

PERFORMANCE TEST REPORT

Rendered to:

PALRAM AMERICAS, INC.

PRODUCT: Clear Palsun

TYPE: Polycarbonate

Report No: C7626.01-106-31

Report Date: 05/08/13

Test Record Retention Date: 05/08/17

PERFORMANCE TEST REPORT

Rendered to:

PALRAM AMERICAS, INC.
9735 Commerce Circle
Arcadia West Industrial Park
Kutztown, Pennsylvania 19530

Report No: C7626.01-106-31

Test Date: 04/30/13

Report Date: 05/08/13

Test Record Retention Date: 05/08/17

Product: Clear Palsun

Type: Polycarbonate

Project Summary: Architectural Testing, Inc. was contracted by Palram Americas, Inc. to evaluate the smoke density of their Clear Palsun polycarbonate. The product description, test procedures and test results are reported herein. The average results obtained from testing are shown in the following table.

Smoke Density

Clear Palsun	Average
0.118" Thickness	61.8
0.500" Thickness	66.3

Test Method: The test specimens were evaluated in conformance with ASTM D 2843-10, *Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics*.

Note that there was one deviation to the method: Palram specified the thicknesses of the test specimens to be nominally 0.118" and 0.500" instead of the specified 1/4" thickness.

Product Description: The Clear Palsun polycarbonate was submitted to Architectural Testing by Palram Americas and consisted of the following: ten nominal 1" x 1" x 0.118" pieces and ten nominal 1" x 1" x 0.500" pieces. Each piece had a UV coating on one 1" x 1" side. The material was tested as-received with the exception of removing the protective film from both sides prior to testing.

Test Procedure and Test Results: Testing procedure and the results obtained from testing are reported as follows. All conditioning of test specimens and test conditions were at standard laboratory conditions.

ASTM D 2843 - Smoke Density

A test specimen was exposed to a flame inside a Smoke Chamber (ICN 004388). The horizontal light absorption was measured across the light beam path of a photoelectric cell, and the condition of the smoke chamber was observed. The test specimen was tested with the UV coated side towards the flame. The Light Absorption Curves are presented in Appendix A.

***Caveat:** This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazard or fire risk assessment of the materials, products or assemblies under actual fire conditions.*

Smoke Density - Clear Palsun Polycarbonate - 0.118" Thickness

Test Specimen	Width (in)	Length (in)	Thickness (in)	Maximum Smoke Density (%)	Smoke Density Rating
1	0.992	0.994	0.117	86.15	60.3
2	0.991	0.992	0.119	90.21	67.2
3	0.996	0.991	0.118	85.90	58.0

Average Smoke Density Rating: 61.8

***Note:** During the first smoke density test, the letters on the exit sign were visible and readable through the smoke. During the second and third smoke density tests, the letters on the exit sign were visible and readable through the smoke, but became unreadable for about one minute. The test specimens melted, flamed, charred, dripped to the pan below and extinguished during the test.*

Smoke Density - Clear Palsun Polycarbonate - 0.500" Thickness

Test Specimen	Width (in)	Length (in)	Thickness (in)	Maximum Smoke Density (%)	Smoke Density Rating
1	1.029	1.030	0.490	97.77	64.6
2	1.024	1.029	0.491	91.48	62.7
3	1.027	1.032	0.488	96.89	71.6

Average Smoke Density Rating: 66.3

***Note:** During all smoke density tests, the letters on the exit sign became obscured. The test specimens melted, flamed, charred and dripped to the pan below. Test specimens two and three extinguished near the end of the test.*

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.:

Dawn M Chaney - Senior Technician
Components / Materials Testing

Gary Hartman, P.E. - Director
Components / Materials Testing

DMC:dmc/nlh

Attachments (pages) This report is complete only when all attachments listed are included.
Appendix A - Smoke Density Light Absorption Curves (8)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	05/08/13	N/A	Original report issue.

APPENDIX A

Smoke Density Light Absorption Curves

Smoke Density Testing per ASTM D 2843

Exit Sign Chamber

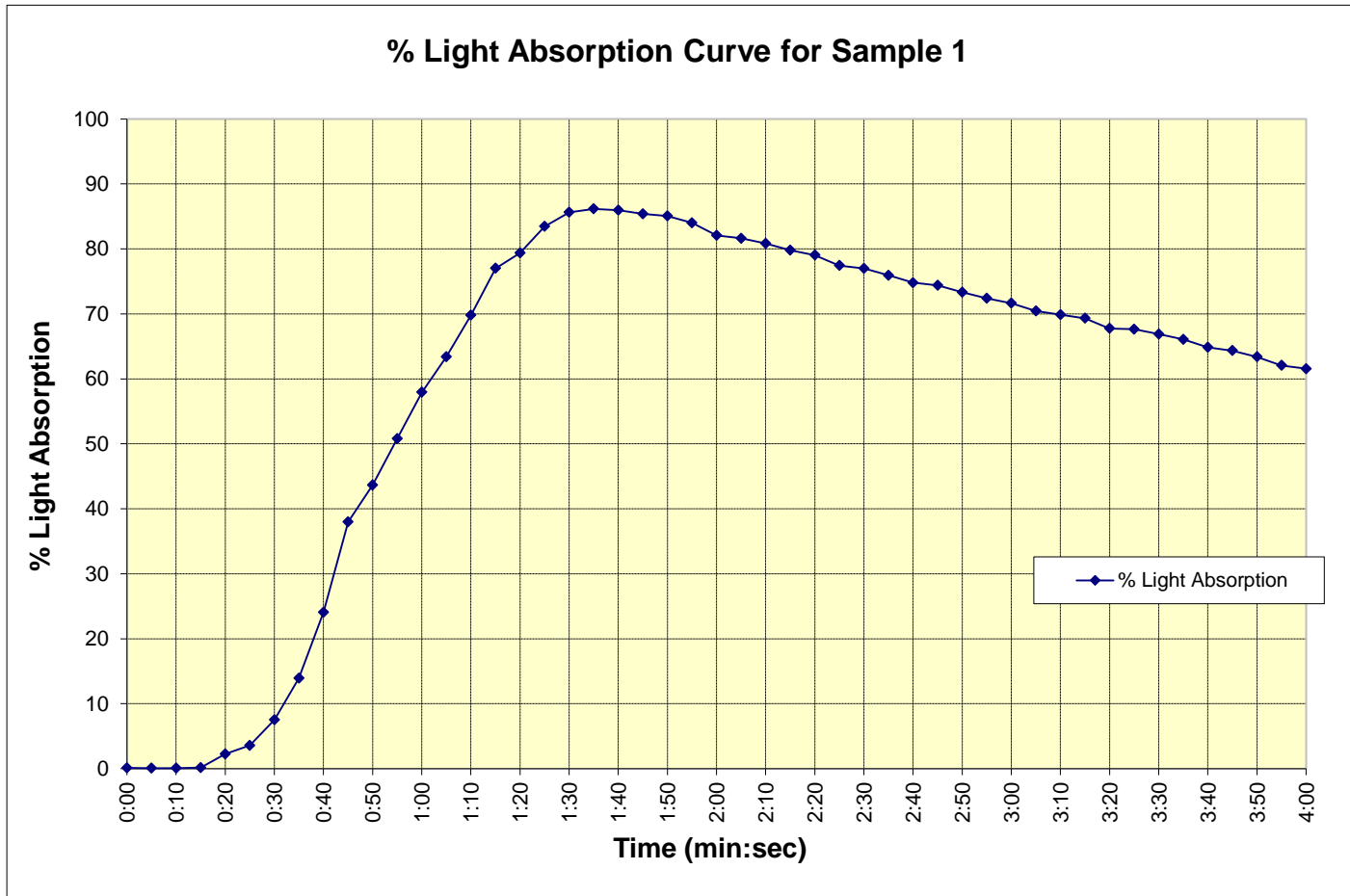
ATI No.: C7626.01-106-31

Test Date: 4/30/2013

Technician: DMC/KAG

Time (min:sec)	% Light	% Light Absorption
0:00	99.88	0.12
0:05	99.92	0.08
0:10	99.93	0.07
0:15	99.84	0.16
0:20	97.75	2.25
0:25	96.42	3.58
0:30	92.49	7.51
0:35	86.07	13.93
0:40	75.92	24.08
0:45	62.02	37.98
0:50	56.34	43.66
0:55	49.21	50.79
1:00	42.06	57.94
1:05	36.61	63.39
1:10	30.20	69.80
1:15	22.99	77.01
1:20	20.64	79.36
1:25	16.55	83.45
1:30	14.38	85.62
1:35	13.85	86.15
1:40	14.04	85.96
1:45	14.61	85.39
1:50	14.93	85.07
1:55	15.99	84.01
2:00	17.91	82.09
2:05	18.37	81.63
2:10	19.16	80.84
2:15	20.20	79.80
2:20	20.95	79.05
2:25	22.56	77.44
2:30	23.00	77.00
2:35	24.07	75.93
2:40	25.21	74.79
2:45	25.60	74.40
2:50	26.68	73.32
2:55	27.59	72.41
3:00	28.36	71.64
3:05	29.57	70.43
3:10	30.15	69.85
3:15	30.67	69.33
3:20	32.25	67.75
3:25	32.38	67.62
3:30	33.11	66.89
3:35	33.94	66.06
3:40	35.16	64.84
3:45	35.65	64.35
3:50	36.62	63.38
3:55	37.94	62.06
4:00	38.44	61.56

Sample #	Manufacturer	Product Name	Material Type	Width (in)	Length (in)	Thickness (in)
1	Palram Americas	Clear Palsun - 0.118"	Polycarbonate	0.992	0.994	0.117



Calibration	Resistance (kΩ)
100% Light	3.149

Plot Area 240 Maximum Smoke Density 86.15 %
 Area Under Curve 144.6 **Smoke Density Rating* 60.3**

* Note: Miami-Dade County requires the Smoke Density Rating to be less than 75.

Smoke Density Testing per ASTM D 2843

Exit Sign Chamber

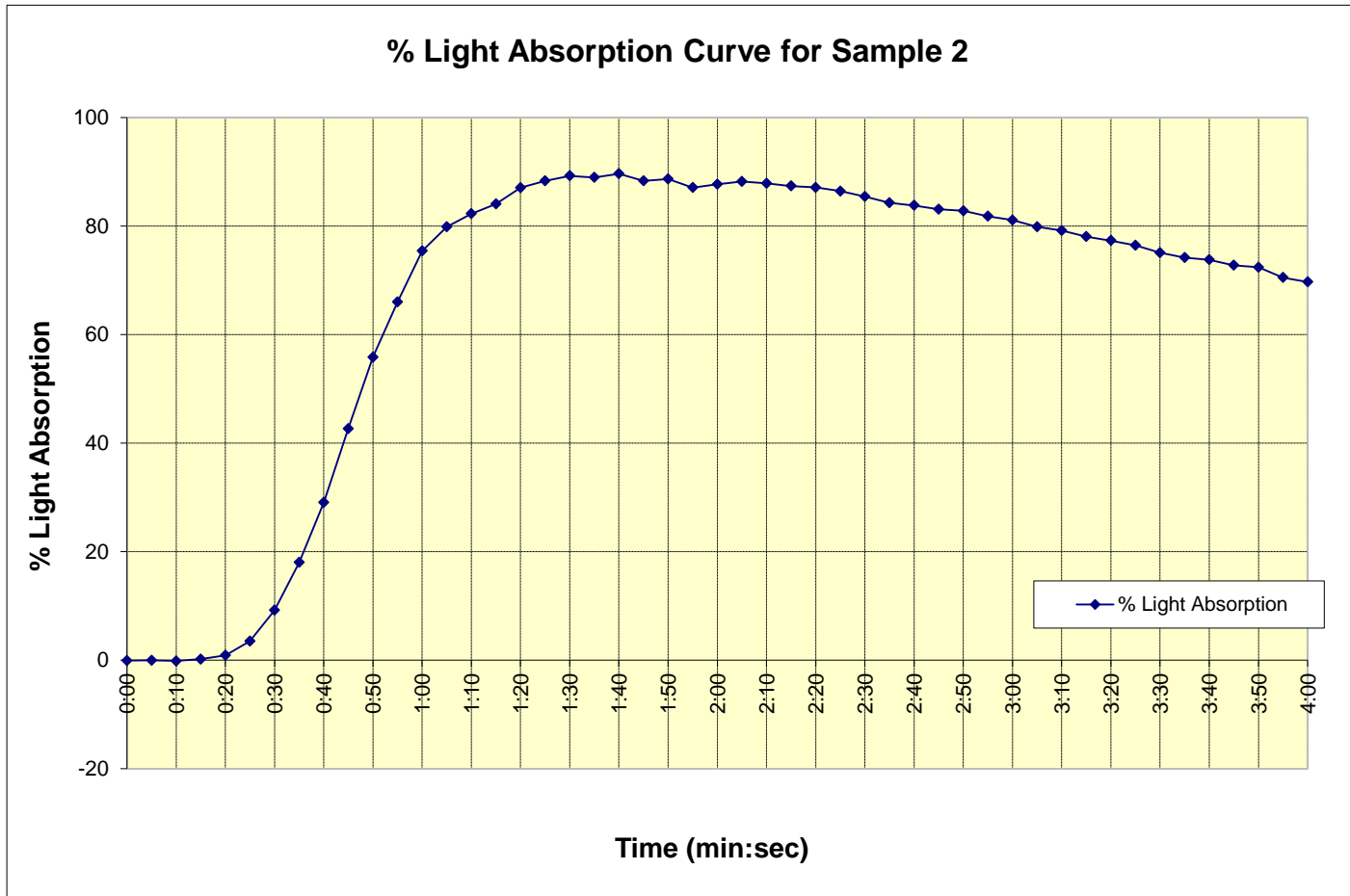
ATI No.: C7626.01-106-31

Test Date: 4/30/2013

Technician: DMC/KAG

Time (min:sec)	% Light	% Light Absorption
0:00	100.08	-0.08
0:05	100.03	-0.03
0:10	100.16	-0.16
0:15	99.82	0.18
0:20	99.11	0.89
0:25	96.49	3.51
0:30	90.81	9.19
0:35	81.99	18.01
0:40	70.94	29.06
0:45	57.34	42.66
0:50	44.19	55.81
0:55	34.00	66.00
1:00	24.60	75.40
1:05	20.14	79.86
1:10	17.74	82.26
1:15	15.94	84.06
1:20	12.94	87.06
1:25	11.67	88.33
1:30	10.75	89.25
1:35	11.03	88.97
1:40	10.35	89.65
1:45	11.66	88.34
1:50	11.32	88.68
1:55	12.92	87.08
2:00	12.32	87.68
2:05	11.81	88.19
2:10	12.13	87.87
2:15	12.62	87.38
2:20	12.89	87.11
2:25	13.57	86.43
2:30	14.57	85.43
2:35	15.72	84.28
2:40	16.20	83.80
2:45	16.89	83.11
2:50	17.21	82.79
2:55	18.20	81.80
3:00	18.89	81.11
3:05	20.16	79.84
3:10	20.83	79.17
3:15	21.95	78.05
3:20	22.68	77.32
3:25	23.55	76.45
3:30	24.90	75.10
3:35	25.80	74.20
3:40	26.22	73.78
3:45	27.22	72.78
3:50	27.60	72.40
3:55	29.49	70.51
4:00	30.30	69.70

Sample #	Manufacturer	Product Name	Material Type	Width (in)	Length (in)	Thickness (in)
2	Palram Americas	Clear Palsun - 0.118"	Polycarbonate	0.991	0.992	0.119



Calibration	Resistance (kΩ)
100% Light	3.109

Plot Area 240 Maximum Smoke Density 90.21 %
 Area Under Curve 161.2 **Smoke Density Rating* 67.2**

* Note: Miami-Dade County requires the Smoke Density Rating to be less than 75.

Smoke Density Testing per ASTM D 2843

Exit Sign Chamber

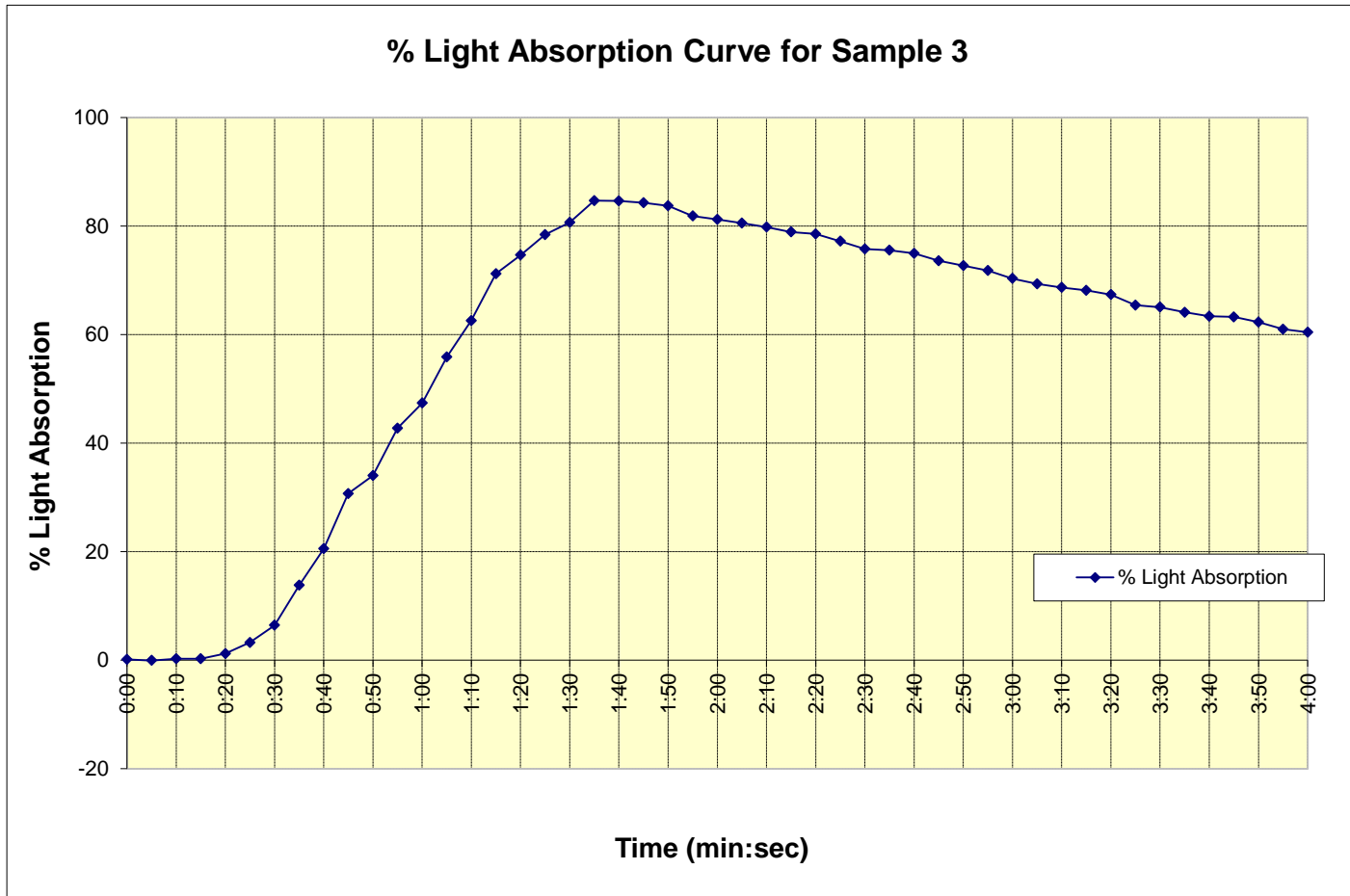
ATI No.: C7626.01-106-31

Test Date: 4/30/2013

Technician: DMC/KAG

Time (min:sec)	% Light	% Light Absorption
0:00	99.87	0.13
0:05	100.06	-0.06
0:10	99.74	0.26
0:15	99.75	0.25
0:20	98.79	1.21
0:25	96.76	3.24
0:30	93.58	6.42
0:35	86.19	13.81
0:40	79.46	20.54
0:45	69.31	30.69
0:50	65.99	34.01
0:55	57.25	42.75
1:00	52.61	47.39
1:05	44.12	55.88
1:10	37.44	62.56
1:15	28.79	71.21
1:20	25.36	74.64
1:25	21.58	78.42
1:30	19.36	80.64
1:35	15.31	84.69
1:40	15.39	84.61
1:45	15.71	84.29
1:50	16.25	83.75
1:55	18.15	81.85
2:00	18.77	81.23
2:05	19.45	80.55
2:10	20.21	79.79
2:15	21.10	78.90
2:20	21.45	78.55
2:25	22.78	77.22
2:30	24.26	75.74
2:35	24.44	75.56
2:40	25.04	74.96
2:45	26.41	73.59
2:50	27.32	72.68
2:55	28.20	71.80
3:00	29.67	70.33
3:05	30.66	69.34
3:10	31.31	68.69
3:15	31.87	68.13
3:20	32.64	67.36
3:25	34.57	65.43
3:30	34.94	65.06
3:35	35.90	64.10
3:40	36.64	63.36
3:45	36.75	63.25
3:50	37.72	62.28
3:55	39.00	61.00
4:00	39.57	60.43

Sample #	Manufacturer	Product Name	Material Type	Width (in)	Length (in)	Thickness (in)
3	Palram Americas	Clear Palsun - 0.118"	Polycarbonate	0.996	0.991	0.118



Calibration	Resistance (kΩ)
100% Light	3.151

Plot Area 240 Maximum Smoke Density 85.90 %
 Area Under Curve 139.2 **Smoke Density Rating* 58.0**

* Note: Miami-Dade County requires the Smoke Density Rating to be less than 75.

Smoke Density Testing per ASTM D 2843

Exit Sign Chamber

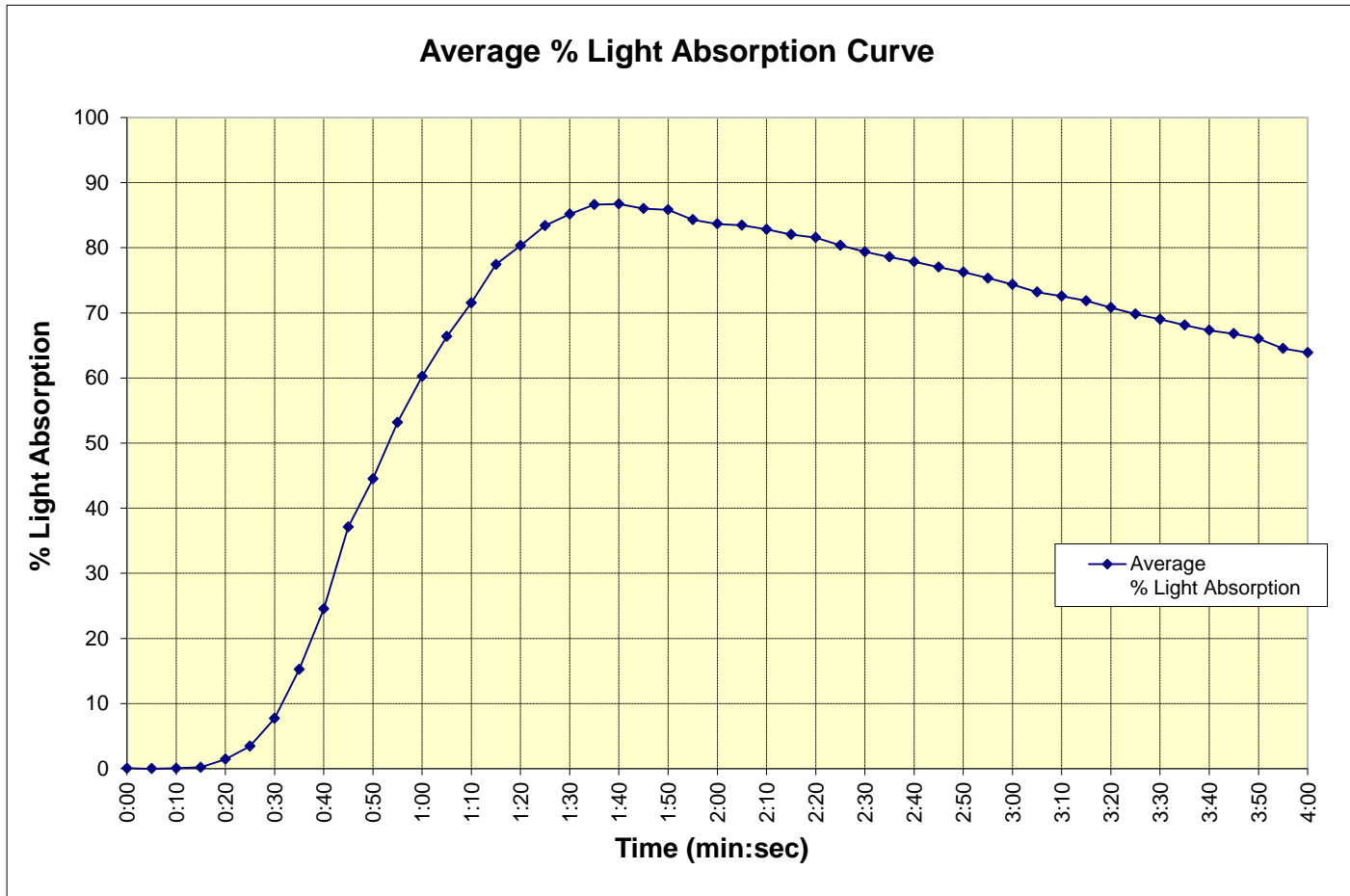
ATI No.: C7626.01-106-31

Test Date: 4/30/2013

Technician: DMC/KAG

Time (min:sec)	Average % Light Absorption
0:00	0.06
0:05	0.00
0:10	0.06
0:15	0.20
0:20	1.45
0:25	3.45
0:30	7.71
0:35	15.25
0:40	24.56
0:45	37.11
0:50	44.49
0:55	53.18
1:00	60.24
1:05	66.37
1:10	71.54
1:15	77.43
1:20	80.35
1:25	83.40
1:30	85.17
1:35	86.60
1:40	86.74
1:45	86.01
1:50	85.83
1:55	84.31
2:00	83.67
2:05	83.45
2:10	82.83
2:15	82.03
2:20	81.57
2:25	80.36
2:30	79.39
2:35	78.59
2:40	77.85
2:45	77.04
2:50	76.26
2:55	75.34
3:00	74.36
3:05	73.20
3:10	72.57
3:15	71.84
3:20	70.81
3:25	69.83
3:30	69.01
3:35	68.12
3:40	67.33
3:45	66.79
3:50	66.02
3:55	64.52
4:00	63.89

Sample #	Manufacturer	Product Name	Material Type	Width (in)	Length (in)	Thickness (in)
AVERAGE	Palram Americas	Clear Palsun - 0.118"	Polycarbonate	0.993	0.992	0.118



Calibration	Resistance (kΩ)
100% Light	3.149

Plot Area 240 Maximum Smoke Density 87.13 %
 Area Under Curve 148.3 **Smoke Density Rating* 61.8**

* Note: Miami-Dade County requires the Smoke Density Rating to be less than 75.

Smoke Density Testing per ASTM D 2843

Exit Sign Chamber

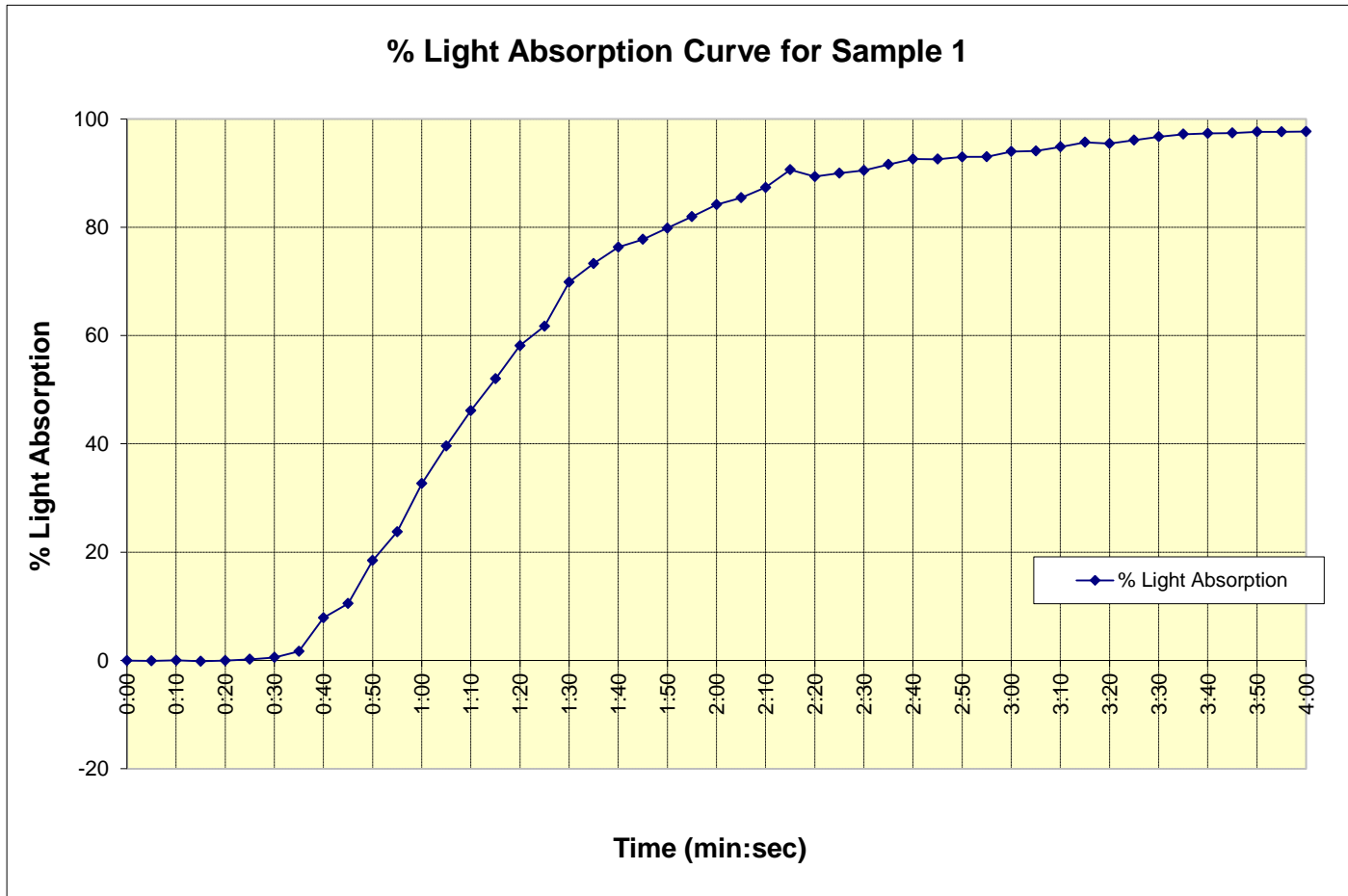
ATI No.: C7626.01-106-31

Test Date: 4/30/2013

Technician: DMCKAG

Time (min:sec)	% Light	% Light Absorption
0:00	100.05	-0.05
0:05	100.11	-0.11
0:10	99.99	0.01
0:15	100.15	-0.15
0:20	100.04	-0.04
0:25	99.81	0.19
0:30	99.45	0.55
0:35	98.35	1.65
0:40	92.13	7.87
0:45	89.51	10.49
0:50	81.57	18.43
0:55	76.26	23.74
1:00	67.33	32.67
1:05	60.40	39.60
1:10	53.87	46.13
1:15	47.97	52.03
1:20	41.86	58.14
1:25	38.28	61.72
1:30	30.12	69.88
1:35	26.72	73.28
1:40	23.66	76.34
1:45	22.23	77.77
1:50	20.18	79.82
1:55	18.06	81.94
2:00	15.82	84.18
2:05	14.57	85.43
2:10	12.65	87.35
2:15	9.38	90.62
2:20	10.64	89.36
2:25	10.04	89.96
2:30	9.52	90.48
2:35	8.41	91.59
2:40	7.39	92.61
2:45	7.43	92.57
2:50	7.01	92.99
2:55	6.98	93.02
3:00	6.02	93.98
3:05	5.92	94.08
3:10	5.15	94.85
3:15	4.30	95.70
3:20	4.56	95.44
3:25	3.93	96.07
3:30	3.29	96.71
3:35	2.81	97.19
3:40	2.68	97.32
3:45	2.60	97.40
3:50	2.39	97.61
3:55	2.37	97.63
4:00	2.32	97.68

Sample #	Manufacturer	Product Name	Material Type	Width (in)	Length (in)	Thickness (in)
1	Palram Americas	Clear Palsun - 0.500"	Polycarbonate	1.029	1.030	0.490



Calibration	Resistance (kΩ)
100% Light	3.223

Plot Area 240 Maximum Smoke Density 97.77 %
 Area Under Curve 155.0 **Smoke Density Rating* 64.6**

* Note: Miami-Dade County requires the Smoke Density Rating to be less than 75.

Smoke Density Testing per ASTM D 2843

Exit Sign Chamber

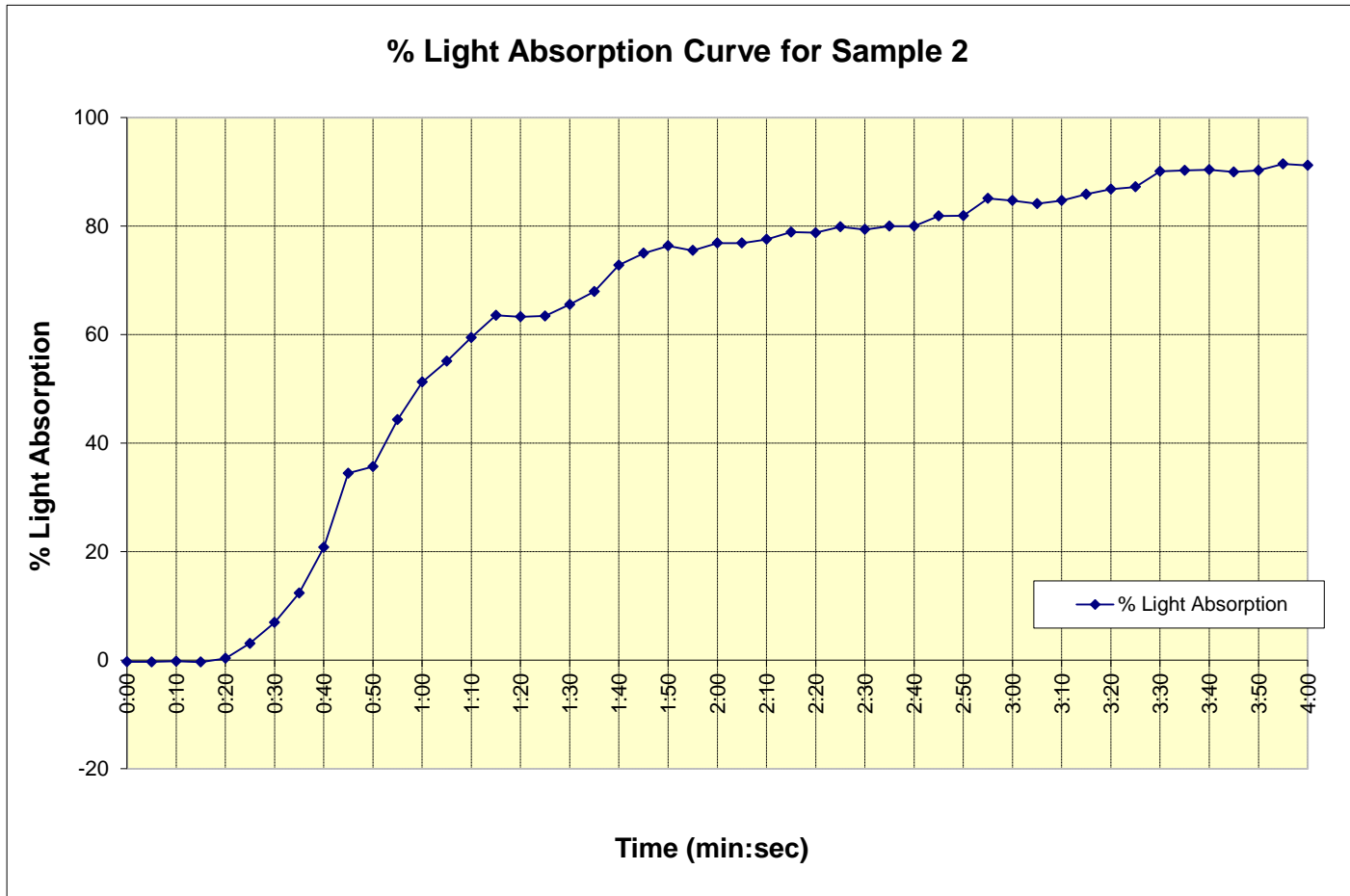
ATI No.: C7626.01-106-31

Test Date: 4/30/2013

Technician: DMCKAG

Time (min:sec)	% Light	% Light Absorption
0:00	100.32	-0.32
0:05	100.34	-0.34
0:10	100.20	-0.20
0:15	100.35	-0.35
0:20	99.68	0.32
0:25	96.92	3.08
0:30	93.07	6.93
0:35	87.64	12.36
0:40	79.22	20.78
0:45	65.55	34.45
0:50	64.34	35.66
0:55	55.68	44.32
1:00	48.76	51.24
1:05	44.89	55.11
1:10	40.55	59.45
1:15	36.45	63.55
1:20	36.70	63.30
1:25	36.58	63.42
1:30	34.45	65.55
1:35	32.09	67.91
1:40	27.21	72.79
1:45	25.01	74.99
1:50	23.64	76.36
1:55	24.49	75.51
2:00	23.14	76.86
2:05	23.15	76.85
2:10	22.44	77.56
2:15	21.13	78.87
2:20	21.25	78.75
2:25	20.13	79.87
2:30	20.62	79.38
2:35	20.01	79.99
2:40	20.04	79.96
2:45	18.13	81.87
2:50	18.11	81.89
2:55	14.90	85.10
3:00	15.31	84.69
3:05	15.90	84.10
3:10	15.30	84.70
3:15	14.13	85.87
3:20	13.22	86.78
3:25	12.79	87.21
3:30	9.92	90.08
3:35	9.75	90.25
3:40	9.63	90.37
3:45	10.03	89.97
3:50	9.74	90.26
3:55	8.57	91.43
4:00	8.81	91.19

Sample #	Manufacturer	Product Name	Material Type	Width (in)	Length (in)	Thickness (in)
2	Palram Americas	Clear Palsun - 0.500"	Polycarbonate	1.024	1.029	0.491



Calibration	Resistance (kΩ)
100% Light	3.203

Plot Area 240 Maximum Smoke Density 91.48 %
 Area Under Curve 150.5 **Smoke Density Rating* 62.7**

* Note: Miami-Dade County requires the Smoke Density Rating to be less than 75.

Smoke Density Testing per ASTM D 2843

Exit Sign Chamber

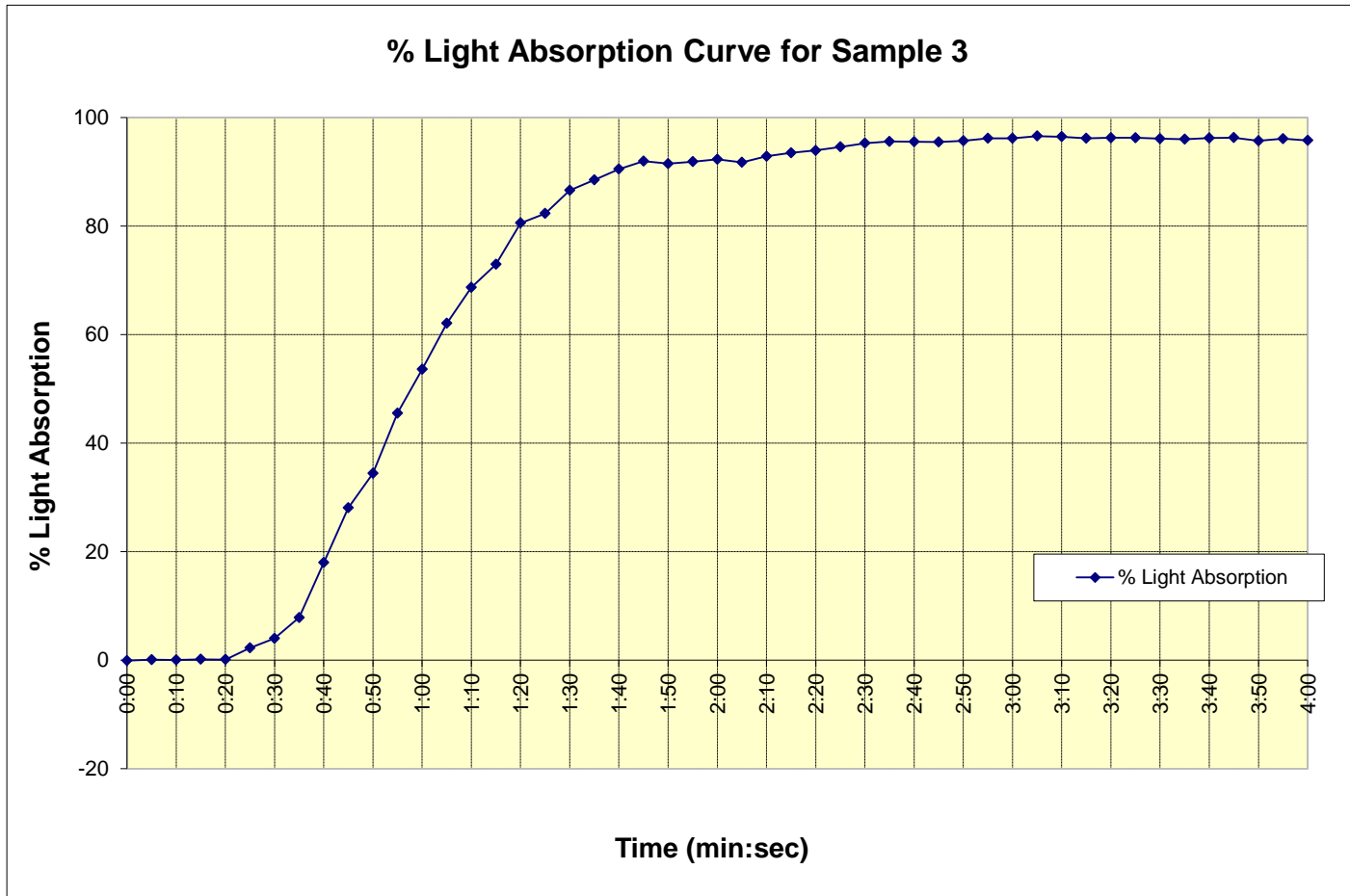
ATI No.: C7626.01-106-31

Test Date: 4/30/2013

Technician: DMCKAG

Time (min:sec)	% Light	% Light Absorption
0:00	100.09	-0.09
0:05	99.93	0.07
0:10	99.97	0.03
0:15	99.85	0.15
0:20	99.88	0.12
0:25	97.75	2.25
0:30	95.98	4.02
0:35	92.14	7.86
0:40	82.03	17.97
0:45	71.93	28.07
0:50	65.57	34.43
0:55	54.49	45.51
1:00	46.41	53.59
1:05	37.93	62.07
1:10	31.32	68.68
1:15	27.05	72.95
1:20	19.43	80.57
1:25	17.67	82.33
1:30	13.42	86.58
1:35	11.48	88.52
1:40	9.49	90.51
1:45	8.03	91.97
1:50	8.51	91.49
1:55	8.12	91.88
2:00	7.68	92.32
2:05	8.25	91.75
2:10	7.14	92.86
2:15	6.49	93.51
2:20	6.07	93.93
2:25	5.41	94.59
2:30	4.72	95.28
2:35	4.41	95.59
2:40	4.46	95.54
2:45	4.49	95.51
2:50	4.31	95.69
2:55	3.81	96.19
3:00	3.83	96.17
3:05	3.41	96.59
3:10	3.54	96.46
3:15	3.83	96.17
3:20	3.73	96.27
3:25	3.73	96.27
3:30	3.92	96.08
3:35	3.99	96.01
3:40	3.79	96.21
3:45	3.71	96.29
3:50	4.31	95.69
3:55	3.91	96.09
4:00	4.21	95.79

Sample #	Manufacturer	Product Name	Material Type	Width (in)	Length (in)	Thickness (in)
3	Palram Americas	Clear Palsun - 0.500"	Polycarbonate	1.027	1.032	0.488



Calibration	Resistance (kΩ)
100% Light	3.200

Plot Area 240 Maximum Smoke Density 96.89 %
 Area Under Curve 171.7 **Smoke Density Rating* 71.6**

* Note: Miami-Dade County requires the Smoke Density Rating to be less than 75.

Smoke Density Testing per ASTM D 2843

Exit Sign Chamber

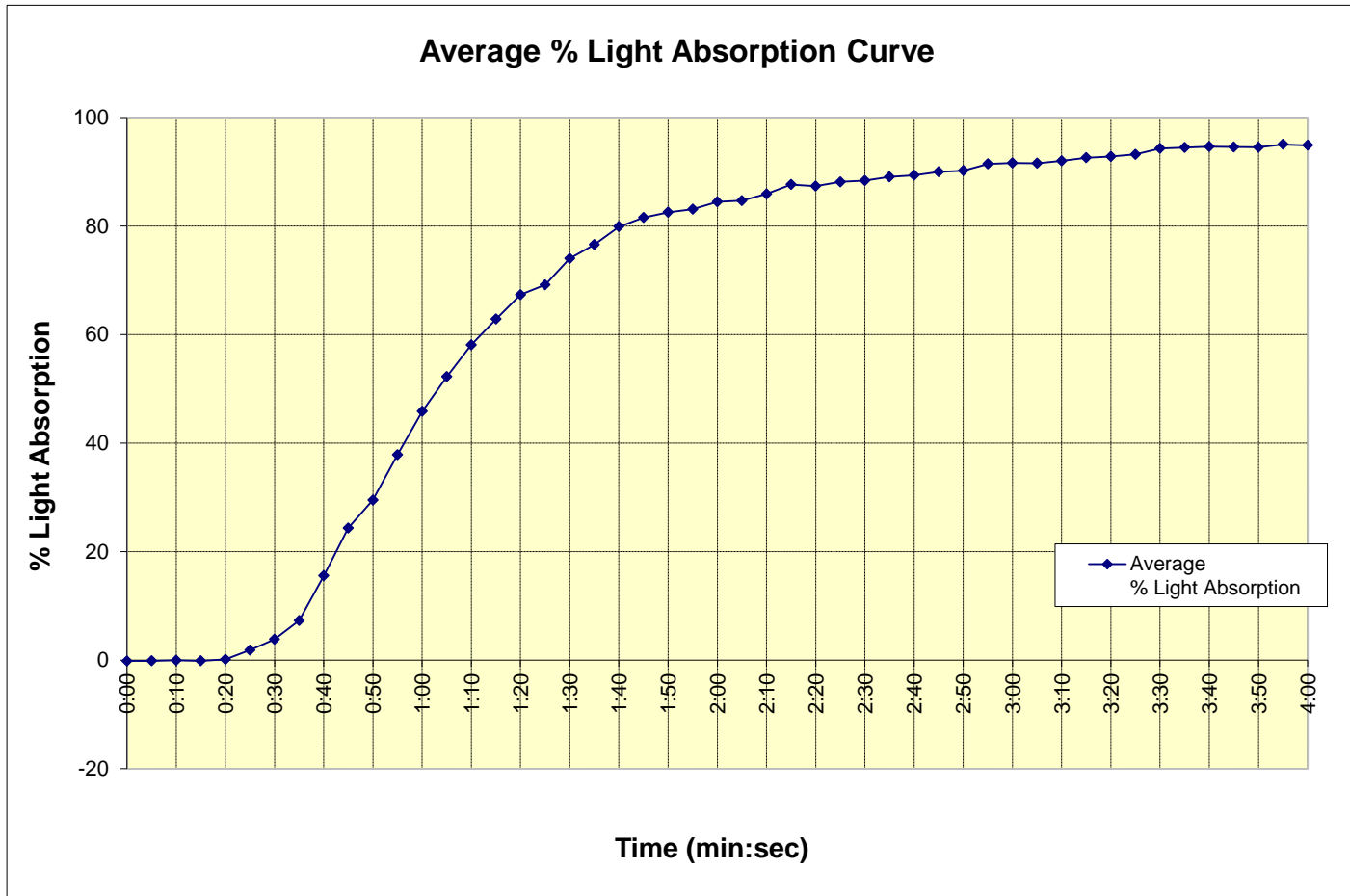
ATI No.: C7626.01-106-31

Test Date: 4/30/2013

Technician: DMCKAG

Time (min:sec)	Average % Light Absorption
0:00	-0.15
0:05	-0.13
0:10	-0.05
0:15	-0.12
0:20	0.13
0:25	1.84
0:30	3.84
0:35	7.29
0:40	15.54
0:45	24.34
0:50	29.50
0:55	37.86
1:00	45.84
1:05	52.26
1:10	58.09
1:15	62.84
1:20	67.33
1:25	69.16
1:30	74.00
1:35	76.57
1:40	79.88
1:45	81.58
1:50	82.56
1:55	83.11
2:00	84.45
2:05	84.68
2:10	85.92
2:15	87.67
2:20	87.35
2:25	88.14
2:30	88.38
2:35	89.06
2:40	89.37
2:45	89.98
2:50	90.19
2:55	91.44
3:00	91.61
3:05	91.59
3:10	92.00
3:15	92.58
3:20	92.83
3:25	93.19
3:30	94.29
3:35	94.48
3:40	94.63
3:45	94.55
3:50	94.52
3:55	95.05
4:00	94.89

Sample #	Manufacturer	Product Name	Material Type	Width (in)	Length (in)	Thickness (in)
AVERAGE	Palram Americas	Clear Palsun - 0.500"	Polycarbonate	1.027	1.030	0.490



Calibration	Resistance (kΩ)
100% Light	3.223

Plot Area 240 Maximum Smoke Density 95.09 %
 Area Under Curve 159.0 **Smoke Density Rating* 66.3**

* Note: Miami-Dade County requires the Smoke Density Rating to be less than 75.