



# ETC Laboratories

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Report Number: ETC-07-906-20033.0

Job Number: ETC-07-906-20033-7

Test Start Date: 03/05/07

Test Finish Date: 02/18/08

Report Date: 02/20/08

## Material Test Report

Rendered To

Plaskolite Inc.  
P.O. Box 1497  
Columbus, OH 43216

### Product

Duraplex

### Summary of Results

No.	Test Description	Test Method	Test Result	Requirements*
1.	Test for Smoke Density	ASTM D2843	32.1 %	Pass < 75 %
2.	Test for Self Ignition Temperature	ASTM D1929	830 °F	Pass > 650 °F
3.	Test for Rate of Burning	ASTM D635	1.32 in./min.	Pass CC2 < 2.5 in./min.
4.	Total Transmittance of Unexposed Samples	ASTM D1003	91.7 %	---
5.	Total Transmittance of 2900-hour Xenon Arc Exposed Samples	ASTM D1003	91.6 %	---
6.	Percent Difference between No. 7 and No. 8	---	0.1 %	Pass < 10 %
7.	Charpy Impact of Unexposed Samples	ASTM D6110	0.736 ft-lbf/in.	---
8.	Charpy Impact of 2900-hour Xenon Arc Exposed Samples	ASTM D6110	0.760 ft-lbf/in.	---
9.	Percent Difference between No. 7 and No. 8	---	3.16%	Pass < 25 %

\*Note: Specimens were tested to meet the test requirements of AAMA/WDMA/CSA 101/I.S. 2/A440-XX, Draft #14, Dated 11-16-06

## Scope of Work

ETC Laboratories was contracted by Plaskolite Inc. to perform Self Ignition Temperature, Rate of Burn, Smoke Density Strength, Light Transmission, and Charpy Impact tests on Duraplex Plastic. The tests were performed according to the following test methods:

- ASTM D1929-96 (2001) *Standard Test Method for Ignition Properties of Plastics*
- ASTM D2843-99 *Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics*
- ASTM D635-98 *Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position*
- ASTM D6110-06 *Standard Test Method for Determining the Charpy Impact Resistance of Notched Specimens of Plastics*
- ASTM D1003-00 *Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics*
- ASTM G155-05a *Practice Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials.*

## Test Specimen

Plaskolite Inc. submitted material and it was prepared for testing per the requirements of each test method. Each specimen was de-burred before testing. The number and the size of the specimens in each group were:

- Self Ignition Temperature group measuring 3/4 in. square by a thickness to create a sample weight of 3 grams.
- Rate of Burn group measuring 6-inch by 1/2 inch by 0.264 in. thick.
- Smoke Density Test group measuring 1 in. square by 0.260 in. thick.
- Transmittance group measuring 0.568 in. square by 0.200 in. thick.
- Charpy Impact group measuring 5/32 in wide, with a 45 degree notch with an end radius of 0.010 in.

The specimens were conditioned at 73 degrees F and 50% RH for a minimum of 48 hours prior to testing.

## Test Procedures

1. ASTM D 1929 Self Ignition Test:  
The test was conducted according to the requirements of the ASTM D1929-96.
2. ASTM D 2843 Smoke Density Test:  
This test was conducted according to the requirements of the ASTM D2843-99.
3. ASTM D 635 Rate of Burning Tests:  
The test was conducted according to the requirements of the ASTM D635-98.
4. Pre/Post Weathering Tests, Light Transmittance and Charpy Impact Testing:  
To begin, the specimen group is divided into two sets of 5 specimens. One set was kept in a relatively light tight box in a room maintained at standard laboratory conditions. These were the unexposed specimens. The other set was placed in an Atlas Weather-o-meter xenon arc chamber model Ci35; it is a 6500 Watt machine producing  $0.35 \text{ W/m}^2$  at a wavelength of 340 nm. The xenon arc chamber is running a 102/18 cycle, which is constant light with 18 minutes of water spray every two hours. Specimens in this chamber will receive one year worth of outdoor radiation in 1350 hours. The specimens were weathered for 2900 hrs in accordance with ASTM G155-05a *Practice Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials*. These were the exposed specimens. The exposed and unexposed specimens were then tested according to the requirements of ASTM D1003 and ASTM D6110.

## Test Results

Listed in Tables 1 through 9 are the results from the Rate of Burn, Self-Ignition Temperature, Smoke Density, Transmittance and Charpy tests. Figure 1 shows the Smoke Density graphs.

The **Rate of Burn** of the plastic was determined to be 1.32 inches per minute. Therefore; according to AAMA/WDMA/CSA 101/I.S. 2/A440-XX, Draft #14, **the sample meets the requirement for a rating of C-2.**

The **Ignition Point** of the plastic was determined to be 830 degrees F. The minimum allowed by AAMA/WDMA/CSA 101/I.S. 2/A440-XX, Draft #14, is 650 degrees F; therefore, **the samples meet the requirements.**

The plastic achieved a **Smoke Density Rating** of 32.1 %. The maximum allowed by AAMA/WDMA/CSA 101/I.S. 2/A440-XX, Draft #14, is 75 therefore; **the sample meets the requirements.**

The plastic achieved a **comparative light transmittance** of 0.1%. The maximum difference allowed by AAMA/WDMA/CSA 101/I.S. 2/A440-XX, Draft #14, is 10% therefore; **the sample meets the requirements.**

The plastic achieved comparative **impact strength** of 3.16%. The maximum difference allowed by AAMA/WDMA/CSA 101/I.S. 2/A440-XX, Draft #14, is 25% therefore; **the sample meets the requirements.**

Table 1: Rate of Burn Test Result for Duraplex

Specimen	Thickness (in)	Burning Time To 25 mm (sec)	100 mm Burn (mm)	Burning Rate (cm/min)	Burning Rate (in/min)
1	0.161	47	yes	3.46	1.36
2	0.161	35	yes	3.21	1.27
3	0.161	36	yes	3.36	1.32
Average	0.161	39	--	3.34	1.32

Table 2: Spontaneous Ignition Temperature Test Result for Duraplex

Specimen	Mass (g)	Air Temp (°F)	Sample Temp (°F)	Ignition (yes/no)
1	3	818	816	no
2	3	829	820	yes

Table 3: Self Ignition Temperature Test Observations for Duraplex

Specimen	Temp @ Ignition (°F)	Combustion Type (Glowing/Flaming)	Observed Smoke (sec)	Observed Soot (sec)
1	--	--	113	--
2	1026	flame	114	--

Figure 1: Percent Light Absorbed Versus Time for Duraplex

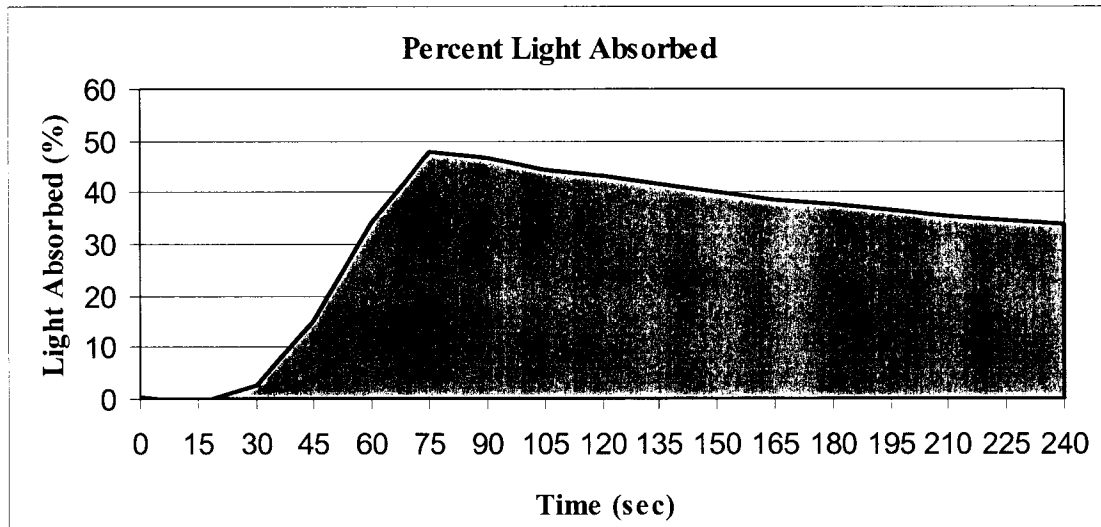


Table 4: Smoke Density Test Result for Duraplex

Time (sec)	% Light Absorbed			Avg. (%)
	Spec 1	Spec 2	Spec 3	
0	0.0	0.4	0.2	0.2
15	-1.6	-0.4	-0.5	-0.8
30	1.5	4.9	2.0	2.8
45	12.5	20.0	12.9	15.1
60	30.9	41.8	30.6	34.4
75	44.4	53.7	46.0	48.0
90	41.1	53.3	45.9	46.8
105	38.4	50.8	44.4	44.5
120	36.4	48.4	45.3	43.4
135	35.5	46.2	42.8	41.5
150	34.2	44.5	41.5	40.1
165	33.2	42.7	39.9	38.6
180	33.0	41.3	38.8	37.7
195	32.1	39.9	37.9	36.6
210	31.1	38.7	36.9	35.6
225	31.0	37.5	35.4	34.6
240	29.9	36.5	34.8	33.7

Table 5: Smoke Density Test Results Summary

Specimen Number	Width (in.)	Depth (in.)	Thickness (in.)	Smoke Density Rating (%)
1	0.975	0.940	0.161	28.0
2	0.976	0.873	0.161	36.3
3	1.057	0.976	0.160	32.1
Average	1.00	0.930	0.161	32.1

Table 6: Unexposed Samples Transmittance and Haze Test Results

Specimen Number	Transmittance		Haze
	Total (%)	Diffuse (%)	(%)
1-NW	91.6	1.1	1.2
2-NW	91.8	2.1	2.3
3-NW	91.8	1.3	1.4
Average	91.7	1.5	1.6
Std. Dev.	0.1	0.5	0.6

Table 7: Exposed Samples Transmittance and Haze Test Results

Specimen Number	Transmittance		Haze
	Total (%)	Diffuse (%)	(%)
1-W	91.7	5.9	6.4
2-W	91.8	7.3	7.9
3-W	91.4	8.6	9.4
Average	91.6	7.2	7.9
Std. Dev.	0.2	1.4	1.5

Table 8: Unexposed Charpy Impact Test Results

Specimen Number	Width	Depth Under Notch	Hammer Capacity	Charpy Impact Strength	Type of Break
	(in.)	(in.)	(ft-lbs)	(ft-lbf/in)	
1-NW	0.1593	0.4028	2.0	0.954	Complete
2-NW	0.1591	0.3995	2.0	0.656	Complete
3-NW	0.1592	0.4002	2.0	0.995	Complete
4-NW	0.1591	0.4020	2.0	0.564	Complete
5-NW	0.1590	0.3972	2.0	0.512	Complete
Average	0.1591	0.4003	2.0	0.736	
Std. Dev.	0.0001	0.0022	0.0	0.22	

Table 9: Exposed Charpy Impact Test Results

Specimen Number	Width	Depth Under Notch	Hammer Capacity	Charpy Impact Strength	Type of Break
	(in.)	(in.)	(ft-lbs)	(ft-lbf/in)	
1-W	0.1582	0.3996	2.0	0.950	Complete
2-W	0.1580	0.3982	2.0	0.616	Complete
3-W	0.1582	0.3988	2.0	0.615	Complete
4-W	0.1591	0.2953	2.0	0.993	Complete
5-W	0.1589	0.3972	2.0	0.624	Complete
Average	0.1585	0.3778	2.0	0.760	
Std. Dev.	0.0005	0.0461	0.0	0.19	

**ASTM D635-98 Caveat**

*This standard should be used to measure and describe the properties of material, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.*

**ASTM D1929-96(2000)e1 Caveat**

*These test results relate only to the behavior of test specimens under particular conditions of the test. They are not intended to be used, and shall not be used, to assess the potential fire hazard of a material in use.*

**ASTM D2843-99 Caveat**

*This standard should be used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire-hazard or fire-risk of materials, products or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire-hazard assessment or a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard or fire-risk of a particular end use.*

### Conditions, Terms, and General Notes Regarding the Test

These test results were obtained by employing all requirements of the designated test methods with no deviations. The test results and specimen supplied for testing comply with the referenced specifications.

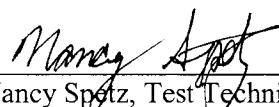
The test results are specific to the product tested by this laboratory and of the sample supplied by the client named herein, and they relate to no other product either manufactured by the client, a fabricator of the client or of installed field performance.


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