
CAN/ULC-S102 Surface Burning Characteristics of "Boreal Nature Elite"

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Submitted by: Element Fire Testing

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6 Pages

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

SPECIFICATIONS OF ORDER

Determine Flame Spread Rating and Smoke Developed Classification based upon triplicate testing conducted in accordance with CAN/ULC-S102-2018 (as referenced in CAN/ULC-S705.1-15 Rev1), as per Element Building Science Project No. 20-06-B0040, Element Work Order No. 543502 and Proposal No. 20-006-95292.

SAMPLE IDENTIFICATION (Element sample identification number 20-06-B0040)

Spray Foam Insulation material, applied to a gypsum board substrate, identified as:
"Boreal Nature Elite"

TEST PROCEDURE

The method, designated as CAN/ULC-S102-2018, "*Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies*", is designed to determine the relative surface burning characteristics of materials under specific test conditions. Results of less than three identical specimens are expressed in terms of Flame Spread Value (FSV) and Smoke Developed Value (SDV). Results of three or more replicate tests on identical samples produce average values expressed as Flame Spread Rating (FSR) and Smoke Developed Classification (SDC).

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 spray foam material was applied to a gypsum board substrate. Each test specimen consisted of a total of three prepared sections of material, each approximately 50 mm in thickness by 559 mm in width by 2438 mm in length. The sections were butted together to create the total specimen length. Prior to testing, the specimens were conditioned to constant mass at a temperature of $23 \pm 3^{\circ}\text{C}$ and a relative humidity of $50 \pm 5\%$. During testing, each specimen was self-supporting.

Testing was performed on: Test #1: 2020-04-23 Test #2: 2020-04-23 Test #3: 2020-04-23

SUMMARY OF TEST PROCEDURE

The tunnel is preheated to 85°C , as measured by the backwall-embedded thermocouple located 7090 mm downstream of the burner ports, and allowed to cool to 40°C , as measured by the backwall-embedded thermocouple located 4000 mm from the burners. At this time the tunnel lid is raised and the test sample is placed along the ledges of the tunnel so as to form a continuous ceiling 7315 mm long, 305 mm above the floor. 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 the Flame Spread Values (FSV) are determined by calculating the total area under the curve for each test sample. If the total area under the curve (AT) is less than or equal to 29.7 m·min, $FSV = 1.85 \cdot AT$; if greater, $FSV = 1640 / (59.4 - AT)$.

The Smoke Developed Value is determined by comparing the area under the obscuration curve for the test sample to that of inorganic reinforced cement board and red oak, established as 0 and 100, respectively. The Smoke Developed Value (SDV) is determined by dividing the total area under the obscuration curve by that of red oak and multiplying by 100.

TEST RESULTS

SAMPLE: "Boreal Nature Elite"

Test	Approx. Time to Ignition (s)	Maximum Flame Front Distance (m)	Time to Maximum Flame Front (s)	Maximum Air Temperature (°C)	Flame Spread Value (FSV)	Smoke Developed Value (SDV)	"Corrected" Flame Spread Value (FSV=92.5 d/t)
1	4	2.75	127	321	46	408	120
2	4	4.74	90	254	104	587	292
3	4	5.94	482	393	69	655	68
Average:					73	550	160
Rounded Average Flame Spread Rating (FSR):					75	-	160
Rounded Average Smoke Developed Classification (SDC):					-	550	-

Observations of Burning Characteristics

The specimens ignited approximately 4 seconds after exposure to the test flame. Falling char was observed at approximately 100 seconds into the test.

Results Interpretation

CAN/ULC-S102 contains no performance criteria of its own. The National Building Code of Canada (NBCC) or other jurisdictional documentation should be referenced to determine the FSR and/or SDC performance criteria that is applicable to the material, for the intended application. CAN/ULC-S102, section 9.2.5 states that materials with low thermal inertia (like foamed plastics) could exhibit anomalous behavior such that an early flame front advance occurs, and then slows down or fails to advance further. CAN/ULC-S102 then requires the use of a "Corrected" FSV equation. Other conditions may also require additional testing, using CAN/ULC-S127 *Standard Corner Wall Method of Test for Flammability Characteristics of Non-Melting Foam Plastic Building Materials*, in order to verify the FSR. The highest FSR would apply. In this case, FSR = 160 unless CAN/ULC-S127 produces a higher value.



Francis Williams,
Technician.



Ian Smith,
Technical Manager.

Test 1 of 3

Sample: "Boreal Nature Elite"

Chart 1. FLAME SPREAD (Specimen #1)

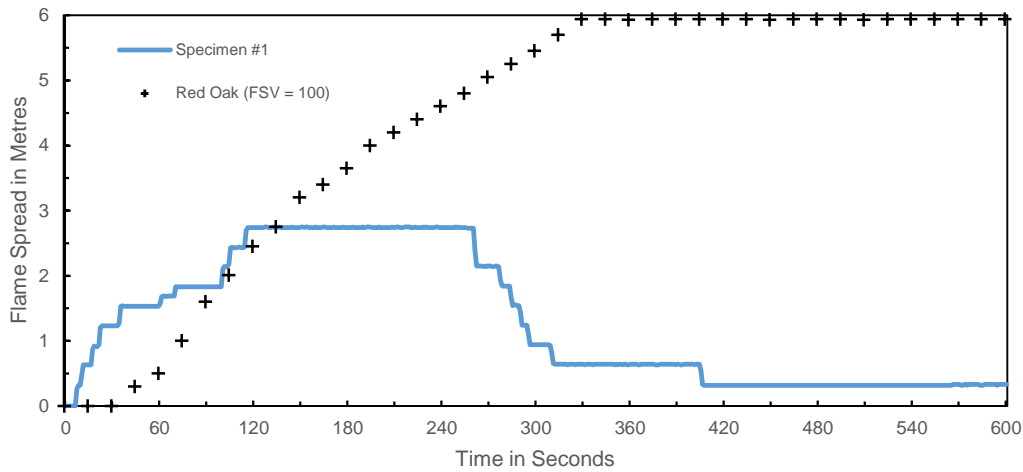


Chart 2. SMOKE DEVELOPED (Specimen #1)

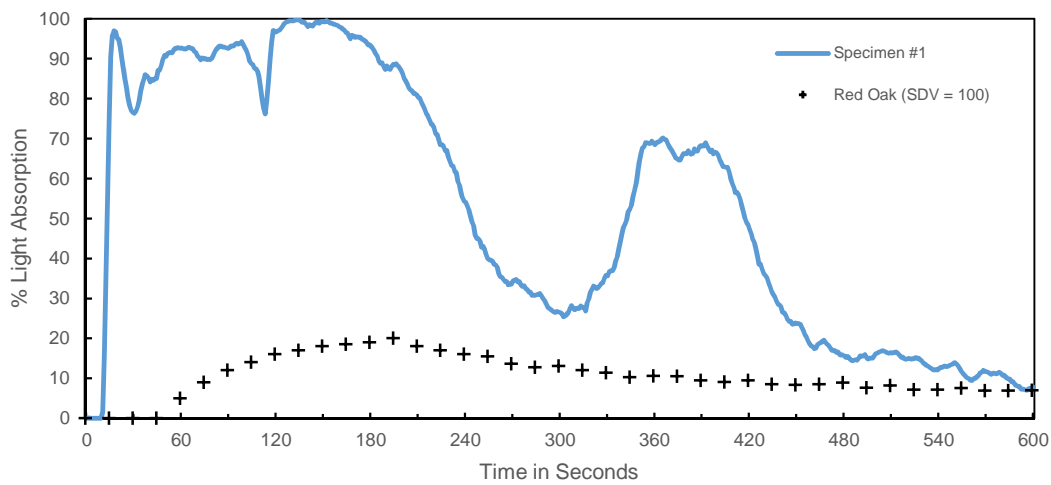
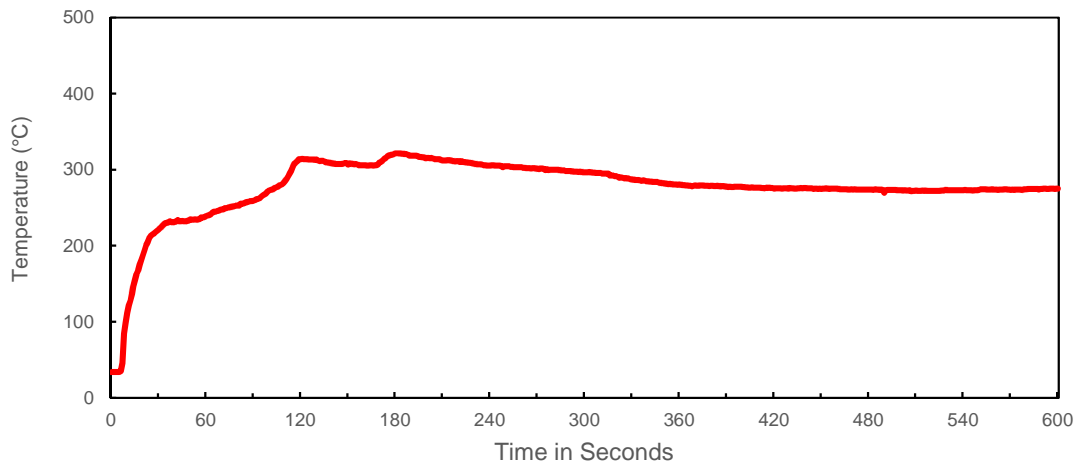


Chart 3. TEMPERATURE (Specimen #1)



Flame Spread
Value (FSV)
46

Smoke Developed
Value (SDV)
408

Maximum Air
Temperature (°C)
321

Test 2 of 3

Sample: "Boreal Nature Elite"

Chart 4. FLAME SPREAD (Specimen #2)

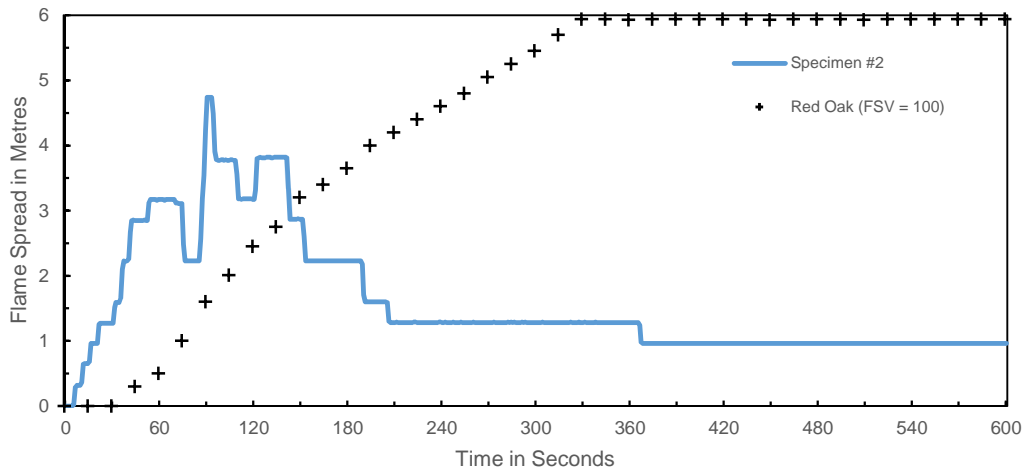


Chart 5. SMOKE DEVELOPED (Specimen #2)

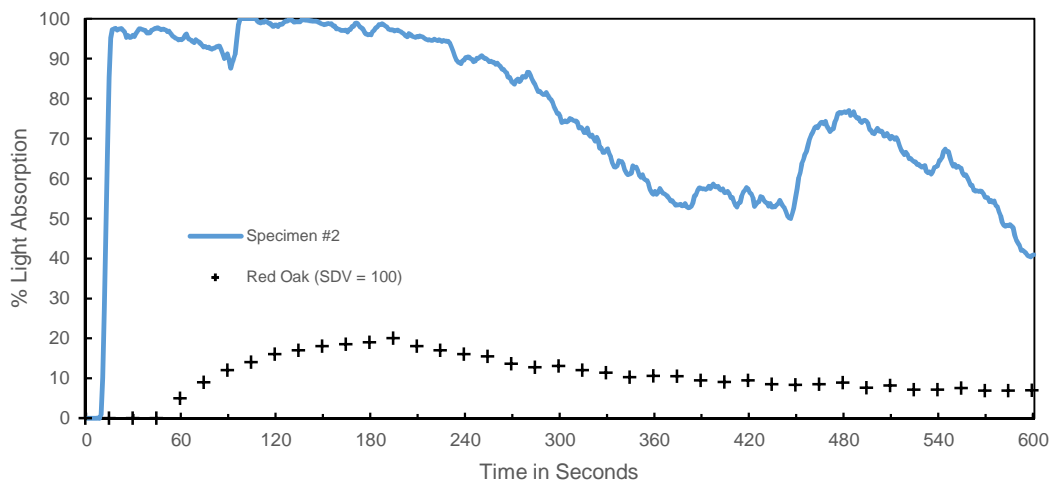
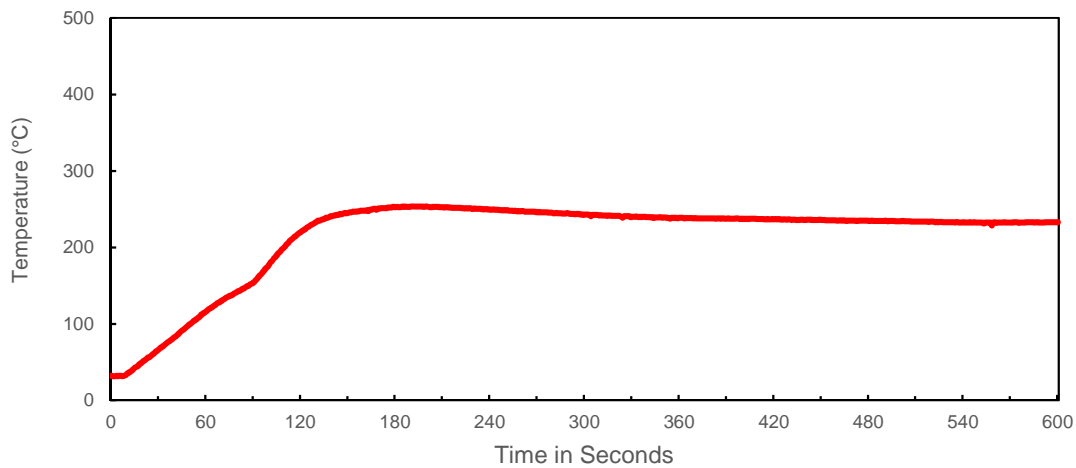


Chart 6. TEMPERATURE (Specimen #2)



Flame Spread
Value (FSV)
104

Smoke Developed
Value (SDV)
587

Maximum Air
Temperature (°C)
254

Test 3 of 3

Sample: "Boreal Nature Elite"

Chart 7. FLAME SPREAD (Specimen #3)

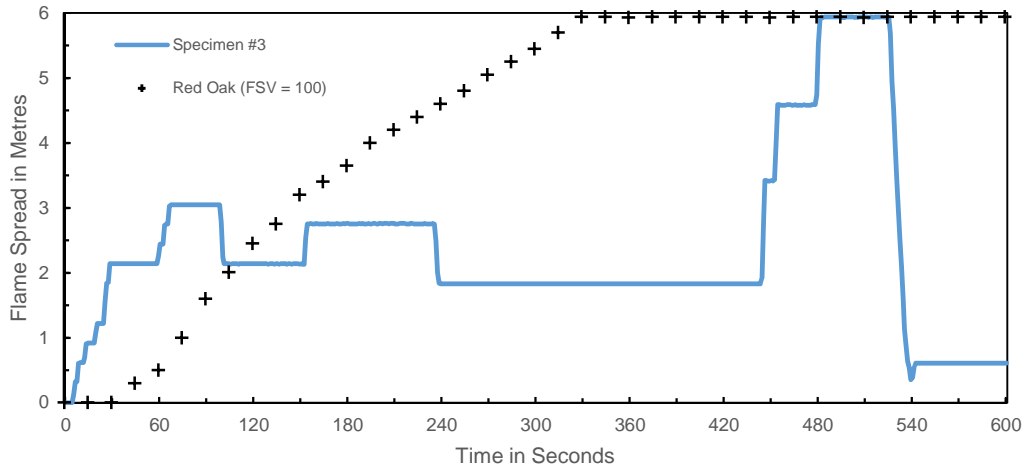


Chart 8. SMOKE DEVELOPED (Specimen #3)

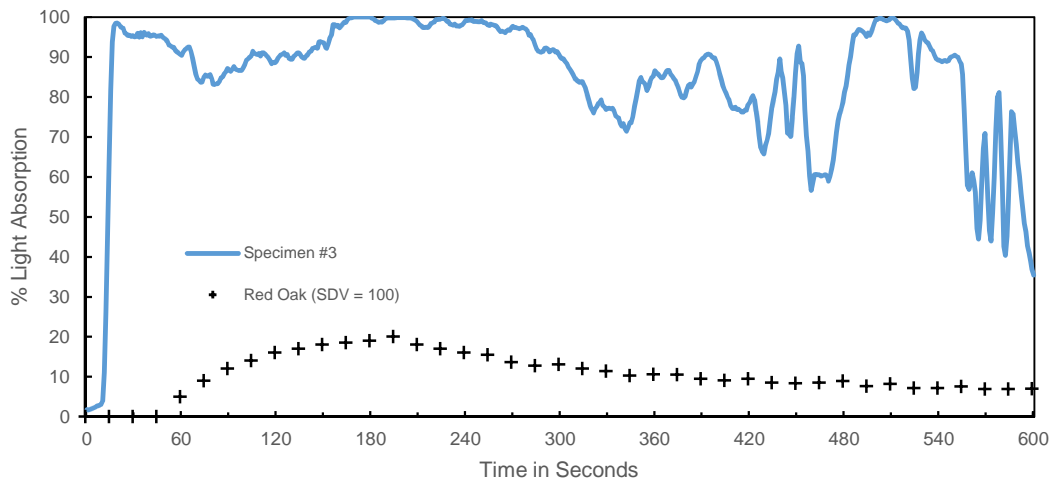
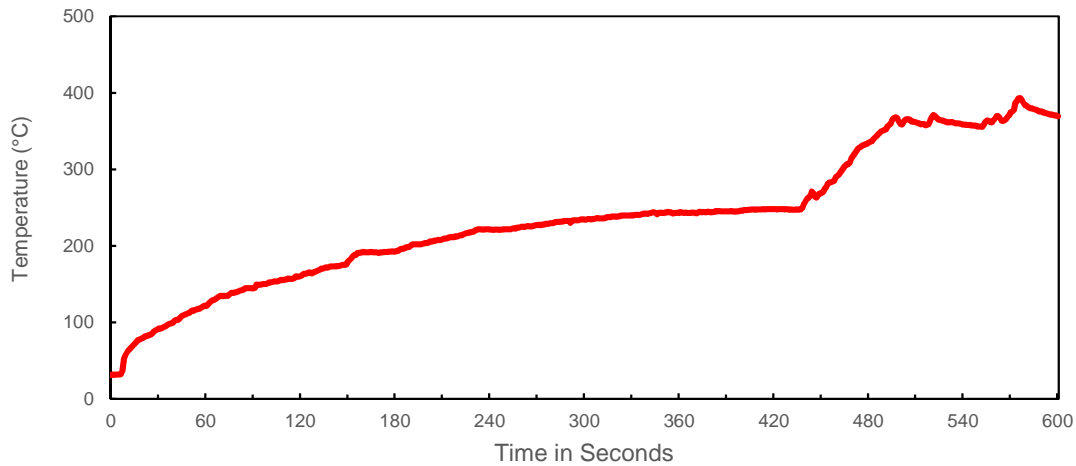


Chart 9. TEMPERATURE (Specimen #3)



Flame Spread
Value (FSV)
69

Smoke Developed
Value (SDV)
655

Maximum Air
Temperature (°C)
393