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**ASTM D 635-14 Horizontal Burning Rate Determination  
of "Marlon FS 1.5mm Clear" Polycarbonate Sheet**

|               |  |
|---------------|--|
| A Report To:  | <b>Brett Martin Ltd.</b><br>24 Roughfort Road<br>Mallusk, Co. Antrim<br>United Kingdom<br>BT36 4RB |
| Phone:        | +44 28 9084 9999   |
| Attention:    | Simona Firth   |
| E-mail:       | simonafirth@brettmartin.com  |
| Submitted by: | Exova Warringtonfire North America   |
| Report No.    | 17-002-307(B2)<br>3 pages  |
| Date:         | May 30, 2017   |

**ACCREDITATION** To ISO/IEC 17025 for a defined Scope of testing by the International Accreditation Service

### **SPECIFICATIONS OF ORDER**

Determine rate of burning and/or extent and time of burning plastics in a horizontal position according to ASTM D 635-14 as per Exova Warringtonfire North America Quotation No. 17-002-496410RV1 dated May 11, 2017.

(Exova sample identification number 17-002-S0307-2)

### **SAMPLE IDENTIFICATION**

Plastic material described as, "Clear flat sheet polycarbonate" and identified as, "Marlon FS 1.5mm Clear".

### **SUMMARY OF TEST PROCEDURE**

Specimens are conditioned for at least 48 hours at  $23 \pm 2^{\circ}\text{C}$  and  $50 \pm 5\%$  relative humidity prior to testing.

At least ten specimens, 125 x 12.5 mm, are each marked at 25 mm and 100 mm from one end. Each specimen is clamped horizontally at the end nearest the 100 mm mark, with its transverse axis incline at  $45 \pm 2^{\circ}$  to the horizontal. A 100 mm square wire gauze screen is clamped in a horizontal position, 10 mm below the edge of the specimen, with approximately 13 mm of the specimen extending beyond its edge.

A 20 mm high blue flame from a burner is applied to the end of the specimen for a period of 30 seconds, or whenever the flame front reaches the 25 mm mark, whichever comes first. The times to reach the 25 mm mark and the 100 mm mark, or when burning ceases are recorded, and the extent of burning measured. Repeat the test procedure until three specimens have burned to 100 mm ref mark, or then have been tested. The behavior of specimens shall be classified as HB (HB = Horizontal Burning) if:

- \* There are no visible signs of combustion after the ignition source is removed, or
- \* The flame front does not pass the 25 mm reference mark, or
- \* The flame front passes the 25 mm reference mark but does not reach the 100 mm reference mark, or
- \* The flame front reaches the 100 mm reference mark and the linear burning rate does not exceed 40 mm/min for specimens having a thickness between 3 and 13 mm or 75 mm/min for specimens having a thickness less than 3 mm.

*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 hazards or fire risk assessment of materials, products, or assemblies under actual fire conditions.*

**TEST RESULTS****ASTM D 635-14**

Standard test method for Rate of Burning and/or Extent  
and Time of Burning of Plastics in a Horizontal Position

| Test | Time of Burning (s) | Extent of Burning (mm) | Linear Burn Rate (mm/min) | Cont. Burning of Specimens (Yes/No?) | Flame Reached 25 mm mark (Yes/No?) | Flame Reached 100 mm Mark (Yes/No?) |
|------|---------------------|------------------------|---------------------------|--------------------------------------|------------------------------------|-------------------------------------|
| 1    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 2    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 3    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 4    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 5    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 6    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 7    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 8    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 9    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 10   | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |

\* A - No Ignition (NI)

B - Self-extinguishing/no burn rate (SE/NBR) (self-extinguishes prior to reaching into the 10-inch (254 mm) timing zone)

C - Burn rate and self-extinguishing (specimen burns into the 10-inch (254 mm) time zone and self-extinguishes)

D - Burn rate (burn continued over the entire 10-inch (254 mm) timing zone)

**CONCLUSIONS**

When tested at a approximate thickness of 1.5 mm, the material identified in this report meets the requirements to be classified HB.

**Note: This is an uncontrolled electronic copy of the report. Signatures are on file with the original.**

Serap Carpino,  
Technologist

Ian Smith,  
Technical Manager.

Note: This report and service are covered under Exova Canada Inc. Standard Terms and Conditions of Contract which may be found on the Exova website ([www.exova.com](http://www.exova.com)), or by calling 1-866-263-9268.

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**ASTM D 635-14 Horizontal Burning Rate Determination  
of "Marlon FS 1.5mm Opal" Polycarbonate Sheet**

A Report To: **Brett Martin Ltd.**  
24 Roughfort Road  
Mallusk, Co. Antrim  
United Kingdom  
BT36 4RB

Phone: +44 28 9084 9999

Attention: Simona Firth  
E-mail: simonafirth@brettmartin.com

Submitted by: Exova Warringtonfire North America

Report No. 17-002-307(A2)  
3 pages

Date: May 30, 2017

**ACCREDITATION** To ISO/IEC 17025 for a defined Scope of testing by the International Accreditation Service

### **SPECIFICATIONS OF ORDER**

Determine rate of burning and/or extent and time of burning plastics in a horizontal position according to ASTM D 635-14 as per Exova Warringtonfire North America Quotation No. 17-002-496410RV1 dated May 11, 2017.

(Exova sample identification number 17-002-S0307-1)

### **SAMPLE IDENTIFICATION**

Plastic material described as, "Opal flat sheet polycarbonate" and identified as, "Marlon FS 1.5mm Opal".

### **SUMMARY OF TEST PROCEDURE**

Specimens are conditioned for at least 48 hours at  $23 \pm 2^{\circ}\text{C}$  and  $50 \pm 5\%$  relative humidity prior to testing.

At least ten specimens, 125 x 12.5 mm, are each marked at 25 mm and 100 mm from one end. Each specimen is clamped horizontally at the end nearest the 100 mm mark, with its transverse axis incline at  $45 \pm 2^{\circ}$  to the horizontal. A 100 mm square wire gauze screen is clamped in a horizontal position, 10 mm below the edge of the specimen, with approximately 13 mm of the specimen extending beyond its edge.

A 20 mm high blue flame from a burner is applied to the end of the specimen for a period of 30 seconds, or whenever the flame front reaches the 25 mm mark, whichever comes first. The times to reach the 25 mm mark and the 100 mm mark, or when burning ceases are recorded, and the extent of burning measured.

Repeat the test procedure until three specimens have burned to 100 mm ref mark, or then have been tested.

The behavior of specimens shall be classified as HB (HB = Horizontal Burning) if:

- \* There are no visible signs of combustion after the ignition source is removed, or
- \* The flame front does not pass the 25 mm reference mark, or
- \* The flame front passes the 25 mm reference mark but does not reach the 100 mm reference mark, or
- \* The flame front reaches the 100 mm reference mark and the linear burning rate does not exceed 40 mm/min for specimens having a thickness between 3 and 13 mm or 75 mm/min for specimens having a thickness less than 3 mm.

*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 hazards or fire risk assessment of materials, products, or assemblies under actual fire conditions.*

**TEST RESULTS****ASTM D 635-14**

Standard test method for Rate of Burning and/or Extent  
and Time of Burning of Plastics in a Horizontal Position

| Test | Time of Burning (s) | Extent of Burning (mm) | Linear Burn Rate (mm/min) | Cont. Burning of Specimens (Yes/No?) | Flame Reached 25 mm mark (Yes/No?) | Flame Reached 100 mm Mark (Yes/No?) |
|------|---------------------|------------------------|---------------------------|--------------------------------------|------------------------------------|-------------------------------------|
| 1    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 2    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 3    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 4    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 5    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 6    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 7    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 8    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 9    | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |
| 10   | 0.0                 | 0.0                    | -                         | No                                   | No                                 | No                                  |

\* A - No Ignition (NI)

B - Self-extinguishing/no burn rate (SE/NBR) (self-extinguishes prior to reaching into the 10-inch (254 mm) timing zone)

C - Burn rate and self-extinguishing (specimen burns into the 10-inch (254 mm) time zone and self-extinguishes)

D - Burn rate (burn continued over the entire 10-inch (254 mm) timing zone)

**CONCLUSIONS**

When tested at a approximate thickness of 1.5 mm, the material identified in this report meets the requirements to be classified HB.

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Serap Carpino,  
Technologist

Ian Smith,  
Technical Manager.

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**ASTM E 84 Surface Burning Characteristics  
of "Marlon FS 1.5mm Opal" Polycarbonate Sheet**

|               |  |
|---------------|--|
| A Report To:  | <b>Brett Martin Ltd.</b><br>24 Roughfort Road<br>Mallusk, Co. Antrim<br>United Kingdom<br>BT36 4RB |
| Phone:        | +44 28 9084 9999   |
| Attention:    | Simona Firth   |
| E-mail:       | simonafirth@brettmartin.com  |
| Submitted by: | Exova Warringtonfire North America   |
| Report No.    | 17-002-307(A1)<br>4 Pages  |
| Date:         | June 16, 2017  |

**ACCREDITATION** To ISO/IEC 17025 for a defined Scope of Testing by the International Accreditation Service

### **SPECIFICATIONS OF ORDER**

Determine the Flame Spread and Smoke Developed Indices based upon a single test conducted in accordance with ASTM E 84-16, as per Exova Warringtonfire North America Quotation No. 17-002-496,410 RV1 dated May 11, 2017.

**SAMPLE IDENTIFICATION** (Exova sample identification number 17-002-S0307-1)

Plastic sheet material, described as, "Opal flat sheet polycarbonate", identified as:  
"Marlon FS 1.5mm Opal"

### **TEST PROCEDURE**

The method, designated as ASTM E 84-16 "*Standard Method of Test for Surface Burning Characteristics of Building Materials*", is designed to determine the relative surface burning characteristics of materials under specific test conditions, where the material under test is mounted so that it forms the ceiling of a horizontal fire tunnel. A specified airflow is introduced through the tunnel and a specified flame is applied to one end. Observations are then made regarding the flame spread along the specimen. Results are expressed in terms of Flame Spread Index (FSI) and Smoke Developed Index (SDI). There is no established relationship between those two values.

*Although the procedure is applicable to materials, products and assemblies used in building construction for development of comparative surface spread of flame data, the test results may not reflect the relative surface burning characteristics of tested materials under all building fire conditions.*

### **SAMPLE PREPARATION**

The test specimen consisted of a total of 3 sections of material, each approximately 0.06 inches (1.5 mm) in thickness by 21 inches (533 mm) in width by 96 inches (2438 mm) in length. The sections were butted together to create the specimen length. Prior to testing, the specimen was conditioned to constant weight at a temperature of  $73 \pm 5^\circ\text{F}$  ( $23 \pm 3^\circ\text{C}$ ) and a relative humidity of  $50 \pm 5\%$ . During testing, the specimen was supported across its width by 0.25 inch (6 mm) steel rods spaced nominally at 24 inch (610 mm) intervals.

The testing was performed on: 2017-06-09

### **SUMMARY OF TEST PROCEDURE**

The tunnel is preheated to  $150 \pm 5^\circ\text{F}$  ( $66 \pm 2.8^\circ\text{C}$ ), as measured by the floor-embedded thermocouple located 23.25 feet (7087 mm) downstream of the burner ports, and is allowed to cool to  $105 \pm 5^\circ\text{F}$  ( $40.5 \pm 2.8^\circ\text{C}$ ), as measured by the floor-embedded thermocouple located 13 feet (3962 mm) from the burners. The tunnel lid is then raised and the test sample is placed along the ledges of the tunnel so as to form a continuous ceiling 24 feet (7315 mm) long, approximately 12 inches (305 mm) above the floor. Three 8 foot (2438 mm) sections of 0.25 inch (6 mm) cement board are then placed on the back side of the sample and the lid is then lowered into place.



**SUMMARY OF TEST PROCEDURE (continued)**

Upon ignition of the gas burners, the flame spread distance is observed and recorded every second. Flame spread distance versus time is plotted. Calculations ignore all flame front recessions and Flame Spread Index (FSI) is determined by calculating the total area under the curve for the test sample. If the area under the curve (A) is less than or equal to 97.5 min-ft, then  $FSI = 0.515 \cdot A$ ; if greater,  $FSI = 4900 / (195 - A)$ . FSI is then rounded to the nearest multiple of 5.

Smoke Developed Index (SDI) is determined by dividing the total area under the obscuration curve by that of red oak, and multiplying by 100. SDI is then rounded to the nearest multiple of 5 if less than 200. SDI values over 200 are rounded to the nearest multiple of 50.

**TEST RESULTS**

| SAMPLE                 | Flame Spread Index (FSI) | Smoke Developed Index (SDI) |
|------------------------|--------------------------|-----------------------------|
| "Marlon FS 1.5mm Opal" | 5                        | 250                         |

**Observations of Burning Characteristics**

The specimen ignited approximately 44 seconds after exposure to the test flame. Melting and dripping behavior was observed. Material that dripped to the floor of the test apparatus also ignited.

The flame front advanced to a maximum observed distance of 2.2 feet (0.7 metres) at approximately 531 seconds.

**Interpretation of Test Results**

Industry documents such as the International Building Code (IBC) or NFPA 101 Life Safety Code refer to ASTM E 84 (UL 723, NFPA 255) test results using the following material classification categories:

|   | Flame-Spread Index (FSI) | Smoke Development Index (SDI) |
|---|--------------------------|-------------------------------|
| Class 1 or Class A                      | 0 - 25                   | 450 Maximum                   |
| Class 2 or Class B                      | 26 - 75                  | 450 Maximum                   |
| Class 3 or Class C                      | 76 - 200                 | 450 Maximum                   |
| Results Classification (if applicable): |                          | Class 1 or Class A            |

**Note: This is an uncontrolled electronic copy of the report. Signatures are on file with the original.**

Francis Williams,  
Technician.

Ian Smith,  
Technical Manager.

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ASTM E 84-16 Test Charts

Sample: "Marlon FS 1.5mm Opal"

Chart 1. FLAME SPREAD

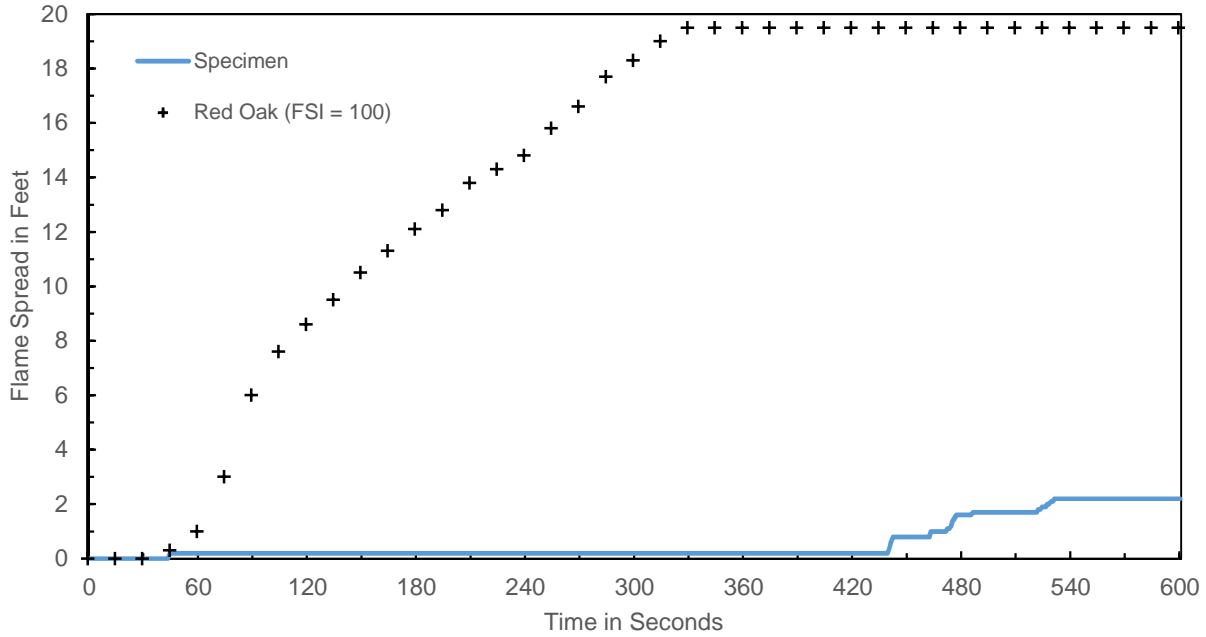
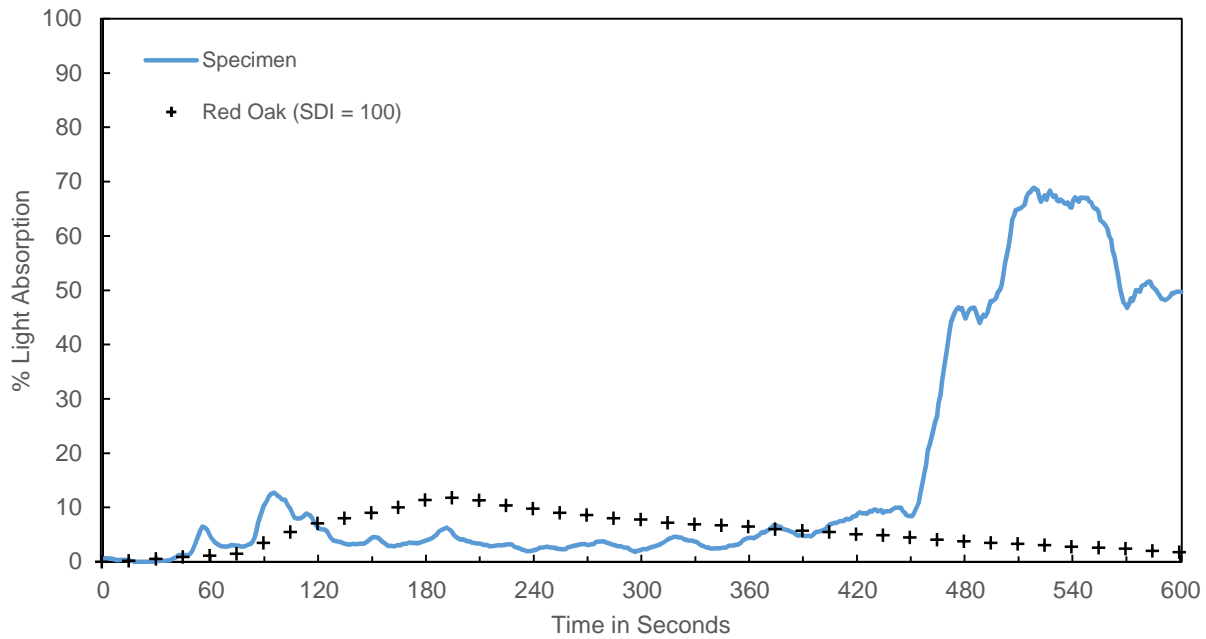


Chart 2. SMOKE DEVELOPED



| Calculated Flame Spread (CFS) | Rounded Flame Spread Index (FSI) | Calculated Smoke Developed (CSD) | Rounded Smoke Developed Index (SDI) | Maximum 23' Air Temperature (°F) |
|-------------------------------|----------------------------------|----------------------------------|-------------------------------------|----------------------------------|
| 3.1                           | <b>5</b>                         | 262.9                            | <b>250</b>                          | 411                              |

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of "Marlon FS 1.5mm Clear" Polycarbonate Sheet**

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**SAMPLE IDENTIFICATION** (Exova sample identification number 17-002-S0307-2)

Plastic sheet material, described as, "Clear flat sheet polycarbonate", identified as: "Marlon FS 1.5mm Clear"

### **TEST PROCEDURE**

The method, designated as ASTM E 84-16 "*Standard Method of Test for Surface Burning Characteristics of Building Materials*", is designed to determine the relative surface burning characteristics of materials under specific test conditions, where the material under test is mounted so that it forms the ceiling of a horizontal fire tunnel. A specified airflow is introduced through the tunnel and a specified flame is applied to one end. Observations are then made regarding the flame spread along the specimen. Results are expressed in terms of Flame Spread Index (FSI) and Smoke Developed Index (SDI). There is no established relationship between those two values.

*Although the procedure is applicable to materials, products and assemblies used in building construction for development of comparative surface spread of flame data, the test results may not reflect the relative surface burning characteristics of tested materials under all building fire conditions.*

### **SAMPLE PREPARATION**

The test specimen consisted of a total of 3 sections of material, each approximately 0.06 inches (1.5 mm) in thickness by 21 inches (533 mm) in width by 96 inches (2438 mm) in length. The sections were butted together to create the specimen length. Prior to testing, the specimen was conditioned to constant weight at a temperature of  $73 \pm 5^{\circ}\text{F}$  ( $23 \pm 3^{\circ}\text{C}$ ) and a relative humidity of  $50 \pm 5\%$ . During testing, the specimen was supported across its width by 0.25 inch (6 mm) steel rods spaced nominally at 24 inch (610 mm) intervals.

The testing was performed on: 2017-06-09

### **SUMMARY OF TEST PROCEDURE**

The tunnel is preheated to  $150 \pm 5^{\circ}\text{F}$  ( $66 \pm 2.8^{\circ}\text{C}$ ), as measured by the floor-embedded thermocouple located 23.25 feet (7087 mm) downstream of the burner ports, and is allowed to cool to  $105 \pm 5^{\circ}\text{F}$  ( $40.5 \pm 2.8^{\circ}\text{C}$ ), as measured by the floor-embedded thermocouple located 13 feet (3962 mm) from the burners. The tunnel lid is then raised and the test sample is placed along the ledges of the tunnel so as to form a continuous ceiling 24 feet (7315 mm) long, approximately 12 inches (305 mm) above the floor. Three 8 foot (2438 mm) sections of 0.25 inch (6 mm) cement board are then placed on the back side of the sample and the lid is then lowered into place.

**SUMMARY OF TEST PROCEDURE (continued)**

Upon ignition of the gas burners, the flame spread distance is observed and recorded every second. Flame spread distance versus time is plotted. Calculations ignore all flame front recessions and Flame Spread Index (FSI) is determined by calculating the total area under the curve for the test sample. If the area under the curve (A) is less than or equal to 97.5 min-ft, then  $FSI = 0.515 \cdot A$ ; if greater,  $FSI = 4900 / (195 - A)$ . FSI is then rounded to the nearest multiple of 5.

Smoke Developed Index (SDI) is determined by dividing the total area under the obscuration curve by that of red oak, and multiplying by 100. SDI is then rounded to the nearest multiple of 5 if less than 200. SDI values over 200 are rounded to the nearest multiple of 50.

**TEST RESULTS**

| SAMPLE                  | Flame Spread Index (FSI) | Smoke Developed Index (SDI) |
|-------------------------|--------------------------|-----------------------------|
| "Marlon FS 1.5mm Clear" | 5                        | 200                         |

**Observations of Burning Characteristics**

The specimen ignited approximately 35 seconds after exposure to the test flame. Melting and dripping behavior was observed. Material that dripped to the floor of the test apparatus also ignited.

The flame front advanced to a maximum observed distance of 7.8 feet (2.4 metres) at approximately 596 seconds.

**Interpretation of Test Results**

Industry documents such as the International Building Code (IBC) or NFPA 101 Life Safety Code refer to ASTM E 84 (UL 723, NFPA 255) test results using the following material classification categories:

|   | Flame-Spread Index (FSI) | Smoke Development Index (SDI) |
|---|--------------------------|-------------------------------|
| Class 1 or Class A                      | 0 - 25                   | 450 Maximum                   |
| Class 2 or Class B                      | 26 - 75                  | 450 Maximum                   |
| Class 3 or Class C                      | 76 - 200                 | 450 Maximum                   |
| Results Classification (if applicable): |                          | Class 1 or Class A            |

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Francis Williams,  
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ASTM E 84-16 Test Charts

Sample: "Marlon FS 1.5mm Clear"

Chart 1. FLAME SPREAD

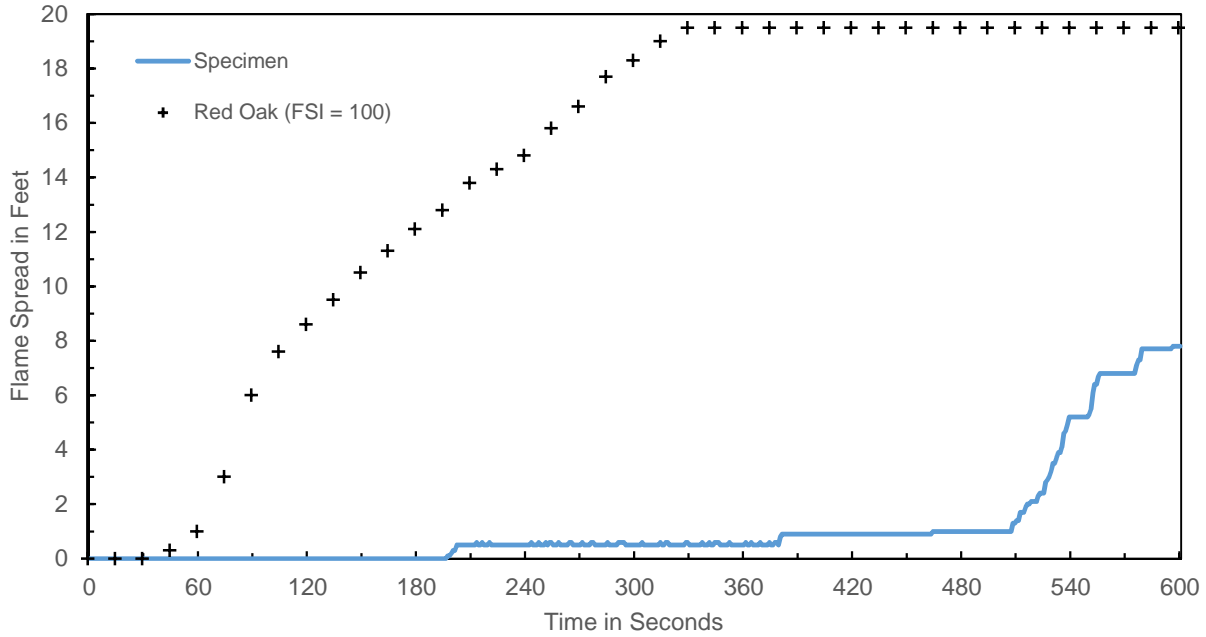
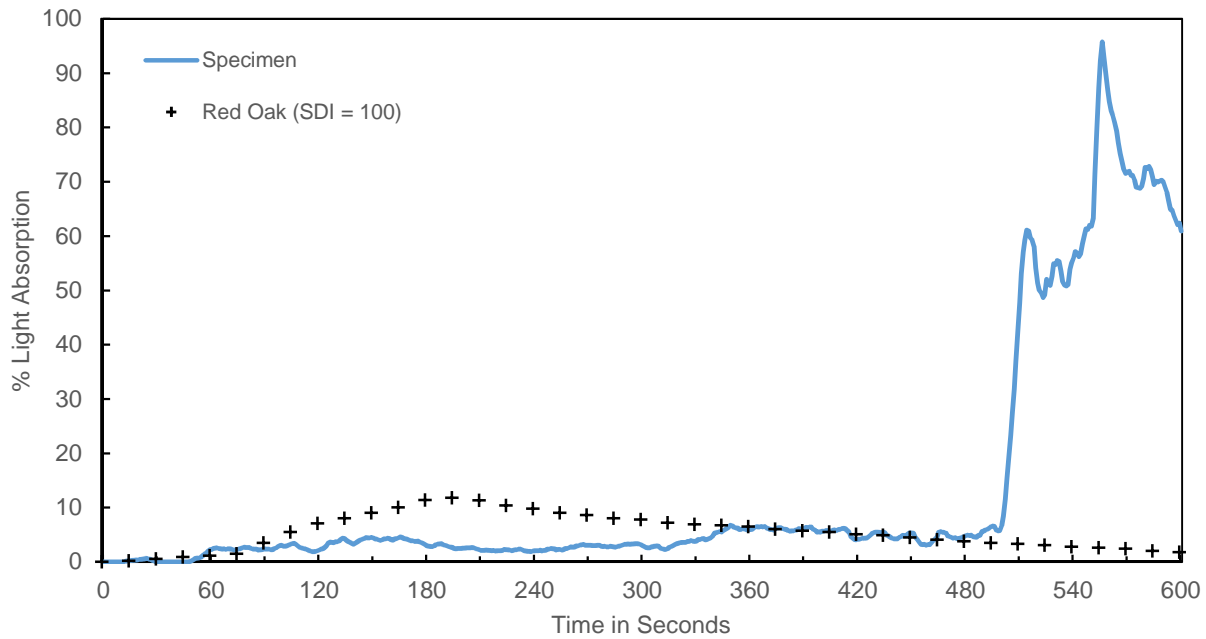


Chart 2. SMOKE DEVELOPED



| Calculated Flame Spread (CFS) | Rounded Flame Spread Index (FSI) | Calculated Smoke Developed (CSD) | Rounded Smoke Developed Index (SDI) | Maximum 23' Air Temperature (°F) |
|-------------------------------|----------------------------------|----------------------------------|-------------------------------------|----------------------------------|
| 6.2                           | 5                                | 212.2                            | 200                                 | 554                              |



# Makrolon® SL sheet

## UV resistant sign grade

Makrolon® SL Sign Grade sheet is a polycarbonate product with an advanced UV resistance technology that promotes long lasting outdoor weathering performance. It features outstanding impact strength, excellent dimensional stability, high temperature resistance, and high clarity. This lightweight thermoformable sheet is also easy to fabricate and decorate. Makrolon SL is offered in clear, a wide range of standard sign colors, or can be custom matched to any color. The product, available in either sheet or reels, has a proven track record of outstanding performance in extreme environments and meets the UL 879 standard for electric sign components. A ten (10) year limited product warranty is available for both clear and colors for breakage resistance. Clear sheet is also covered for weathering resistance. The terms of the warranty are available upon request.

## Applications

Flat and formed sign faces and channel letters

## Regulatory code compliance and certifications

UL 879: Electric Sign Components,  
UL File #E146154

UL 94: Flammability, UL File #E351891

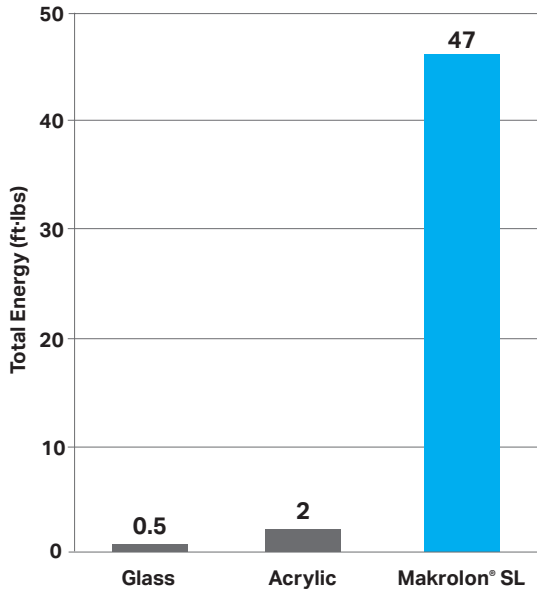
Miami-Dade NOA No. 16-1024.01  
Florida Building Code 2014  
High Velocity Hurricane Zone Classified

## Typical Properties

| Property  | Test Method | Units                         | Values                  |
|---|-------------|-------------------------------|-------------------------|
| <b>PHYSICAL</b>                                   |             |                               |                         |
| Specific Gravity                                  | ASTM D 792  | –                             | 1.2                     |
| Refractive Index                                  | ASTM D 542  | –                             | 1.586                   |
| Light Transmission, Clear @ 0.118"                | ASTM D 1003 | %                             | 86                      |
| Light Transmission, B59 White @ 0.118"            | ASTM D 1003 | %                             | 27                      |
| Light Transmission, B54 White @ 0.150" and 0.177" | ASTM D 1003 | %                             | 27                      |
| Water Absorption, 24 hours                        | ASTM D 570  | %                             | 0.15                    |
| Poisson's Ratio                                   | ASTM E 132  | –                             | 0.38                    |
| <b>MECHANICAL</b>                                 |             |                               |                         |
| Tensile Strength, Ultimate                        | ASTM D 638  | psi                           | 9,500                   |
| Tensile Strength, Yield                           | ASTM D 638  | psi                           | 9,000                   |
| Tensile Modulus                                   | ASTM D 638  | psi                           | 340,000                 |
| Elongation  | ASTM D 638  | %                             | 110                     |
| Flexural Strength                                 | ASTM D 790  | psi                           | 13,500                  |
| Flexural Modulus                                  | ASTM D 790  | psi                           | 345,000                 |
| Compressive Strength                              | ASTM D 695  | psi                           | 12,500                  |
| Compressive Modulus                               | ASTM D 695  | psi                           | 345,000                 |
| Izod Impact Strength, Notched @ 0.125"            | ASTM D 256  | ft-lbs/in                     | 18                      |
| Izod Impact Strength, Unnotched @ 0.125"          | ASTM D 256  | ft-lbs/in                     | 60 (no break)           |
| Instrumented Impact @ 0.125"                      | ASTM D 3763 | ft-lbs                        | 47                      |
| Shear Strength, Ultimate                          | ASTM D 732  | psi                           | 10,000                  |
| Shear Strength, Yield                             | ASTM D 732  | psi                           | 6,000                   |
| Shear Modulus                                     | ASTM D 732  | psi                           | 114,000                 |
| Rockwell Hardness                                 | ASTM D 785  | –                             | M70 / R118              |
| <b>THERMAL</b>                                    |             |                               |                         |
| Coefficient of Thermal Expansion                  | ASTM D 696  | in/in/°F                      | 3.75 x 10 <sup>-5</sup> |
| Coefficient of Thermal Conductivity               | ASTM C 177  | BTU-in/hr-ft <sup>2</sup> -°F | 1.35                    |
| Heat Deflection Temperature @ 264 psi             | ASTM D 648  | °F                            | 270                     |
| Heat Deflection Temperature @ 66 psi              | ASTM D 648  | °F                            | 280                     |
| Brittleness Temperature                           | ASTM D 746  | °F                            | -200                    |
| <b>ELECTRICAL</b>                                 |             |                               |                         |
| Dielectric Constant @ 10 Hz                       | ASTM D 150  | –                             | 2.96                    |
| Dielectric Constant @ 60 Hz                       | ASTM D 150  | –                             | 3.17                    |
| Volume Resistivity                                | ASTM D 257  | Ohm-cm                        | 8.2 x 10 <sup>16</sup>  |
| Dissipation Factor @ 60 Hz                        | ASTM D 150  | –                             | 0.0009                  |
| Arc Resistance                                    | –           | –                             | –                       |
| Stainless Steel Strip electrode                   | ASTM D 495  | Seconds                       | 10                      |
| Tungsten Electrodes                               | ASTM D 495  | Seconds                       | 120                     |
| Dielectric Strength, in air @ 0.125"              | ASTM D 149  | V/mil                         | 380                     |
| <b>FLAMMABILITY</b>                               |             |                               |                         |
| Horizontal Burn, AEB                              | ASTM D 635  | in.                           | <1                      |
| Flame Class @ 0.060"                              | UL 94       | –                             | HB                      |
| Ignition Temperature, Self                        | ASTM D 1929 | °F                            | 1022                    |
| Ignition Temperature, Flash                       | ASTM D 1929 | °F                            | 824                     |

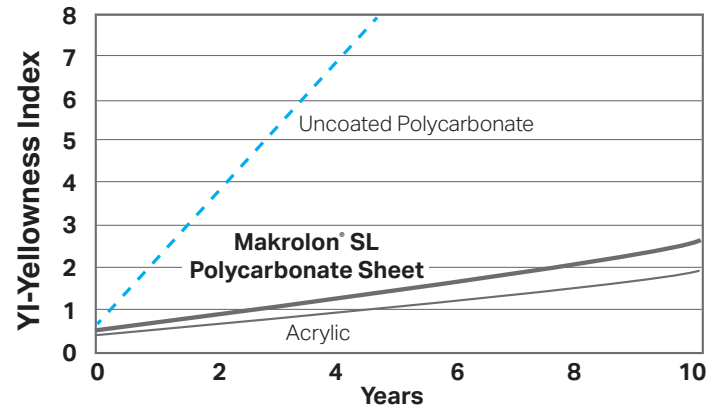
# Makrolon® SL sheet

## Impact Resistance\*



\*Instrumented Impact per ASTM D 3763, sample thickness 0.125" nominal

## UV Weather Resistance



Visible yellowness at 8 or greater

## Makrolon® SL Standard Colors

| Standard Covestro Color | Standard Industry Color | Standard Gauge  |
|-------------------------|-------------------------|-----------------|
| Clear/ A00              | -                       | 0.093" - 0.236" |
| White/ B59              | 7328                    | 0.093" - 0.118" |
| White/ B54              | 7328                    | 0.150" - 0.236" |
| Red/ D92                | 6192                    | 0.118" - 0.177" |



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