

Exova
2395 Speakman Dr.
Mississauga
Ontario
Canada
L5K 1B3

T: +1 (905) 822-4111
F: +1 (905) 823-1446
E: sales@exova.com
W: www.exova.com



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ASTM E 84 Surface Burning Characteristics of "Model 2 (Felt Blue)"

| | |
|---------------|---|
| A Report To: | SLALOM srl Via E. Rossi 69 20862 Arcore, (MB) Italy |
| Phone: | 0039 039 61 80571 |
| Attention: | Elettra De Pellegrin |
| E-mail: | info@slalom-it.com |
| Submitted by: | Exova Warringtonfire North America |
| Report No. | 18-002-609(B) 4 Pages |
| Date: | October 16, 2018 |

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 84-18, as per Exova Warringtonfire North America Quotation No. 18-002-567,238 RV1 dated September 7, 2018.

SAMPLE IDENTIFICATION (Exova sample identification number 18-002-S0609-2)

Felt, approximately 0.154 inches (4 mm) in thickness, described as, "Col. 001 Azure", identified as: "Model 2 (Felt Blue)"

TEST PROCEDURE

The method, designated as ASTM E 84-18 "*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 rate of 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 one continuous section of material approximately 0.154 inches (3.9 mm) in measured thickness by 22 inches (559 mm) in width by 288 inches (7315 mm) in 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 over its entire surface area by 2 inch (50 mm) hexagonal wire mesh and was further supported across its width by 0.25 inch (6 mm) steel rods spaced nominally at 24 inch (610 mm) intervals. The uncoated (darker) surface was exposed to the test flame.

The testing was performed on: 2018-10-12

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: "Model 2 (Felt Blue)"**

| Approx. Time to Ignition (s) | Maximum Flame Front Distance | Time to Maximum Flame Front (s) | Flame Spread Index (FSI) | Smoke Developed Index (SDI) |
|------------------------------|------------------------------|---------------------------------|--------------------------|-----------------------------|
| 22 | (ft.): 3.2 (m): 0.98 | 44 | 15 | 450 |

Observations of Burning Characteristics

The specimen ignited approximately 22 seconds after exposure to the test flame. Melting, dripping, and flaming dripping behavior was observed. Material that dripped to the floor of the apparatus also ignited (at approximately 70 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 |



Francis Williams,
Technician.



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), or by calling 1-866-263-9268.

ASTM E 84-18 Test Charts

Sample: "Model 2 (Felt Blue)"

Chart 1. FLAME SPREAD

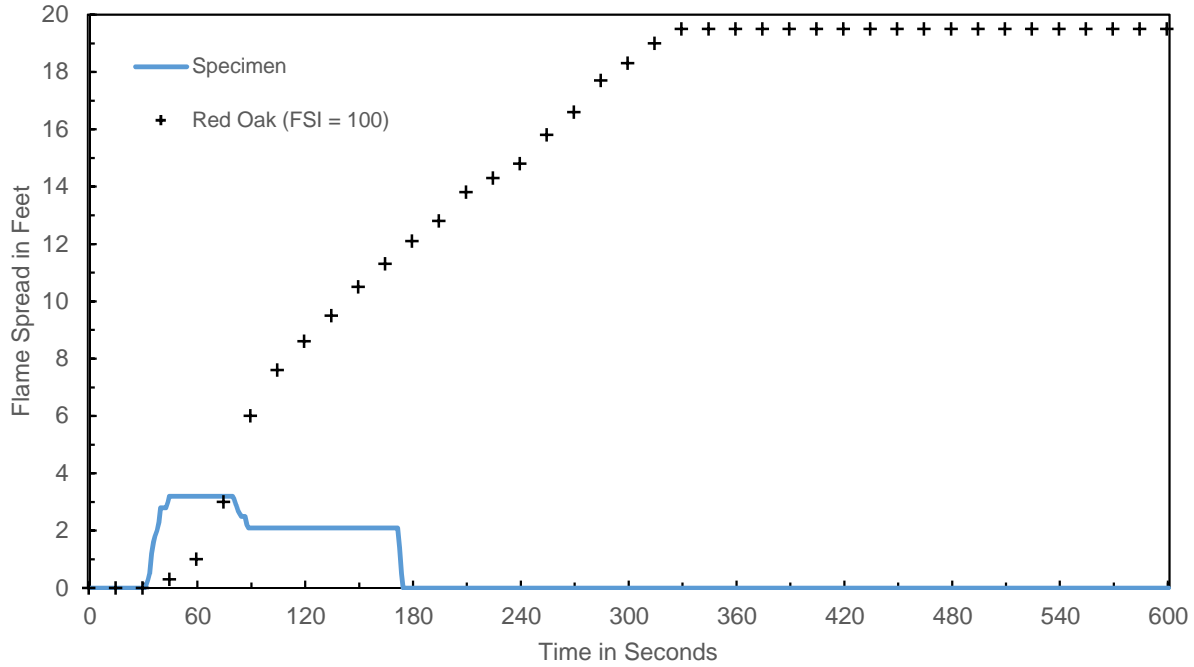
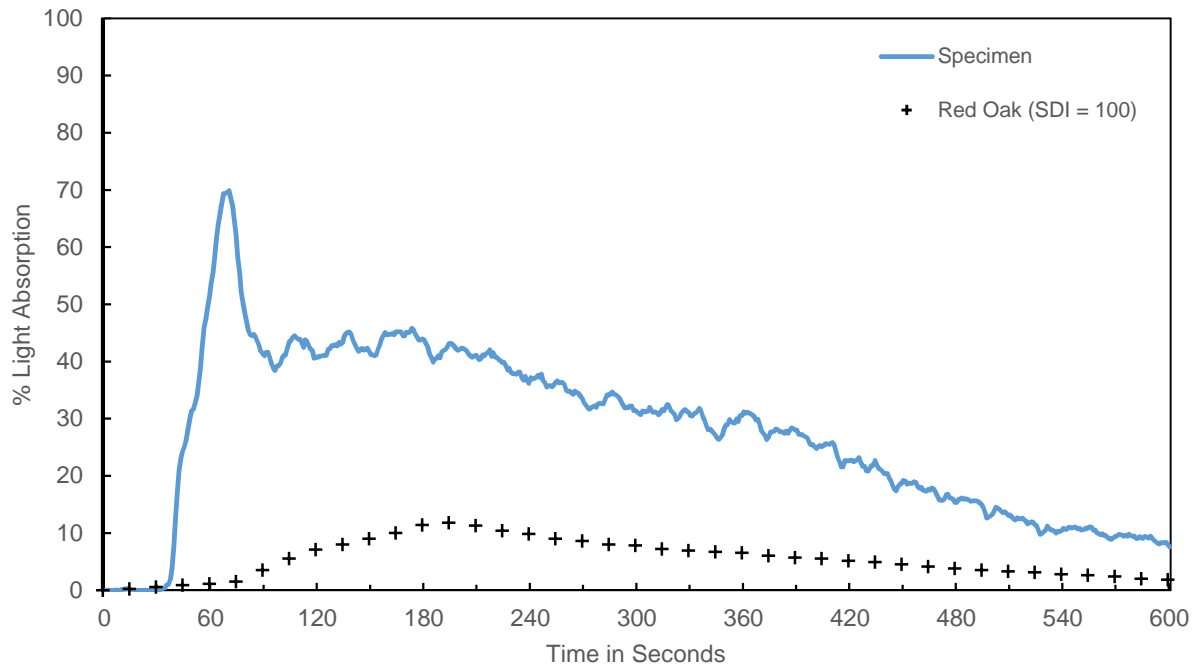


Chart 2. SMOKE DEVELOPED



| Calculated Flame Spread (CFS) | Rounded Flame Spread Index (FSI) | Calculated Smoke Developed (CSD) | Rounded Smoke Developed Index (SDI) | Maximum 23' Air Temperature (°F) |
|-------------------------------|----------------------------------|----------------------------------|-------------------------------------|----------------------------------|
| 15.5 | 15 | 429.2 | 450 | 506 |