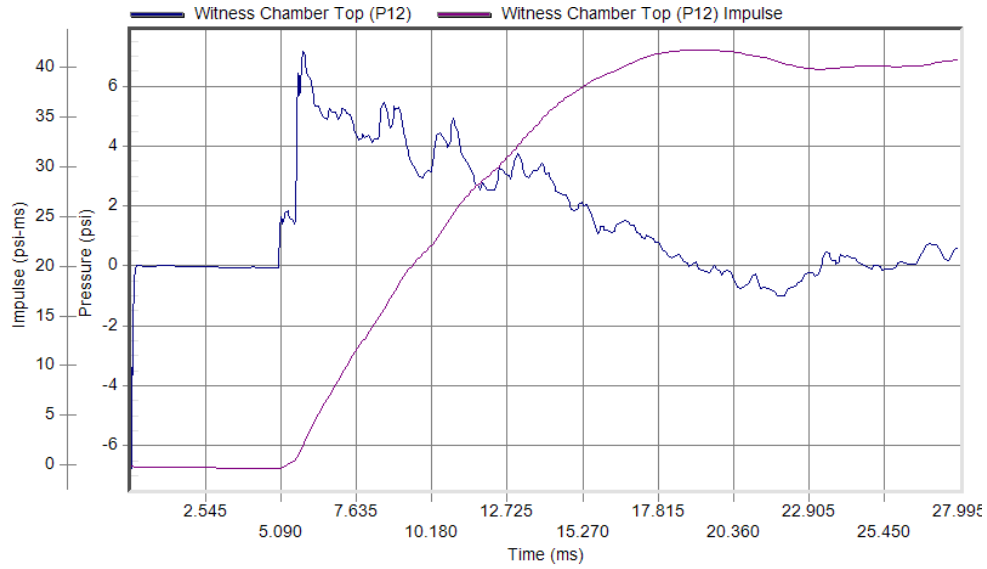
Test Date: 7/14/2014  
Test Time: 4:47 pm



Peak Pressure: 6.55 psi at 6.14 ms  
Duration: 12.80 ms

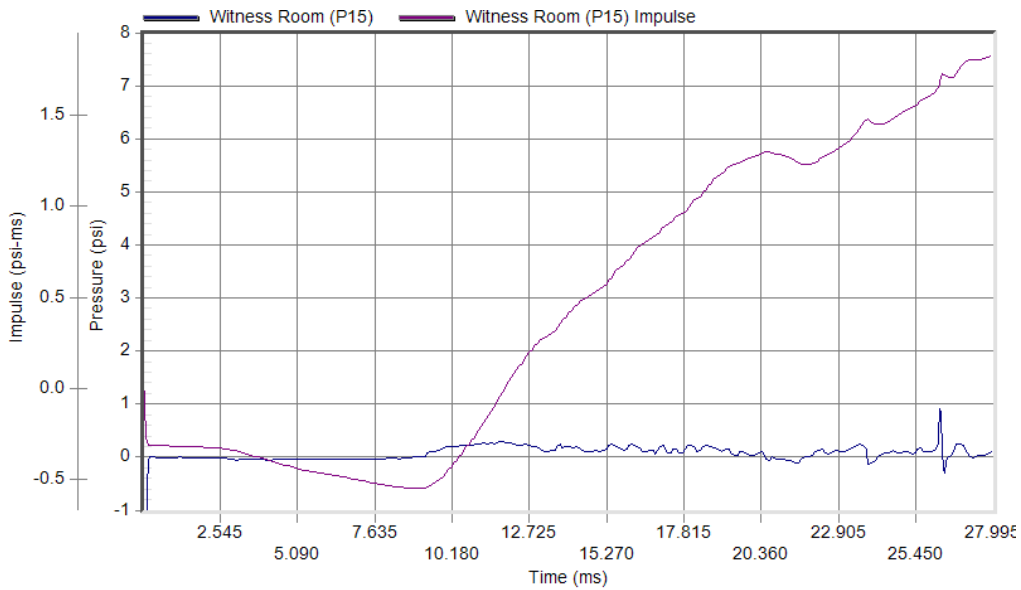
Test Date: 7/14/2014  
Test Time: 4:47 pm

### Specimen #5: (Continued)



Peak Pressure: 7.21 psi at 5.86 ms  
Duration: 12.94 ms

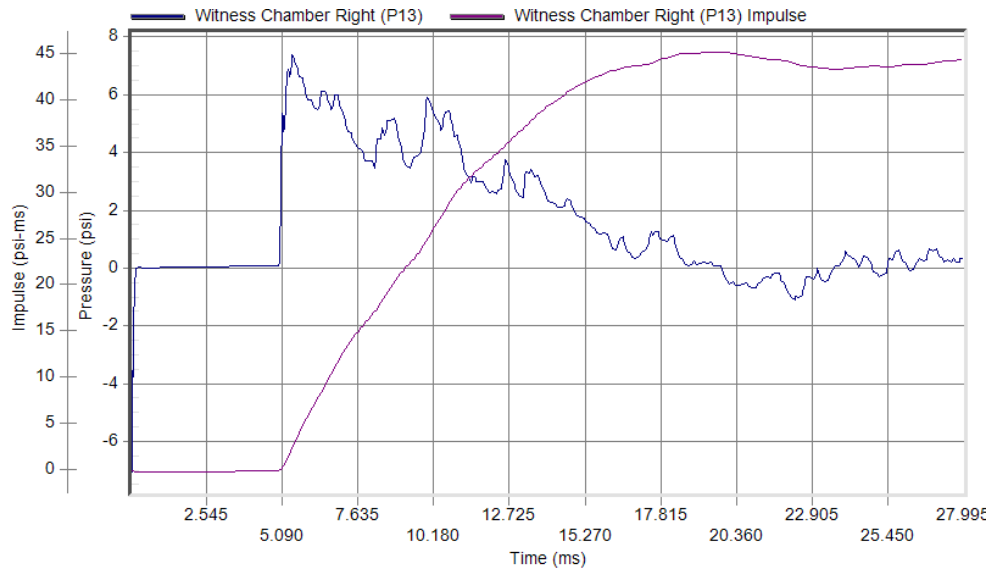
Test Date: 7/14/2014  
Test Time: 4:47 pm



Peak Pressure: 0.91 psi at 26.25 ms  
Duration: 0.09 ms

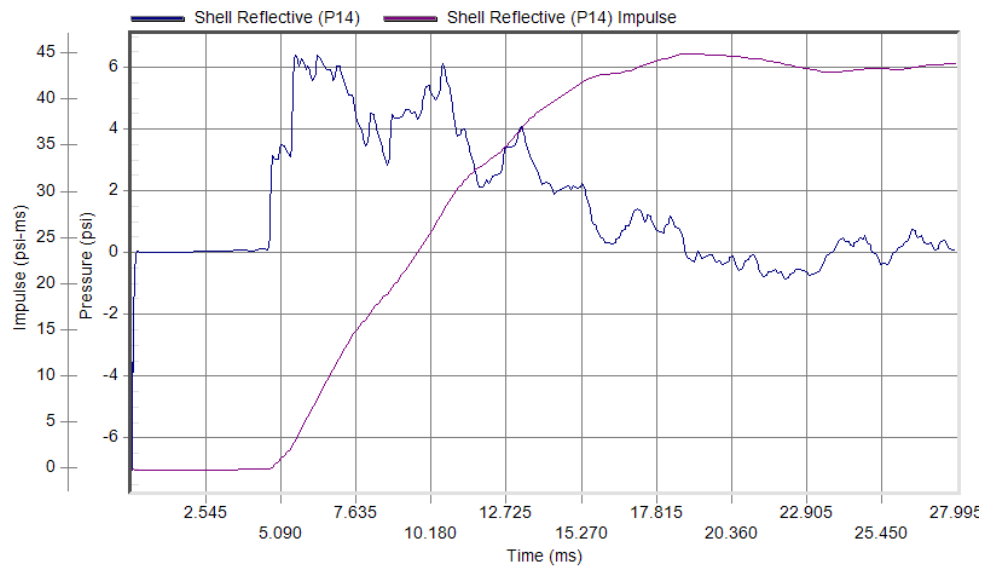
Test Date: 7/14/2014  
Test Time: 4:47 pm

### Specimen #6:



Peak Pressure: 7.48 psi at 5.45 ms  
Duration: 14.14 ms

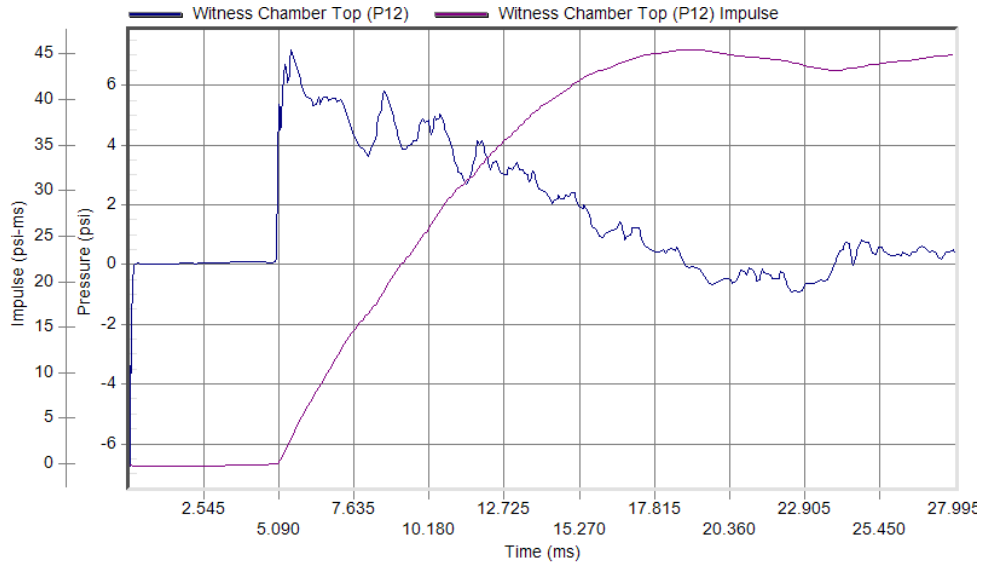
Test Date: 9/8/2014  
Test Time: 4:25 pm



Peak Pressure: 6.45 psi at 5.61 ms  
Duration: 13.18 ms

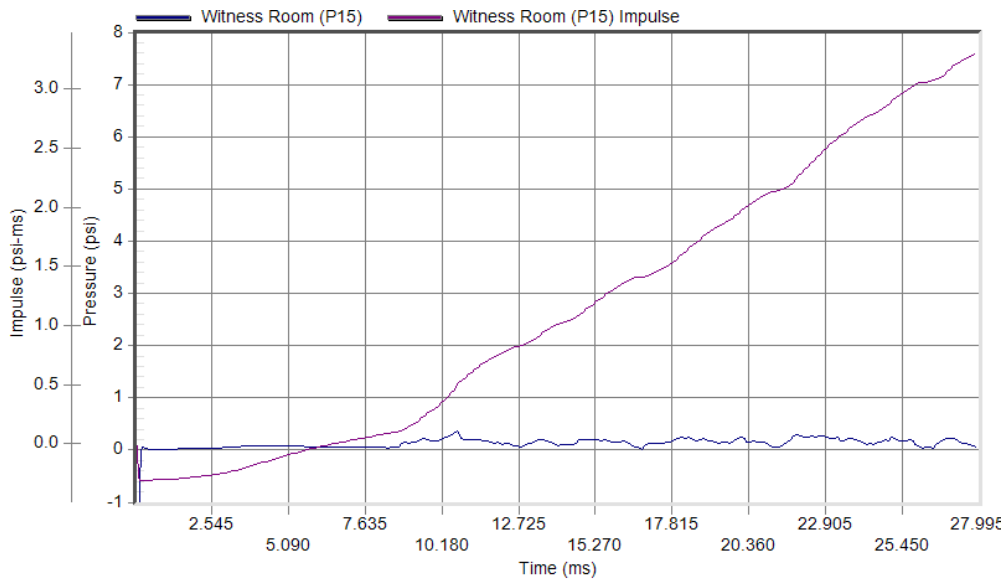
Test Date: 9/8/2014  
Test Time: 4:25 pm

### Specimen #6: (Continued)



Peak Pressure: 7.19 psi at 5.52 ms  
Duration: 13.30 ms

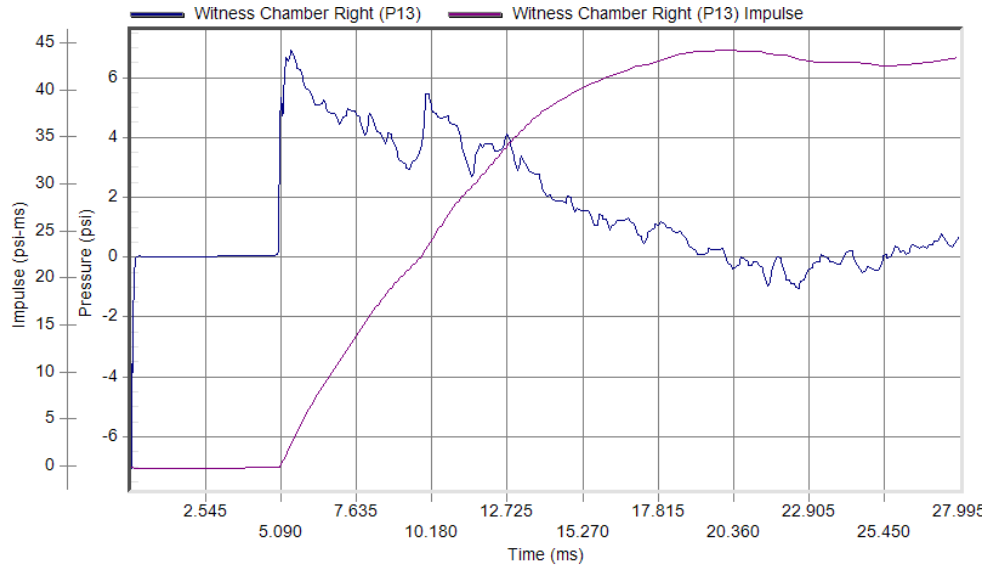
Test Date: 9/8/2014  
Test Time: 4:25 pm



Peak Pressure: 0.37 psi at 10.67 ms  
Duration: 6.10 ms

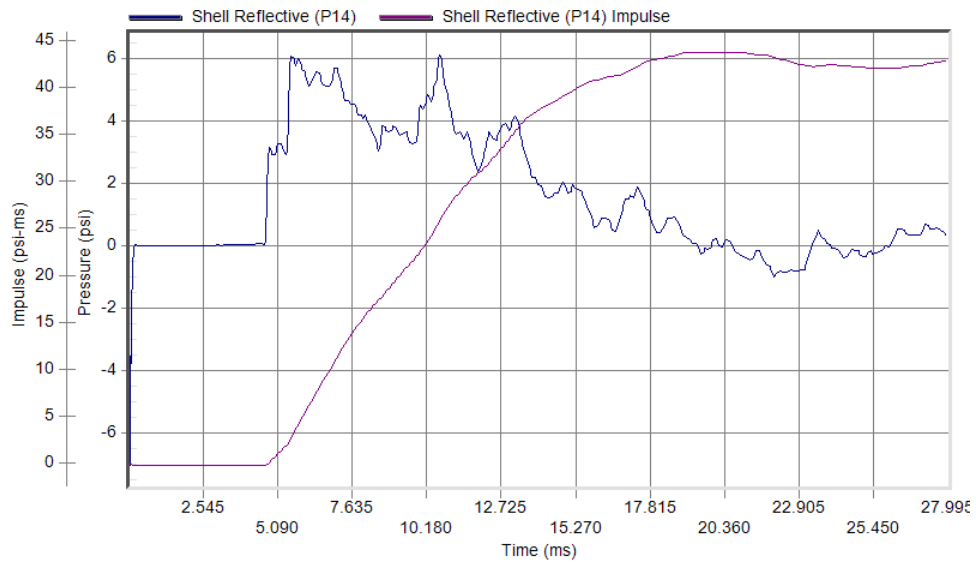
Test Date: 9/8/2014  
Test Time: 4:25 pm

### Specimen #7:



Peak Pressure: 6.93 psi at 5.44 ms  
Duration: 14.65 ms

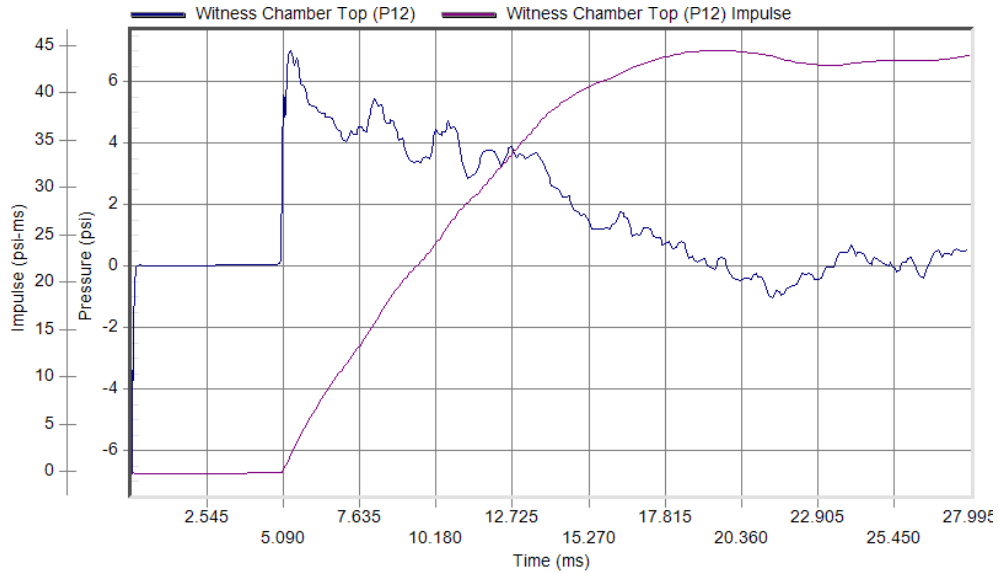
Test Date: 9/9/2014  
Test Time: 9:50 am



Peak Pressure: 6.21 psi at 10.64 ms  
Duration: 8.65 ms

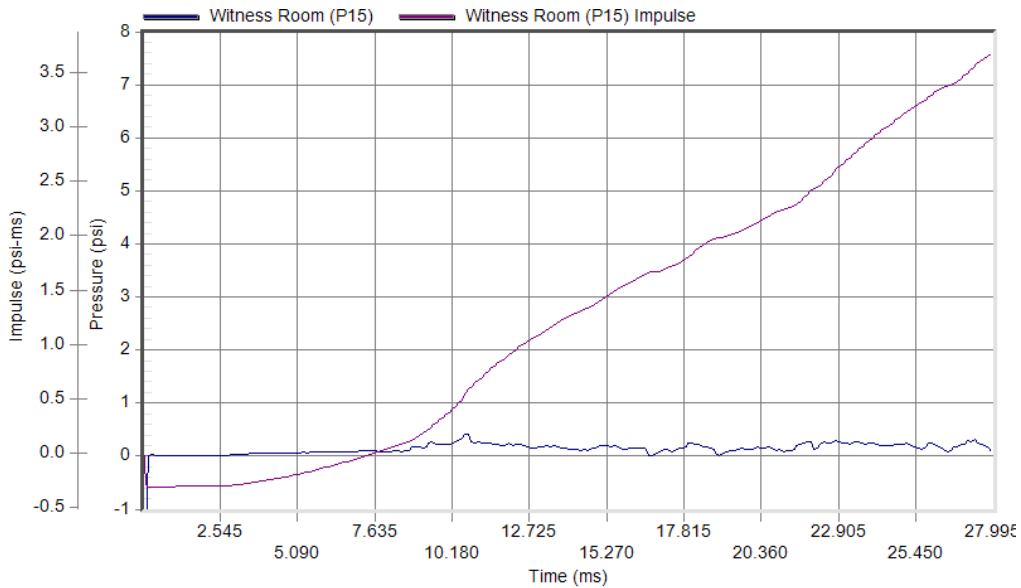
Test Date: 9/9/2014  
Test Time: 9:50 am

### Specimen #7: (Continued)



Peak Pressure: 7.02 psi at 5.34 ms  
Duration: 13.86 ms

Test Date: 9/9/2014  
Test Time: 9:50 am



Peak Pressure: 0.42 psi at 10.67 ms  
Duration: 6.02 ms

Test Date: 9/9/2014  
Test Time: 9:50 am



## **APPENDIX C**

### **Photographs**



**Photo No. 1**  
**Pre-test Specimen #1, Interior**



**Photo No. 2**  
**Post-test Specimen #1, Witness Chamber**



**Photo No. 3**  
**Post-test Specimen #1, Interior**



**Photo No. 4**  
**Pre-test Specimen #2, Interior**



**Photo No. 5**  
**Post-test Specimen #2, Witness Chamber**



**Photo No. 6**  
**Post-test Specimen #2, Interior**



**Photo No. 7**  
**Pre-test Specimen #3, Interior**



**Photo No. 8**  
**Post-test Specimen #3, Witness Chamber**





**Photo No. 9**  
**Post-test Specimen #3, Interior**



**Photo No. 10**  
**Pre-test Specimen #4, Interior**



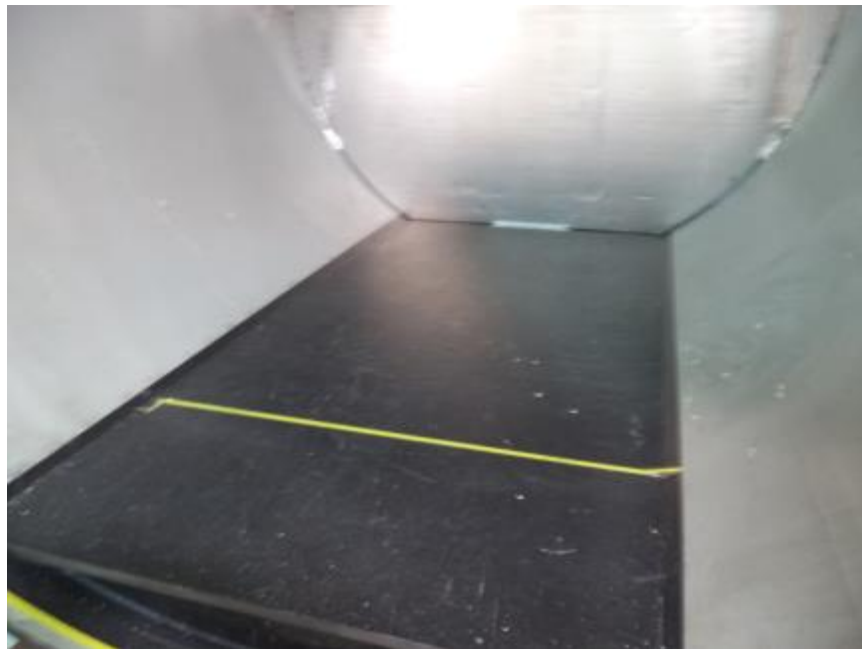
**Photo No. 11**  
**Post-test Specimen #4, Witness Chamber**



**Photo No. 12**  
**Post-test Specimen #4, Interior**



**Photo No. 13**  
**Pre-test Specimen #6, Interior**



**Photo No. 14**  
**Post-test Specimen #6, Witness Chamber**

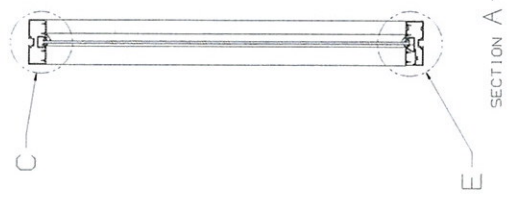
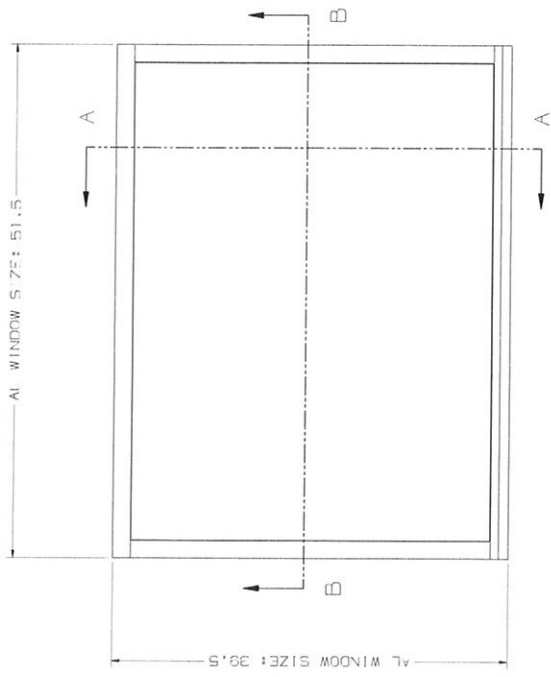


**Photo No. 15**  
**Post-test Specimen #6, Interior**

## **APPENDIX D**

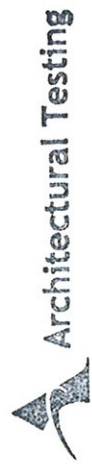
### **Drawings**





Test sample complies with these details.  
Deviations are noted.

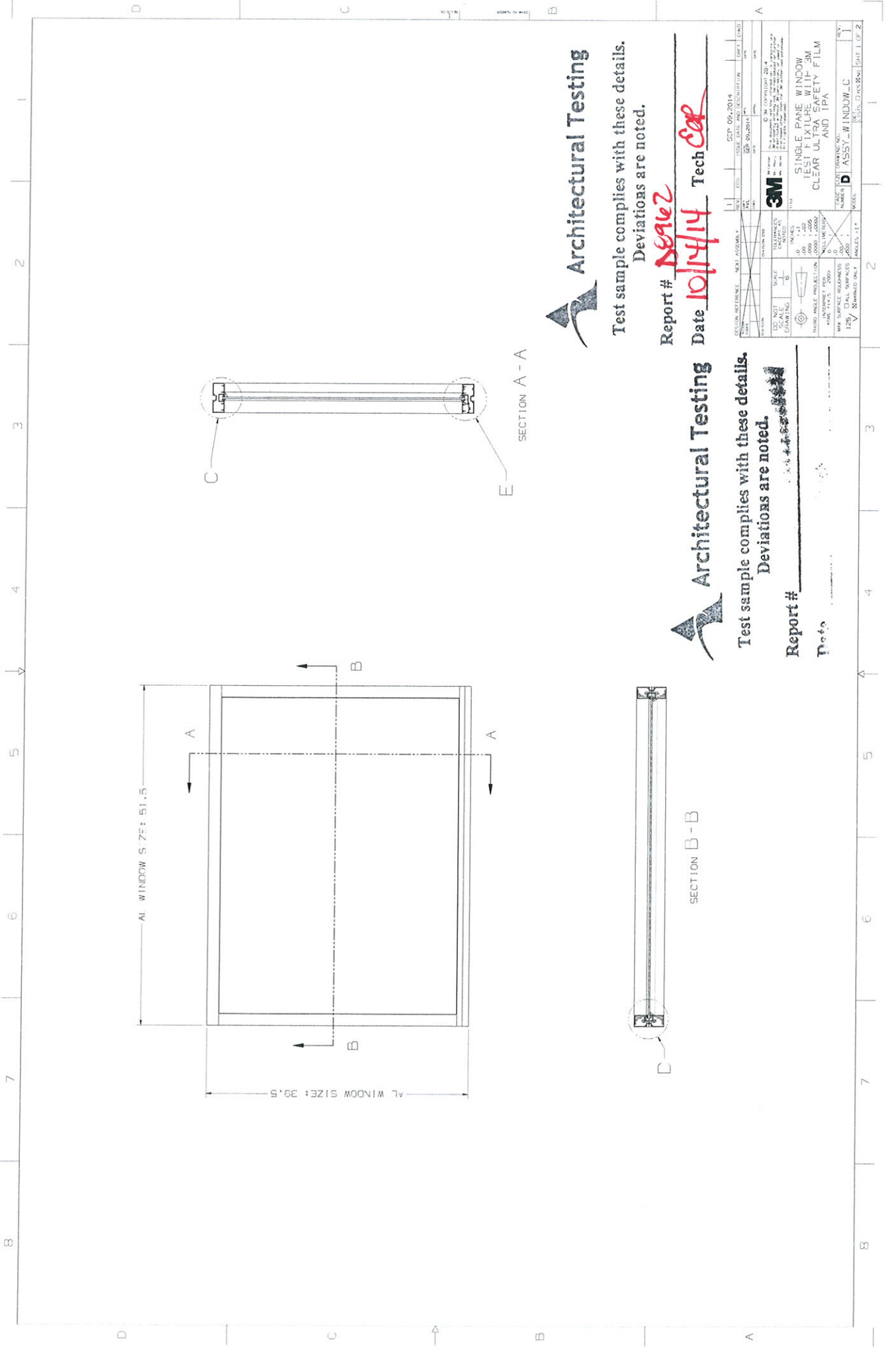
Report # 18942  
Date 10/14/14 Tech car



Test sample complies with these details.  
Deviations are noted.

Report # \_\_\_\_\_  
Date \_\_\_\_\_

REV	DATE	BY	APP	DESCRIPTION
1	SEP 06, 2014			
TITLE: _____ PROJECT: _____ DRAWING NO.: _____ SHEET NO.: _____ OF _____				
PRODUCT: <b>3M</b> MANUFACTURER: _____ MODEL: _____ PART NUMBER: _____				
TEST TYPE: _____ TEST METHOD: _____ TEST STANDARD: _____ TEST RESULT: _____				
COMMENTS: _____ TESTER: _____ DATE TESTED: _____				

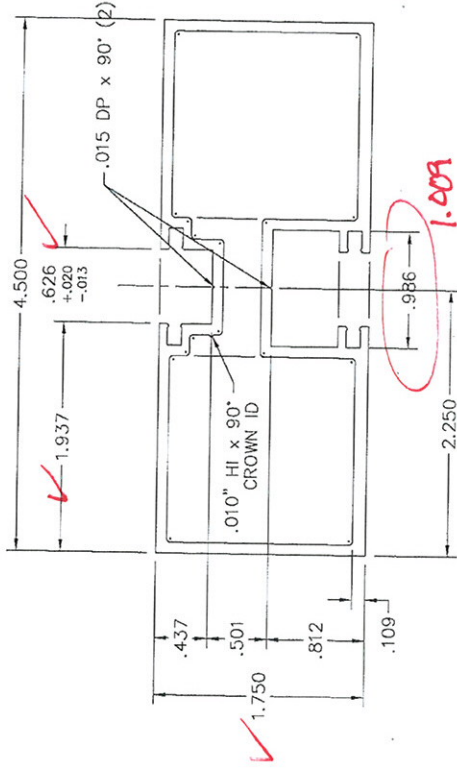




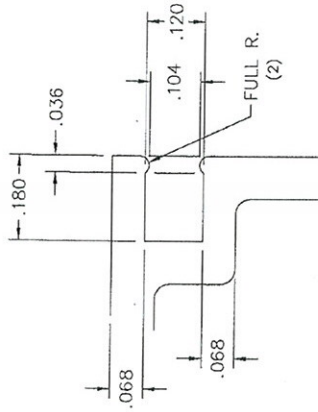
PRINT REVISIONS	DATE

12580
Die Number
45-010
Customer Number

ACTUAL SIZE



ENTIRE OUTSIDE SURFACE EXPOSED



DETAIL "A"  
4 x SIZE



Test sample complies with these details.  
Deviations are noted.

Report # D8962

Date 10/14/14 Tech EGP

STANDARD TOLERANCES APPLY UNLESS OTHERWISE NOTED

BREAK UNSPECIFIED CORNER: .010 R. TYPICAL WALL UNLESS OTHERWISE NOTED: .090

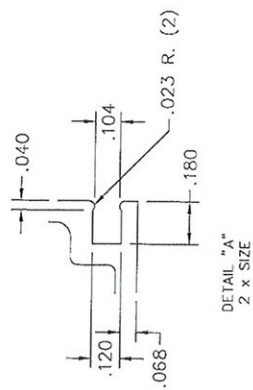
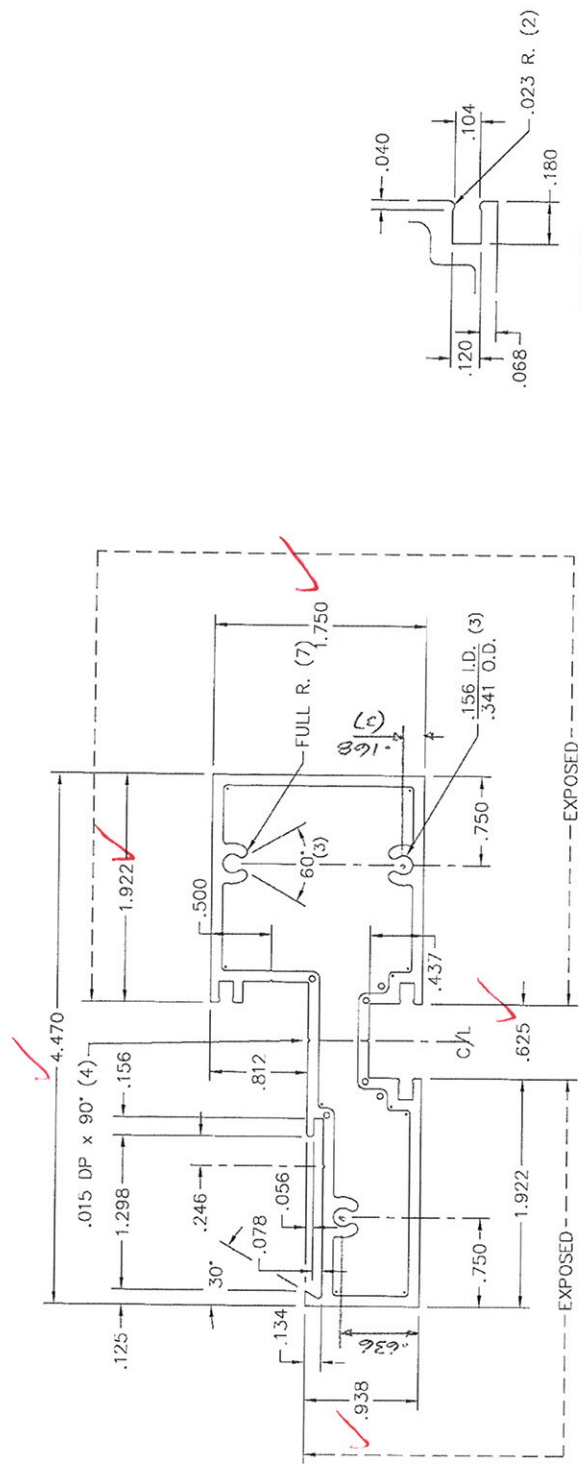
ESTIMATED DIE DATA	
ALLOY/TEMPER:	6063-T5
AREA	1.445 W/FT 1.733
PERIMETER	31.168 SCALE 4 - 5
OUTSIDE PERIMETER	17.197 FACTOR 18
EXPOSED PERIMETER	17.197 HOLLOW
DATE	

LEGEND	
•	.031 R.
◦	.062 R.
×	.125 R.
⊗	.250 R.
*	*

DIE #	12580
SCALE	FULL & NOTED
DATE	12-11-08
LAST REVISION	03-24-11
DRAWN	TCG
CUSTOMER NUMBER	45-010
<b>Crown Extrusions, Inc.</b> 122 Columbia Court N. Chaska, MN 55318 952-446-3533 Fax: 952-446-3528	
<b>CMI Architectural</b> CMI Architectural Products, Inc. 20621 SD Highway 25 DeSmet, SD 57231-5827 605-854-3226 Fax: 605-854-3220	
PART NAME: MULLION	

PRINT REVISIONS	DATE
1 REDRAWN ON CAD MB	7-30-98

CRM-44  
 REV.  DELHI  TIFTON  BOTH



Test sample complies with these details.  
 Deviations are noted.

Report # **D8962**  
 Date **10/14/14** Tech **EA**

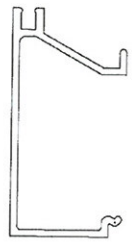
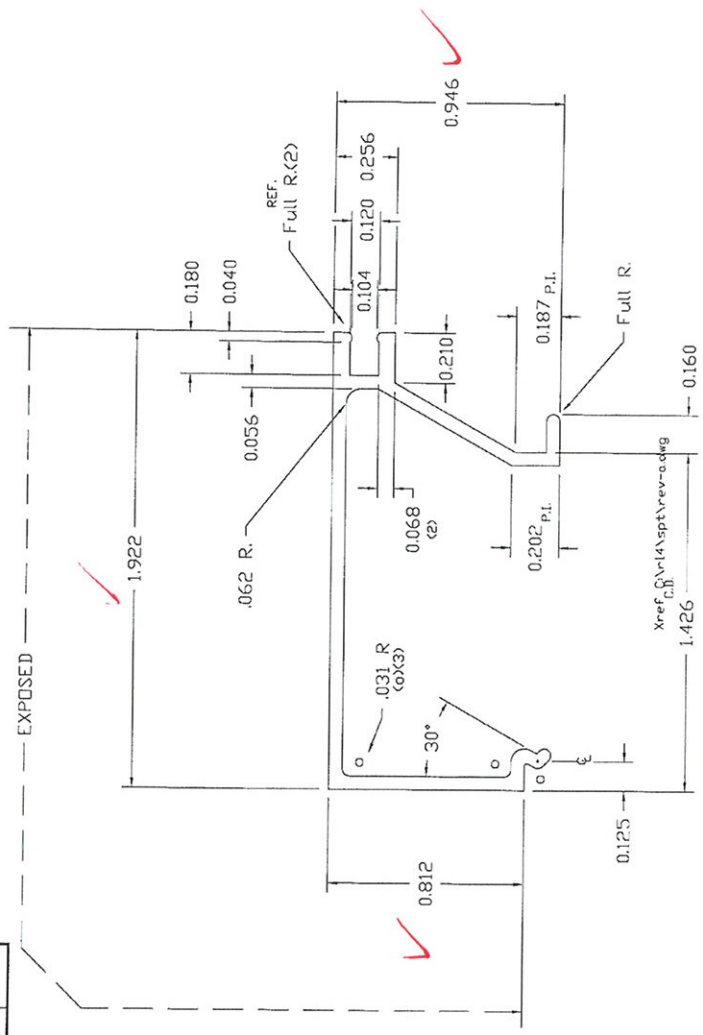
ESTIMATE # 6063-T5		DIE DATA	
INTERNAL USE	AREA 1.354	W/FT 1.624	DATE
PERIMETER 29.721	CIRCLE SIZE 4 - 5	FACTOR 18	DATE
NUMBER OF POINTS 15.421	EXPOSED PERIMETER	HOLLOW II	DATE
LEGEND			
• = .031 R	○ = .062 R	×	• = .125 R
⊗ = .250 R	×	×	×

BREAK UNSPECIFIED CORNERS	.010 R	.090	TYPICAL WALL UNLESS SPECIFIED OTHERWISE.
ESTIMATE #	6063-T5	CAD #	CRM-44 350
INTERNAL USE	AREA 1.354	W/FT 1.624	SCALE FULL & NOTED
PERIMETER 29.721	CIRCLE SIZE 4 - 5	FACTOR 18	DATE 7-29-98
NUMBER OF POINTS 15.421	EXPOSED PERIMETER	HOLLOW II	LAST REVISION
CUSTOMER		DRAWN BY	
sapa: Sapa Extrusions, Inc. BEULIA71832		Michael Bryson	
CUSTOMER		JOB	
CMI ARCHITECTURAL PRODUCTS		MINNEAPOLIS, MN 55430	
2800 FREEWAY BOULEVARD		F.C. SILL 1/4"	
SUITE 205		APPLICATION	
MINNEAPOLIS, MN 55430		CUSTOMER NUMBER	
F.C. SILL 1/4"		45-018	

PRINT REVISIONS	DATE

CRM-49.B  
 REV.  DELHI  TIFTON  BOTH



**Architectural Testing**  
 Test sample complies with these details.  
 Deviations are noted.  
 Report # **D8962**  
 Date **10/14/14** Tech **EAR**

BREAK UNSPECIFIED CORNERS .010 R. .056 TYPICAL WALL UNLESS SPECIFIED OTHERWISE.

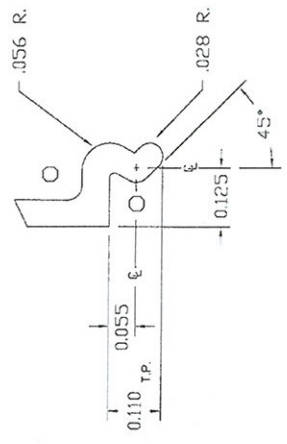
sapa: Sapa Extrusions, Inc. DELU, LA 71232		CARD #
CUSTOMER: CRONSTROMS		SCALE: 2 x & Noted
MINNEAPOLIS, MN		DATE: 10-31-88
APPLICATION: SILL STOP 1/4" TO 1"		LAST REVISION:
DRAWN: J. ALBEREZ		JOB:
CUSTOMER NUMBER: 45-026		

ESTIMATED DIE DATA	INTERNAL USE
6063-T5	
WT/FT .291	
PERMEER 8.478	
CIRCLE SIZE 2-3	
DISSOLVER	
FACTOR 29	
EXPOSED PERM P.R. 2.734	

LEGEND	DATE
A   REF. DESIGNED	1-5-88
B   SHORTENED LEG	2-13-89

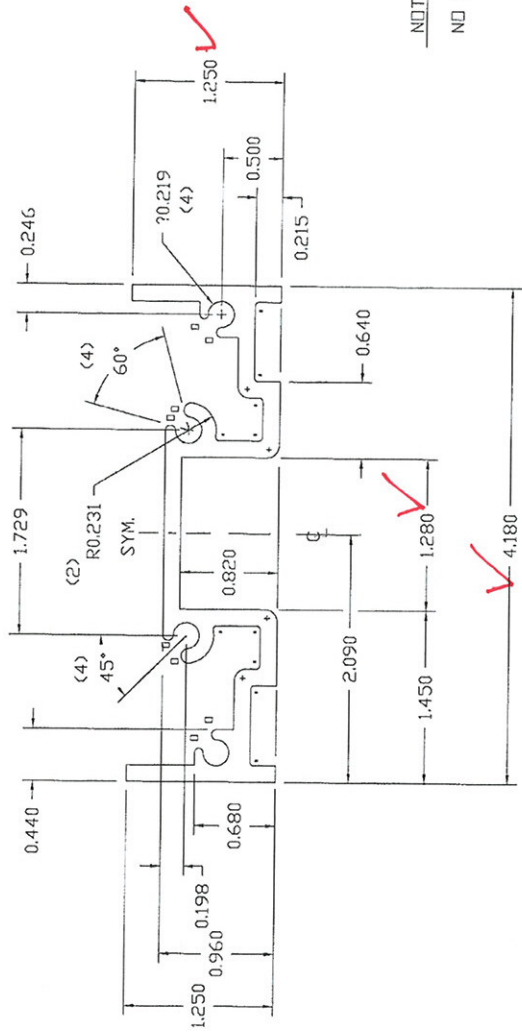
SYMBOL	MEANING
•	.031 R
o	.062 R
x	.125 R
⊗	.250 R
*	*

DETAIL  
 4 x Size



CRM-62  
REV.  DELHI  TIFTON  BOTH

PRINT REVISIONS	DATE



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

Report # **DE9167**

Date **10/14/14** Tech **EAR**

NOTE:

NO EXPOSED SURFACE.

LEGEND:

- \* = 0.031 R. (10)
- + = 0.100 R. (4)
- u = FULL R. (8)

BREAK UNSPECIFIED CORNERS 0.010 R. 0.140 TYPICAL WALL UNLESS SPECIFIED OTHERWISE.

ESTIMATED DIE DATA		SAPA: Sapa Extrusions, Inc.		DAMD # MRC---10 010	
INTERNAL USE	6063-T5	CUSTOMER	CRONSTROMS	SCALE	ACTUAL
AREA	1.389	W/FT	1.667	DATE	12-3-88
PERIMETER	23.555	CIRCLE SIZE	4-5	LAST REVISION	
OUTSIDE LENGTH		FACTOR	12	DRAWN	M. COPEL
EXPOSED PERIMETER				JOB	308
DIE DIMENSIONS		MINNEAPOLIS, MINN.		CUSTOMER NUMBER	
				32-002	
APPLICATION		MULL. CLIP			

DISS. SIZE	LEGEND	DATE
*	= 0.31 R.	
+	= 0.62 R.	
x	= 1.25 R.	
⊗	= .250 R.	
*	=	