



January 2, 2007

Scott Kuntz  
Transparent Protection Systems, Inc.  
6643 42<sup>nd</sup> Terrace North  
West Palm Beach, FL 33407

Re: CLEARGUARD® POLYCARBONATE STORM PANELS

Dear Mr. Kuntz:

Enclosed you will find the test report package for the CLEARGUARD® POLYCARBONATE STORM PANEL tests that were performed at Hurricane Test Laboratory, LLC (HTL).

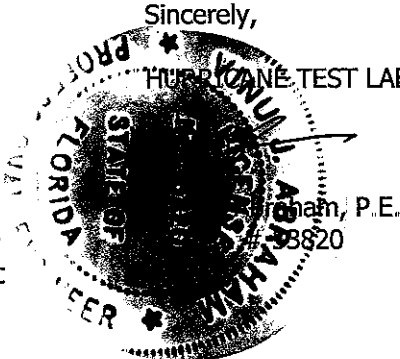
This test report package includes the following items:

- Laboratory compliance letter
- HTL test report # 0239-0312-06 (8 pages)
- Transparent Protection System, Inc. drawing #06-TPS-0003 MIAMI-DADE NOA (4 sheets)
- Transparent Protection System, Inc. drawing #06-TPS-0003 TEST PROGRAM (2 sheets)

If you have any questions, please contact our office.

Sincerely,

HURRICANE TEST LABORATORY, LLC



HURRICANE TEST  
LABORATORY, LLC

FLORIDA OFFICE

6655 Garden Road

Riviera Beach, FL 33404

561.881.0020

Fax 561.881.0075

GEORGIA OFFICE

1701 Westfork Drive, Suite 106

Lithia Springs, GA 30122

770.941.6916

Fax 770.941.2930

[www.htltest.com](http://www.htltest.com)



January 2, 2007

Jaime D. Gascon  
Miami-Dade Building Code Compliance Office  
Metro-Dade Flagler Building, Suite 1603  
140 West Flagler Street  
Miami, Florida 33130-1563

Re: Laboratory Compliance Letter (HTL 06024)

Dear Mr. Gascon:

The tests described in the reports for the below jobs and specimen numbers have been performed in full accordance of the requirements of the Florida Building Code, with no deviations.

Job #	Specimen #	TAS 201	TAS 203	TAS 202			FORCED ENTRY
				AIR	WATER	STATIC	
0239-0312-06	5					X	
0239-0312-06	6	X	X				
0239-0312-06	8					X	
0239-0312-06	9					X	
0239-0312-06	10					X	
0239-0312-06	11	X	X				
0239-0312-06	12	X	X				
0239-0312-06	13					X	
0239-0312-06	14	X	X				
0239-0312-06	15	X	X				
0239-0312-06	16	X	X				
0239-0312-06	17	X	X				
0239-0312-06	18					X	
0239-0312-06	19					X	
0239-0312-06	20					X	
0239-0312-06	21					X	

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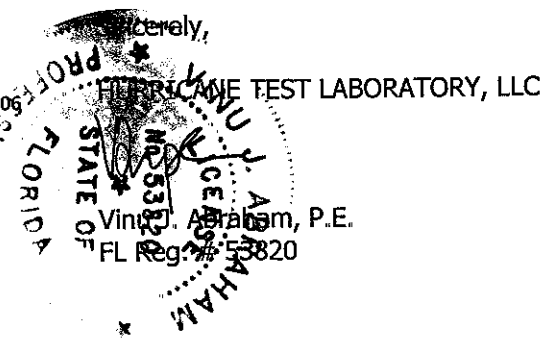
1701 Westfork Drive, Suite 106

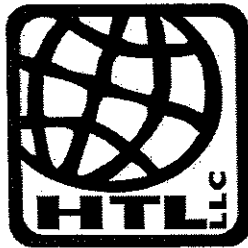
Lithia Springs, GA 30122

770.941.6916

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**HURRICANE TEST LABORATORY, LLC**  
**TESTING AND EVALUATION SOLUTIONS**  
 6655 Garden Road  
 Riviera Beach, FL 33404  
[www.htltest.com](http://www.htltest.com)

**Report #: See section 5.0**  
**Report Expiration Date: 1/2/12**  
 Page 1 of 8

**MANUFACTURER INFORMATION**

- 1.0 NAME OF APPLICANT:** Transparent Protection Systems, Inc.  
 6643 42<sup>nd</sup> Terrace North  
 West Palm Beach, FL 33407  
 888.447.8320
- 2.0 CONTACT PERSON:** Scott Kuntz
- 3.0 HTL TEST NOTIFICATION #:** HTL 06024 (Miami-Dade)
- 4.0 HTL LAB CERTIFICATION:** Miami-Dade County (05-1014.01); Florida Building Code (TST1527); IAS-ES (TL-244); AAMA; WDMA; Keystone Certifications; Texas Department of Insurance.

**5.0 REPORT INFORMATION:**

Report #	HTL Specimen #	Test Date
0239-0312-06	5	4/21/06
	6	4/24/06 – 4/25/06
	8	5/1/06
	9	5/8/06
	10	
	11	5/11/06
	12	5/12/06 – 5/13/06
	13	5/17/06
	14	5/18/06 – 5/19/06
	15	6/6/06 – 6/12/06
	16	6/6/06 – 6/7/06
	17	6/27/06 – 6/28/06
	18	7/17/06 – 7/18/06
	19	7/22/06
	20	7/27/06
21	8/4/06	

**PRODUCT IDENTIFICATION**

- 6.0 Product Type:** Removable Hurricane Panels
- 7.0 Model Number:** CLEARGUARD® POLYCARBONATE STORM PANELS
- 8.0 Performance Class and Overall Size:**

HTL Specimen #	Performance Class	Overall Size
5	+59.50/-67.60 psf	38.75" (w) x 66" (h)
6	+48.00/-48.00 psf	38.75" (w) x 78" (h)
8	+85.00/-90.00 psf	38.75" (w)x 58" (h)
9	+105.00/-105.00 psf	38.75" (w)x 52" (h)
10	+46.40/-65.00 psf	38.75" (w)x 78" (h)
11	+46.40/-65.00 psf	
12	+120.00/-120.00 psf	38.75" (w)x 45" (h)
13	+120.00/-120.00 psf	38.75" (w)x 78" (h)
14	+46.40/-65.00 psf	

No. 53820  
**ENGINEER OF RECORD**  
 STATE OF  
 Vinu J. Abraham, P.E.  
 FL Reg. # 53820  
 1/2/07



HTL Specimen #	Performance Class	Overall Size
15	+120.00/-120.00 psf	38.75" (w)x 45" (h)
16	+46.40/-65.00 psf	38.75" (w)x 78" (h)
17	+120.00/-120.00 psf	38.75" (w)x 45" (h)
18	-67.83	38.75" (w)x 78" (h)
19	+46.60	38.75" (w)x 78" (h)
20	+46.00	38.75" (w)x 78" (h)
21	+47.20	38.75" (w)x 78" (h)

- 9.0 Configuration:** See Transparent Protection System, Inc. drawing #06-TPS-0003, sheet 1 for an overall elevation of these units.
- 10.0 Drawing:** This test report is incomplete if not accompanied by Transparent Protection Systems, Inc. drawing #06-TPS-0003 MIAMI-DADE NOA (sheets 1 through 3) and #06-TPS-0003 TEST PROGRAM (sheets 1 and 2) each bearing the raised seal of Hurricane Test Laboratory, LLC.
- 11.0 Sample Source:** Sample provided by Transparent Protection Systems, Inc.

## PRODUCT DESCRIPTION

### 12.0 DETAILED DESCRIPTION:

**12.1 Panels:** Each sample tested as part of this test program consisted of three (3) storm panels that were interlocked together. The panels were fabricated from Dow CALIBRE™ 302V-6 extruded Polycarbonate Resin. Each storm panel had an effective covering width of 12". The valleys of each storm panel had a 0.580" x 1.220" standard key slot punched with the centerline 1.375" from each panel end. The panels had overall cross sectional dimensions as listed in the following table:

Description	Item #	Overall Cross Section
UV-stabilized Polycarbonate Storm Panel	1	2.000" (h) x 14.394" (w) x 0.100" (t)

The following procedures (typical) were utilized when assembling the shutter sample:

**Storm Panel Attachment:** Each storm panel was either direct-mounted to the opening as listed in the installation section of this test report or was in-directly mounted to the opening using some or all of the accessories listed in Section 12.2 of this report.

**12.2 Storm Panel Mounting Fixtures:** Some or all of the following fixtures were utilized in the testing of the storm panel samples:

Description	Item #	Overall Cross Section	Aluminum Alloy
Reverse 'F' Angle	4	2.000" x 2.000" x 0.092"	6063-T6
'F' Track	6	0.380" x 1.675" x 0.095"	6063-T6
Closure Angle	7	2.000" x 5.000" x 0.125"	6063-T6
Stud Angle	10	2.000" x 2.000" x 0.093"	6063-T6
Studded Angle	11	2.000" x 2.000" x 0.093"	6063-T6
Buildout 'F' Track	12	3.000" x 1.805" x 0.125"	6063-T6

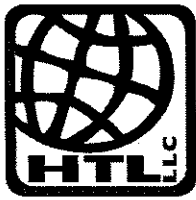
**Panel Attachment:** The panels were attached to their respective mounting fixtures using 1/4-20 x 3/4" MS studs with keyhole washers and washered wingnuts spaced 2" from each end and 6" on center thereafter. The exceptions to this were specimens 12, 13 and 16 which were trap mounted into their respective fixtures.

**Build-out Stud Angle:** The stud angle was used in a build-out mounting style by attaching the stud angle to the closure angle using a single row of 1/4-20 x 2" sidewalk bolts with matching wingnuts spaced 1" from each end and 8" on center thereafter.

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*V. [Signature]*

1/2/07



**PRODUCT INSTALLATION**

**13.0** The following section of this report details how each specimen was installed into the provided openings:

Mounting Style	HTL Specimen #	Substrate	Anchor Type
Direct Mount	5, 8, 9, 10, 11, 18, 19, 20, 21 (All at Bottom)	CMU	Elco® PanelMate® Male Fasteners (1-1/4" minimum embedment)
	10, 11, 18, 19, 20, 21 (All at Top)	Wood	Elco® PanelMate® Female Fasteners (1-7/8" minimum embedment)
'F' Track	5, 8, 9 (All at Top)	CMU	1/4" Tapcons® (1-1/4" minimum embedment)
	6, 17 (Both at Top)	Wood	7/16" wood bushing (7/8" minimum embedment) with 1/4-20 SS MS
Reverse 'F' Angle (Trap Mount)	12 (Bottom)	Wood	1/4" Tapcons® (1-1/2" minimum embedment)
	16 (Top)	Wood	Elco® PanelMate® Female Fasteners (1-7/8" minimum embedment)
	13 (Bottom)	CMU	1/4" Tapcons® (1-1/4" minimum embedment)
Stud Angle	17 (Bottom)	CMU	Powers® FASTENERS 1/4-20 Calk-In™ (7/8" minimum embedment)
Stud Angle (Trap Mount)	12 (Top), 13 (Top), 16 (Bottom)	CMU	1/4" Tapcons® (1-1/4" minimum embedment)
Studded Angle	6 (Bottom)	CMU	All Points 1/4-20 Solid Set MS anchor (7/8" minimum embedment)
Build-out 'F' Track	14, 15 (Both at Top)	Wood	1/4" lag screw (2-3/32" minimum embedment)
Build-out Stud Angle	14, 15 (Both at Bottom)	CMU	1/4" Tapcons® (1-1/4" minimum embedment)

Anchor Schedule: All direct mount fasteners were spaced 6" on center. All other mounting styles had fastener spacing of 2" from each end and 8" on center thereafter.

**TEST RESULTS**

**14.0 SUMMARY OF RESULTS:**

TEST METHOD	TEST CONDITIONS	SPECIMEN #
Static Load Test (ASTM E330 and TAS 202)	See Section 8.0	5, 8, 9, 10, 13, 18, 19, 20, 21
Large Missile Impact Test (TAS 201)	--	6, 11, 12, 14, 15, 16, 17
Cyclic Load Test (TAS 203)	See section 8.0	

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**15.0 TEST SEQUENCE:**

TEST SEQUENCE	SPECIMEN #
Uniform static load test at positive pre load Uniform static load test at positive design load Uniform static load test at positive over load Uniform static load test at negative pre load Uniform static load test at negative design load Uniform static load test at negative over load	5, 8, 9, 10, 13, 18, 19, 20, 21
Large missile impact test Positive cyclic load test Negative cyclic load test	6, 11, 12, 14, 15, 16, 17

**16.0 UNIFORM STATIC LOAD TEST RESULTS:**

**16.1 DEFLECTION DATA:**

Specimen #	Location	Load (psf)	Net Deflection (in.)	Permanent Set (in.)	Percent Recovery (%)
5	Geometric Center of Shutter	+41.25	1.234	0.028	97.8
		+59.50	1.980	0.039	98.0
		+89.25	2.940	0.065	97.8
		-41.25	0.965	0.065	93.3
		-67.60	1.390	0.130	90.6
		-101.40	1.865	0.215	88.5
8	Geometric Center of Shutter	+63.75	1.482	0.011	99.3
		+85.00	1.950	0.017	99.1
		+127.50	2.914	0.029	99.0
		-67.50	1.115	0.020	98.2
		-90.00	1.440	0.100	93.1
		-135.00	1.635	0.140	91.4
9	Geometric Center of Shutter	+78.75	1.266	0.038	97.0
		+105.50	1.685	0.050	97.1
		+157.50	2.752	0.085	96.9
		-78.75	0.860	0.015	98.3
		-105.50	1.105	0.020	98.2
		-157.50	1.450	0.005	99.7
10	Geometric Center of Shutter	+36.00	1.509	0.006	99.6
		+48.00	2.069	0.005	99.8
		+69.61	2.892	0.017	99.4
		-36.00	1.175	0.100	91.5
		-71.30	1.750	0.040	97.7
		-97.50	2.325	0.150	93.5
13	Geometric Center of Shutter	+90.00	0.852	0.013	98.5
		+120.00	1.298	0.016	98.8
		+180.00	2.366	0.078	96.7
		-90.00	0.765	0.020	97.4
		-120.00	0.695	0.030	95.7
		-180.00	1.275	0.080	93.7

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Specimen #	Location	Load (psf)	Net Deflection (in.)	Permanent Set (in.)	Percent Recovery (%)
18	Geometric Center of Shutter	-50.87	1.240	0.000	100.00
		-67.83	1.540	0.005	99.68
		-101.75	2.095	0.000	100.00
		-223.54	Failure load – concrete bottom substrate failed		
19	Geometric Center of Shutter	+34.95	1.402	0.000	100.00
		+46.60	1.868	0.006	99.68
		+69.90	2.991	0.000	100.00
		+179.20	Failure load – concrete bottom substrate failed		
20	Geometric Center of Shutter	+34.50	1.501	0.000	100.00
		+46.00	2.000	0.007	99.67
		+69.00	3.200	0.000	100.00
		+198.95	The concrete bottom substrate failed however there was no product failure so testing was continued. The maximum sustained load was 198.95 due to the test equipment being unable to sustain a higher pressure.		
21	Geometric Center of Shutter	+35.40	1.613	0.005	99.72
		+47.20	1.999	0.019	99.07
		+70.80	2.993	0.015	99.52
		+165.16	Failure load – concrete bottom substrate failed		

**16.2 REMARKS:**

No signs of failure were observed during the uniform static load tests. As such, these specimens were found to satisfy the uniform static load test requirements of TAS 202 and ASTM E330.

**17.0 LARGE MISSILE IMPACT TEST RESULTS:**

**17.1 IMPACT DATA:**

**Missile Weight:** 9 lb.6 oz.

**Missile Length:** 96 in.

Specimen #	Impact #	Velocity (ft/s)	X Coordinate (in.)	Y Coordinate (in.)	Instant Deflection (in.)	Permanent Deflection (in.)
6	1	49.98	25.25	40.25	3.00	0.00
	2	49.95	31.50	9.50	1.50	0.00
11	1	49.98	25.50	39.00	5.00	0.00
	2	49.98	29.50	12.50	2.00	1.00
12	1	49.24	25.25	19.50	3.75	3.25
	2	49.80	31.50	9.00	2.75	2.50
14	1	49.38	19.00	40.00	4.60	0.00
	2	50.35	29.00	8.00	3.50	0.50
15	1	47.76	19.00	22.00	4.50	1.00
	2	47.94	28.50	13.50	4.63	2.38

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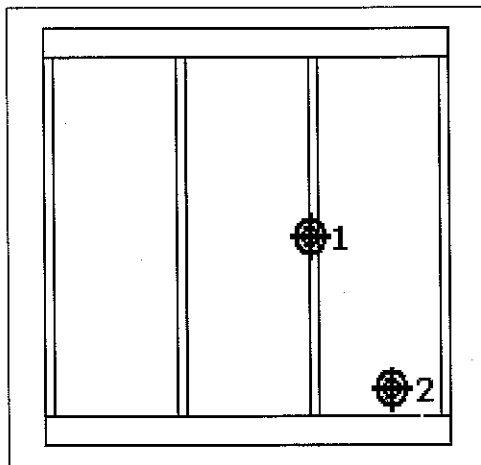
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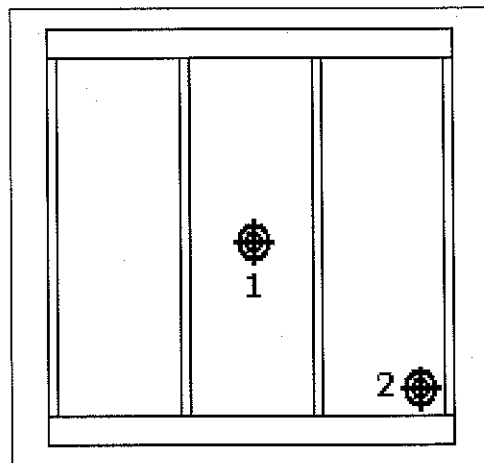
Specimen #	Impact #	Velocity (ft/s)	X Coordinate (in.)	Y Coordinate (in.)	Instant Deflection (in.)	Permanent Deflection (in.)
16	1	49.60	7.50	39.50	1.50	0.00
	2	49.65	25.00	37.50	1.55	0.00
17	1	48.76	8.50	23.00	4.00	0.00
	2	48.99	26.00	23.00	3.50	0.00

**17.2 IMPACT LOCATIONS:**

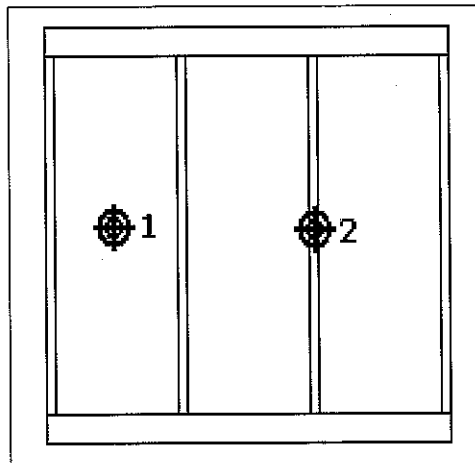
**Specimen: 6, 11, 12**



**Specimens: 14, 15**



**Specimens: 16, 17**



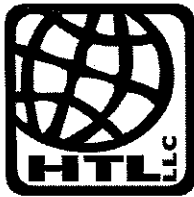
**17.3 REMARKS:**

Each impact test conducted on this specimen was performed in accordance with the requirements of TAS 201. All of the impacts hit their intended targets resulting in the recorded measurements. Upon completion of the missile impact test, this sample subsequently underwent the cyclic load test as specified by TAS 203.

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**18.0 CYCLIC LOAD TEST RESULTS:**

**18.1 TEST PRESSURE:**

Specimen #	CYCLIC TEST PRESSURE	
	$(P_d)_{in} = P_{max}$	$(P_d)_{out} = P_{max}$
6	48.0 psf	48.0 psf
11, 14, 16	46.4 psf	65.0 psf
12, 15, 17	120.0 psf	120.0 psf

**18.2 TEST SPECTRUM:**

**18.2.1 POSITIVE:**

Specimen #	# OF INWARD ACTING CYCLES/STAGE		
	600	70	1
6	0 - 24.00 (psf)	0 - 28.80 (psf)	0 - 62.40 (psf)
11, 14, 16	0 - 23.20 (psf)	0 - 27.84 (psf)	0 - 60.32 (psf)
12, 15, 17	0 - 60.00 (psf)	0 - 72.00 (psf)	0 - 156.00 (psf)

**18.2.2 NEGATIVE:**

Specimen #	# OF OUTWARD ACTING CYCLES/STAGE		
	600	70	1
6	0 - 24.00 (psf)	0 - 28.80 (psf)	0 - 62.40 (psf)
11, 14, 16	0 - 32.50 (psf)	0 - 39.00 (psf)	0 - 84.50 (psf)
12, 15, 17	0 - 60.00 (psf)	0 - 72.00 (psf)	0 - 156.00 (psf)

**18.3 DEFLECTION DATA:**

Specimen #	Location	Load (psf)	Permanent Set (in.)	Percent Recovery (%)
6	Geometric Center of Shutter	+48.0	0.10	97.7
		-48.0	0.40	86.1
11	Geometric Center of Shutter	+46.4	0.20	91.3
		-65.0	0.24	91.1
12	Geometric Center of Shutter	+120.0	0.00	100.0
		-120.0	0.00	100.0
14	Geometric Center of Shutter	+46.4	0.12	97.2
		-65.0	0.20	87.5
15	Geometric Center of Shutter	+120.0	0.00	100.0
		-120.0	0.00	100.0
16	Geometric Center of Shutter	+46.4	0.40	93.0
		-65.0	0.10	98.2

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Specimen #	Location	Load (psf)	Permanent Set (in.)	Percent Recovery (%)
17	Geometric Center of Shutter	+120.0	0.09	93.8
		-120.0	0.11	81.4

**18.4 REMARKS:**

This sample was inspected carefully upon completion of the cyclic test for failures. None were found. As such, this specimen was found to satisfy the cyclic test requirements of TAS 203.

**MISCELLANEOUS INFORMATION**

**19.0 CERTIFICATION & DISCLAIMER STATEMENT:**

All tests performed on this test specimen were conducted in accordance with the specifications of the applicable codes, standards & test methods listed below by the Hurricane Test Laboratory, LLC located at 6655 Garden Road, Riviera Beach, FL 33404. HTL does not have, nor does it intend to acquire or will it acquire, a financial interest in any company manufacturing or distributing products tested at HTL. HTL is not owned, operated or controlled by any company manufacturing or distributing products it tests. This report is only intended for the use of the entity named in section 1.0 of this report. Detailed assembly drawings showing wall thickness of all members, corner construction and hardware applications are on file and have been compared to the test specimen submitted. A copy of this test report along with representative sections of the test specimen will be retained at HTL for a period of three (3) years. All results obtained apply only to the specimen tested and they do indicate compliance with the performance requirements of the test methods and specifications listed in the following section.

**20.0 APPLICABLE CODES, STANDARDS & TEST METHODS:**

**ASTM E330-02** - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

**Florida Building Code TAS 201-94** – Impact Test Procedures.


**Florida Building Code TAS 202-94** – Criteria For Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure.

**Florida Building Code TAS 203-94** – Criteria For Testing Products Subject To Cyclic Wind Pressure Loading.

**21.0 LIST OF OFFICIAL OBSERVERS:**

Vinu J. Abraham, P.E. – HTL, Managing Partner  
Urmilla Jokhu-Sowell, P.E. – HTL, Assistant Operations Manager  
Michelle Seybert – HTL, Technician  
Fred Henderson – HTL, Technician  
Eric Reyes – HTL, Technician  
Eric Alvarado – HTL, Technician  
Chuck Hildenbrand – HTL, Technician  
Veron Wickham – HTL, Technician  
Alvin Paschal – HTL, Technician  
Patrick Pemberton – HTL, Technician

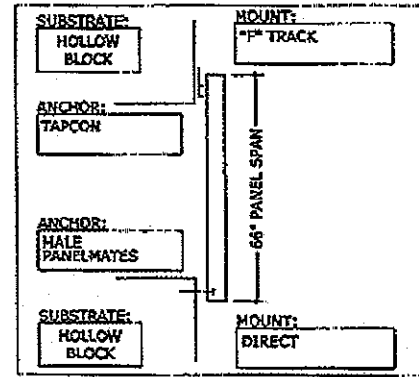
**ENGINEER OF RECORD**

  
1/2/07

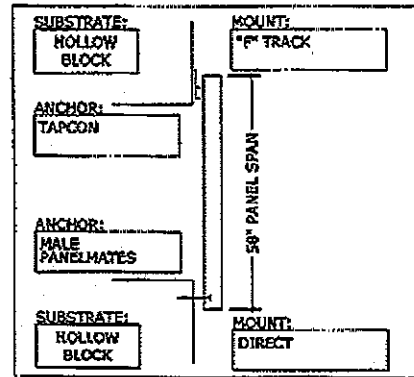
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# TEST PROGRAM

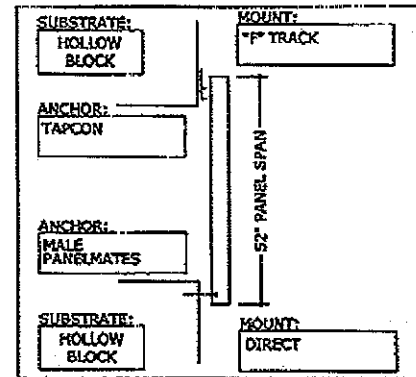
## STATIC LOAD TEST SAMPLES PER TAS 202



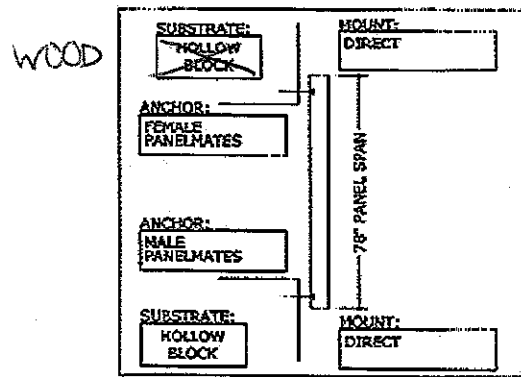
**SAMPLE #5**  
LOAD TO +59/-68 PSF  
*+59.5/-67.6*



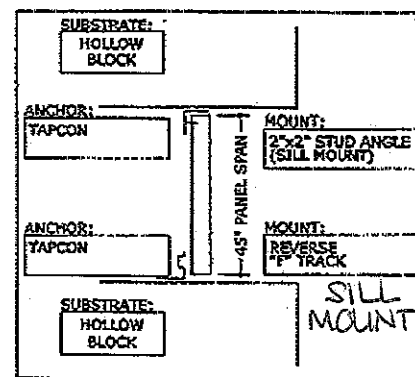
**SAMPLE #8**  
LOAD TO 85 PSF  
*+85/-90*



**SAMPLE #9**  
LOAD TO 105 PSF



**SAMPLE #10**  
LOAD TO +45.4/-65 PSF  
NOTE: SAMPLES #18, 19, 20 AND 21 WERE TESTED TO FAILURE WITH THE SAME SET UP AS SAMPLE #10.



**SAMPLE #13**  
LOAD TO 120 PSF

01/29/2007

**ENGINEERING EXPRESS**  
160 SW 12th AVENUE, #106  
DEERFIELD BEACH, FL 33442  
PH: (954) 354-0860 FAX: (954) 354-0443  
WWW.ENGINEXP.COM  
CREATED BY: AUPH1988  
A. FRANK L. BENIMADO, P.E., D.C. INNOVATION

**TRANSPARENT PROTECTION SYSTEMS, Inc.**  
6643 42nd TERRACE NORTH  
WEST PALM BEACH, FL 33407  
CLEAR POLYCARBONATE STORM PANELS  
TEST PROGRAM FOR  
MIAMI-DADE NOA

REVISION	DATE	BY	CHK	DESCRIPTION

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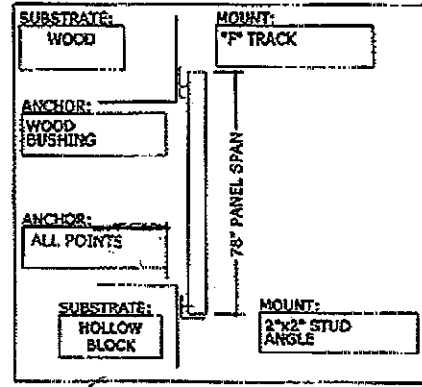
06-TPS-0003  
PAGE SCALE: N.T.S.  
DESCRIPTION:  
TEST PROGRAM SETUP & MOUNTING CONDITIONS  
1/2



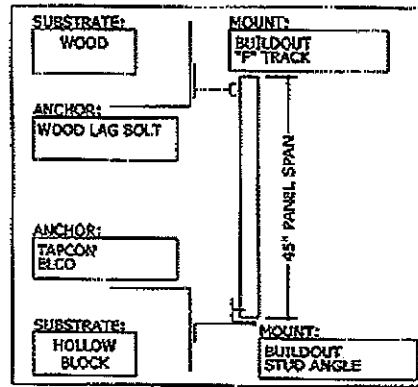
01/29/2007 - 10:15am RMR FPI Project (Miami Transparent Protection (TPS)) Job# 06-TPS-0003 Clear Carbon Storm Panels (06-TPS-0003) Job Test Program Rev. 0.0

# TEST PROGRAM

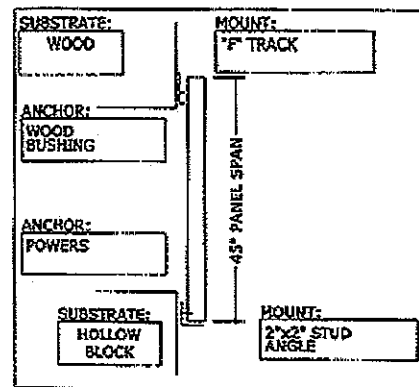
## IMPACT & CYCLIC LOAD TEST SAMPLES PER TAS 201 & 203



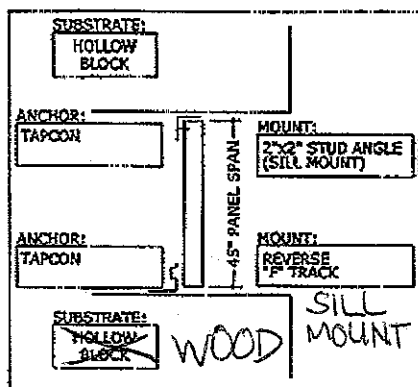
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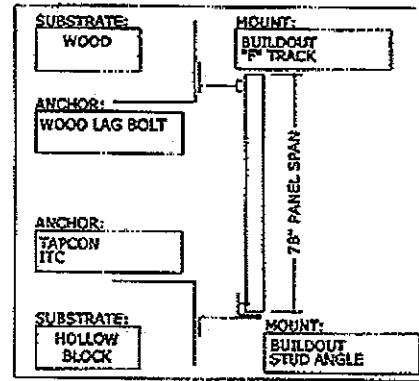
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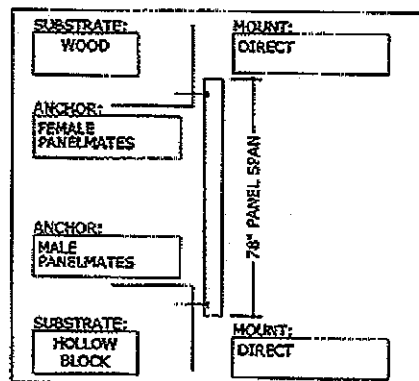
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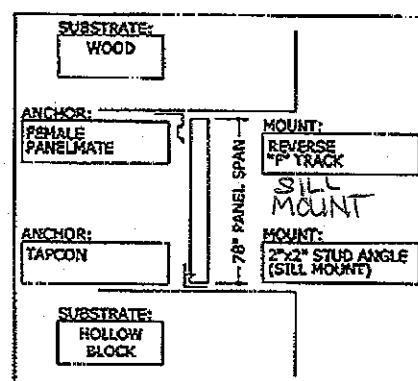
✓ **SAMPLE #12**  
LOAD TO 120 PSF



✓ **SAMPLE #14**  
LOAD TO +46.4/-65 PSF



✓ **SAMPLE #11**  
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**SAMPLE #16**  
LOAD TO +46.4/-65 PSF

01/29/2007

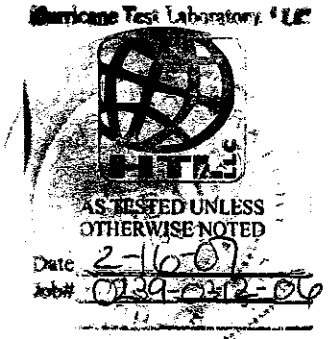
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**TRANSPARENT PROTECTION SYSTEMS, Inc.**  
 6643 42nd TERRACE NORTH  
 WEST PALM BEACH, FL 33407  
 CLEAR POLYCARBONATE STORM PANELS  
 TEST PROGRAM FOR  
 MIAMI-DADE NOA

REV.	DATE	DESCRIPTION

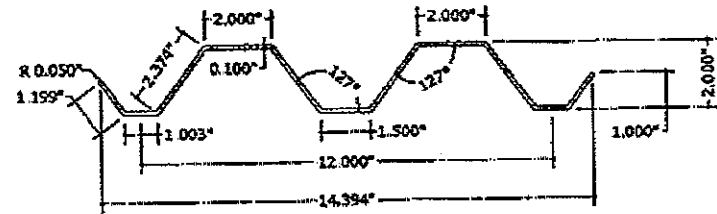
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 DESCRIPTION:  
 TEST PROGRAM SETUP & MOUNTING CONDITIONS

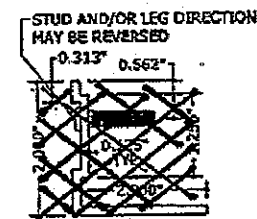


# ® POLYCARBONATE STORM PANELS (MIAMI-DADE NOA)

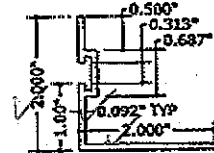
01/29/2007



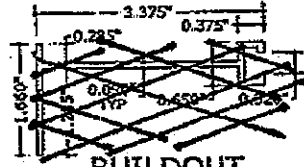
**1 FULL PANEL PROFILE**  
3" = 1'-0"



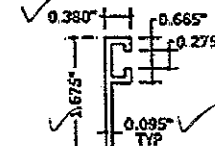
**3 STUD ANGLE**  
6" = 1'-0"



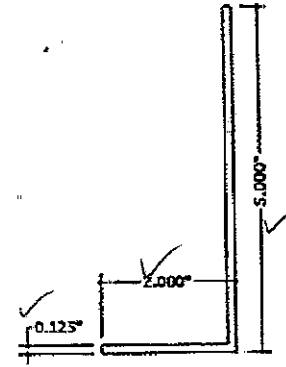
**4 REVERSE 'F' ANGLE**  
6" = 1'-0"



**5 BUILDOUT 'F' TRACK**  
6" = 1'-0"

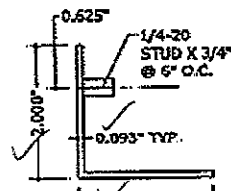


**6 'F' TRACK**  
6" = 1'-0"



**7 CLOSURE ANGLE**  
6" = 1'-0"

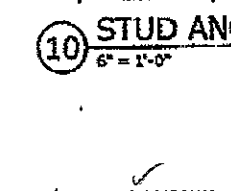
NOTE ALL EXTRUSIONS TO BE 6063-T6 ALUMINUM ALLOY UNLESS OTHERWISE NOTED.



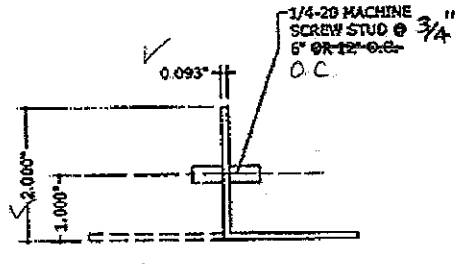
**8 KEYHOLE WASHER**  
6" = 1'-0"



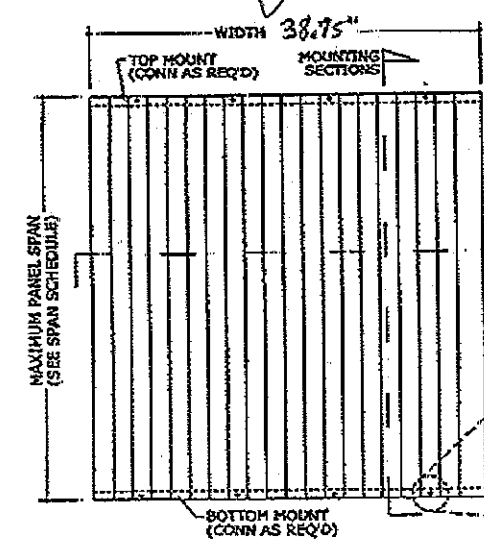
**9 WASHED WINGNUT**  
6" = 1'-0"



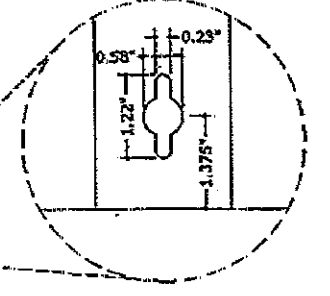
**10 STUD ANGLE**  
6" = 1'-0"



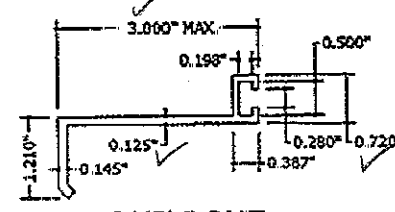
**11 STUDDED ANGLE**  
6" = 1'-0"



**1 TYPICAL ELEVATION**  
1 N.T.S.



**2 KEYHOLE DETAIL**  
1 N.T.S.  
ALT: FIELD DRILL #3/8" HOLE (OR #5/8" HOLE W/ KEYHOLE WASHER)



**12 BUILDOUT 'F' TRACK**  
6" = 1'-0"

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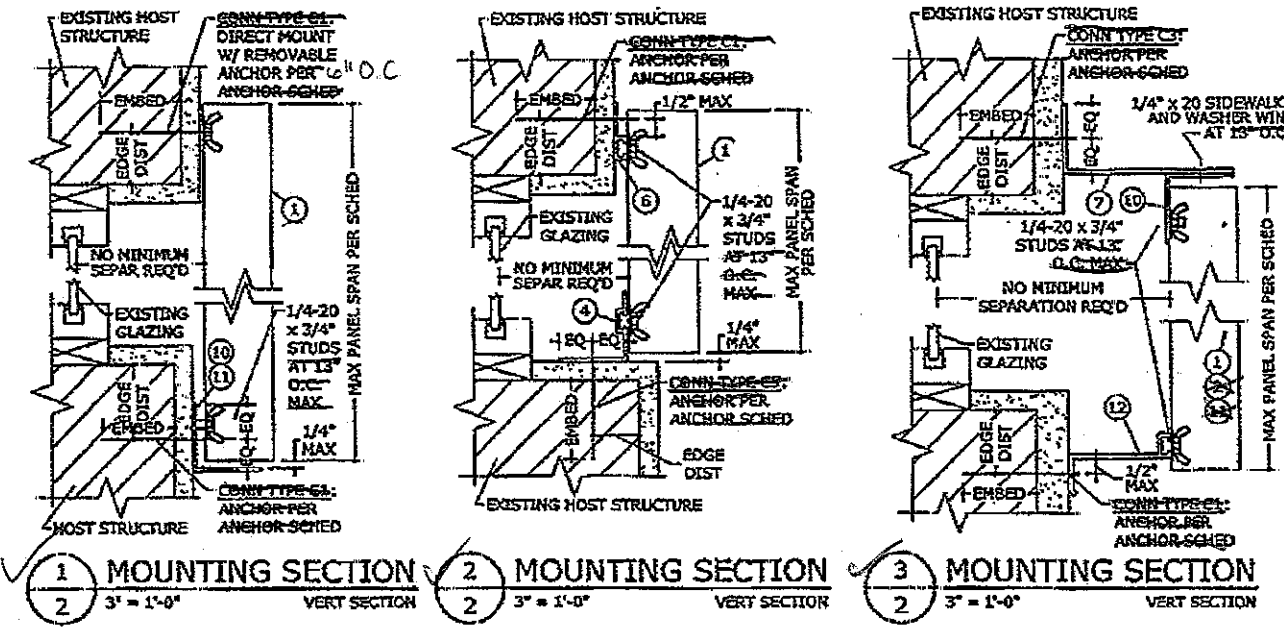
**TPS** Transport Protection Systems, Inc.  
6643 42ND TERRACE  
WEST PALM BEACH, FL 33417  
CLEARGUARD POLYCARBONATE STORM PANELS  
FOR USE WITHIN THE HVHZ  
MIAMI-DADE NOA

DATE	BY	DESCRIPTION

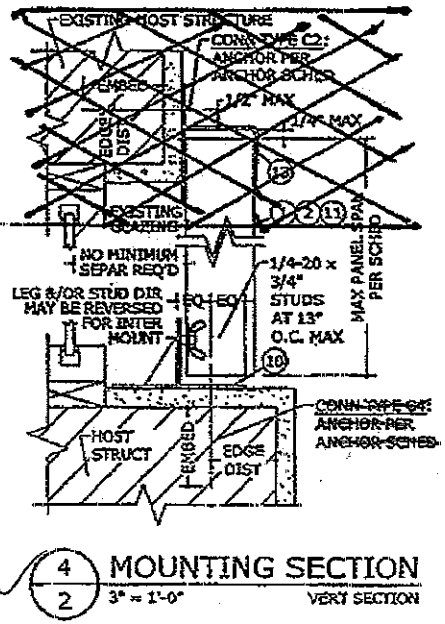
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Maximum Test Laboratory  
Date: 2-18-07  
Job: 02-09-02-06

01/26/2007 - 2:45pm  
 F501 Project Plan/Transparent Protection (TPS) 06/03/03  
 John V. TPS-0003 ClearGuard Storm Panels (TPS) - Lab Drawing



1" FROM EACH END AND 8" ON CENTER THEREAFTER



- ALL DIRECT MOUNT ANCHORS WERE SPACED 6" ON CENTER
- ALL OTHER MOUNTING STYLES HAD ANCHOR SPACING OF 2" FROM EACH END AND 8" ON CENTER THEREAFTER
- PANEL ATTACHMENT USES 1/4-20 x 3/4" STUDS SPACED 2" FROM EACH END AND 6" ON CENTER THEREAFTER

01/26/2007

**ENGINEERING EXPRESS**

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 CITY OF AUTHORITY  
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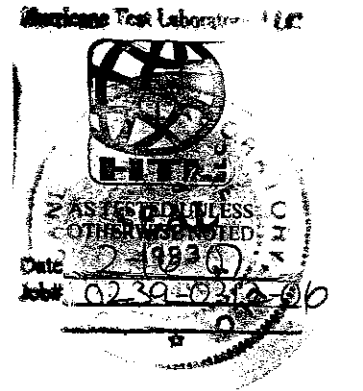
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**TPS**  
 Transparent Protection Systems, Inc.  
 6643 42ND TERRACE  
 WEST PALM BEACH, FL 33407  
 CLEARGUARD POLYCARBONATE STORM PANELS  
 FOR USE WITHIN THE HVHZ  
 MIAMI-DADE NOA

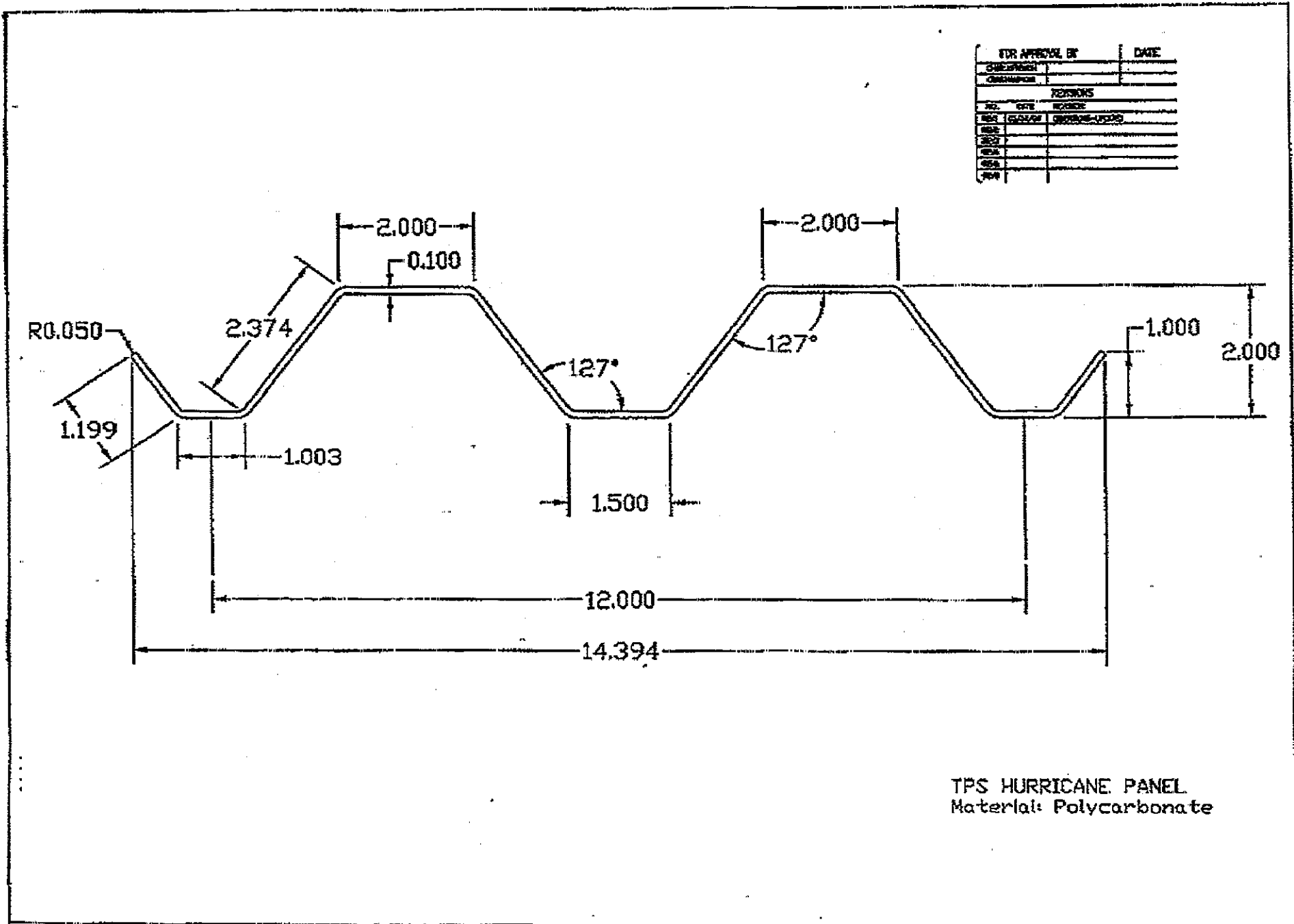
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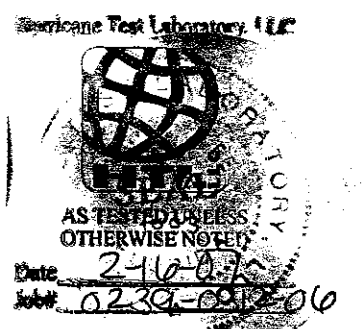
FOR APPROVAL BY		DATE
DESIGNER		
CHECKER		
REVISIONS		
NO.	DATE	REVISION

**TRANSPARENT PROTECTION SYSTEMS, INC**  
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 FAX: (561) 844 2447  
 E-MAIL: [TPS@TPS.COM](mailto:TPS@TPS.COM)  
 WEBSITE: [WWW.TPS.COM](http://WWW.TPS.COM)  
 6845 42nd  
 WEST PALM BEACH, FLORIDA 33407

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TPS HURRICANE PANEL  
 Material: Polycarbonate

✓  
 1 A







# CALIBRE 302V-6

## Polycarbonate Resin

### Overview

CALIBRE\* 302V-6 Polycarbonate resin offers exceptional impact resistance, heat distortion resistance and clarity

### Applications

- ITE
- Automotive
- Appliances

Physical Properties <sup>(1)</sup>	Test Method	English Units	SI Units
Specific Gravity	ASTM D 792	1.2	1.2
Melt Flow Rate, 300°C/1.2kg	ASTM D 1238	6 g/10 min	6 g/10 min
Mold Shrinkage, Flow	ASTM D 955	0.005-0.007 in/in	0.005-0.007 mm/mm
Water Absorption	ASTM 570		
73°F (23°C), 24 hrs		0.15	0.15
73°F (23°C), 50% RH @ Equilibrium		0.32	0.32
Mechanical Properties <sup>(2)</sup>			
Tensile Strength at Yield, 50 mm/min	ASTM D 638	8,700 psi	60 MPa
Tensile Strength at Break, 50 mm/min	ASTM D 638	10,500 psi	72 MPa
Tensile Elongation at Break, 50 mm/min	ASTM D 638	150 %	150 %
Tensile Modulus, 50 mm/min	ASTM D 638	350,000 psi	2410 MPa
Flexural Strength, 3-points, 2 mm/min	ASTM D 790	14,000 psi	96 MPa
Flexural Modulus, 3-points, 2 mm/min	ASTM D 790	350,000 psi	2410 MPa
Tensile Impact Strength	ASTM D 1822	280 ft-lb/in	589 J/m
Notched Izod Impact	ASTM D 256		
73°F (23°C)		17 ft-lb/in	900 J/m
Unnotched Izod Impact	ASTM D 256		
73°F (23°C)		No break	No break
Instrumented Dart Impact	ASTM D 3763		
Peak Energy, 73°F (23°C), 8000 ipm		800 in-lb	90 J
Taber Abrasion Resistance - $\Delta$	ASTM D 1044	45 %	45 %
Rockwell Hardness, R Scale (M Scale)	ASTM D 785	118	73
Thermal Properties			
Deflection Temperature Under Load	ASTM D 648		
66 psi (0.45 MPa), annealed		288°F	142°C
264 psi (1.8 MPa), annealed		282°F	139°C
264 psi (1.8 MPa), unannealed		252°F	122°C
Vicat Softening Point	ASTM D 1525		
50°C/hr, 50N		298°F	148°C
CLTE, flow, -40 to 180°F (-40 to 80°C)	ASTM D 696	38 x 10 <sup>-6</sup> in/in/°F	68 x 10 <sup>-6</sup> mm/mm/°C
Electrical Properties			
Dielectric Strength	ASTM D 149	420 V/mil	17 kV/mm
Dielectric Constant, 60 Hz	ASTM D 150	3.0	3.0
1 MHz		3.0	3.0
Dissipation Factor, 50 Hz	ASTM D 150	0.001	0.001
1 MHz		0.002	0.002
Volume Resistivity	ASTM D 257	2.0 x 10 <sup>17</sup> ohm	2.0 x 10 <sup>17</sup> cm
Optical Properties			
Refractive Index	ASTM D 542	1.586 n <sub>D</sub>	1.586 n <sub>D</sub>
Haze	ASTM D 1003	1 %	1 %
Light Transmission	ASTM D 1003	89 %	89 %

\*Trademark of The Dow Chemical Company



**Flammability<sup>(3)</sup>**

UL94 Classification at 1.6 mm (0.0625 in)	UL 94	V-2	V-2
3.2 mm (0.125 in)	UL 94	V-2	V-2
Limiting Oxygen Index	ISO 4589-2	26 %	26 %
Average Extent of Burning	ASTM D 635	1 in	25 mm

**Notes**

- 1 Typical properties; not to be construed as sales specifications. Fabrication conditions, part design, additives, processing aids, finishing materials, and use conditions can all affect the integrity, performance, and regulatory status of finished goods.
- 2 Tests conducted on 0.125 inch (3.2 mm) injection molded specimen, unannealed, unless noted.
- 3 This rating not intended to reflect hazards presented by this or any other material under actual fire conditions.

## Safety and Handling Considerations

Material Safety Data (MSD) sheets are available for all resins from Dow Plastics, a business group of The Dow Chemical Company and its subsidiaries. MSD sheets are updated regularly and are available on [www.dow.com](http://www.dow.com) or can be requested through the Dow Customer Information Group. Always review the most current MSD sheet before handling or using any product. The following comments are general and apply only to all engineering plastics resins as supplied by Dow plastics. Various additives and processing aids used in fabrication and other materials used in finishing steps have their own safe use profile and must be investigated separately.

### Hazards and Handling Precautions

Engineering plastics resins have a very low degree of toxicity and under normal conditions of use should pose no unusual problems from ingestion, eye, or skin contact. However, caution is advised when handling, storing, using, or disposing these resins. Good housekeeping and controlling of dust are necessary for safe handling. Workers should be protected from the possibility of contact with molten resin.

Handling of engineering plastic resins can result in the generation of vapors and dust including small particles of glass fibers when dealing with glass filled resins. Dust resulting from sawing, filing, and sanding in post-molding operations may cause irritation of eyes and upper respiratory tract. Use an approved dust respirator in dusty atmospheres. Slight itching and irritation may result from skin contact of glass filled resins. Repeated exposure to particles generated by grinding glass fiber-reinforced materials may result in implantation of particles in the skin.

Processing may release fumes which can be irritating. Good general ventilation should be sufficient for most conditions. In addition, local exhaust ventilation may be necessary for some operations. For high heat ABS resins, local exhaust ventilation above the dies and vent ports of processing equipment such as injection molding and extrusion machines is necessary to keep airborne dust levels below the exposure guidelines.

Use safety glasses. If there is a potential for exposure to particles which could cause mechanical injury to the eye, wear chemical goggles. If vapor exposure causes eye discomfort, use a full-face respirator. Use gloves with insulation for thermal protection when needed. Processing fumes will condense in the air extraction system and can deposit on equipment surfaces close to the emission points. Fume deposits of high heat ABS resins can cause skin irritation and skin damage. Wear chemical resistant gloves when in contact with surfaces contaminated with these deposits and when cleaning the deposits.

To accelerate cooling of large polymer masses of ignition resistant resins, RETAIN\* post consumer recycle content plastic resins and high heat ABS resins, quench purge patties in water. If quenching is not possible, move the purge patties from the working area to a well-ventilated area to cool. Do not purge the processing equipment with these materials.

### Combustibility

Although engineering plastics resins may contain ignition resistant chemical additives, they will, once ignited, burn rapidly under the right conditions. Do not permit dust to accumulate. Dust layers can be ignited by spontaneous combustion or other ignition sources. When suspended in air, dust can also pose an explosion hazard. Dense black smoke and toxic fumes are produced when product burns. Water fog or fine spray is the preferred extinguishing media. Carbon dioxide or dry chemicals may also be used.

### Disposal

Do not dump into any sewers, on the ground, or into any body of water. All disposal methods must be in compliance with Federal, State/Provincial, and local laws and regulations. The Dow Customer Information Group can provide lists of companies which recycle, reprocess, or manage plastics waste.

### Environment

Generally speaking, pellets lost in the environment are not a problem since they are inert and benign in terms of their physical environmental impact. However, when they enter the marine environment and are ingested by waterfowl or aquatic life, they may mechanically cause adverse effects. Spills should be minimized and they should be cleaned up when they happen.

## Medical Applications Policy

DOW PLASTICS MAKES NO WARRANTIES, EXPRESS OR IMPLIED, CONCERNING THE SUITABILITY OF ANY DOW PLASTICS PRODUCT FOR USE IN MEDICAL APPLICATIONS. It is the responsibility of the medical device or pharmaceutical manufacturer to determine that the Dow Plastics product is safe, lawful, and technically suitable for the intended use.

Dow Engineering Plastics will not knowingly sell or sample any products into any commercial or developmental application intended for:

- Long term contact with internal body fluids or internal body tissues. (Long term is a use which exceeds 72 continuous hours, or 30 days for PELLETHANE™ thermoplastic polyurethane elastomers);
- Use in cardiac prosthetic devices regardless of the length of time involved. (Cardiac prosthetic devices include, but are not limited to, pacemaker leads and devices, artificial hearts, heart valves, intra-aortic balloons and control systems, and ventricular bypass assisted devices);
- Use as a critical component in medical devices that support or sustain human life;
- Use specifically by pregnant women or in applications designed to promote or interfere with human reproduction.

In addition, new business opportunities require a business assessment prior to sale or sampling.

This engineering plastics medical policy applies to all engineering plastics resins from Dow Plastics. Authorized distributors and resellers will also adhere to this policy.

For additional information contact the Dow Customer Information Group:  
Asia/Pacific: 800-7776-7776  
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