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**ASTM E 84 Surface Burning Characteristics
of "3 mm Palsun Basic"**

A Report To:	Palram Americas 9735 Commerce Circle Kutztown, PA USA 19530
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Submitted by:	Exova Warringtonfire North America
Report No.	15-002-743(B2) 4 Pages
Date:	January 22, 2016

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 84-15a, as per Palram Americas, Inc. reference Purchase Order No. 4900080181 and Exova Warringtonfire North America Proposal Ref. #15-002-381,246RV2 dated December 15, 2015.

SAMPLE IDENTIFICATION (Exova sample identification number 15-002-S0743-2)

Clear polycarbonate sheet, nominally 3 mm in thickness, identified as:
"3 mm Palsun Basic"

TEST PROCEDURE

The method, designated as ASTM E 84-15a "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. Results are expressed in terms of Flame Spread Index (FSI) and Smoke Developed (SD).

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 0.118 inches (3 mm) in thickness by 21 inches (533 mm) in width by 96 inches (2438 mm) in length. The sections were butted together during testing to form the requisite 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 self-supporting and the marked surface was exposed to the test flame.

The testing was performed on: 2016-01-04

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 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. 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 24 feet (7315 mm) long, 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 end-to-end, to protect the tunnel lid, 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 (SD) is determined by dividing the total area under the obscuration curve by that of red oak, and multiplying by 100. SD is then rounded to the nearest multiple of 5 if less than 200. SD values over 200 are rounded to the nearest multiple of 50.

TEST RESULTS

<u>SAMPLE</u>	<u>Flame Spread Index (FSI)</u>	<u>Smoke Developed (SD)</u>
"3 mm Palsun Basic"	5	250

Observations of Burning Characteristics

- The specimen ignited approximately 85 seconds after exposure to the test flame. Surface charring, bubbling, and sagging was observed prior to surface ignition. Partial collapse (melting) of the material was observed and material that fell to the floor of the apparatus also ignited.
- The flame front propagated to a maximum distance of 16.1 feet (4.9 metres) at approximately 589 seconds.

The International Building Code (IBC) requirements (Section 803.1):

	<u>Flame-Spread Index</u>	<u>Smoke Development</u>
Class A	0 - 25	450 Maximum
Class B	26 - 75	450 Maximum
Class C	76 - 200	450 Maximum

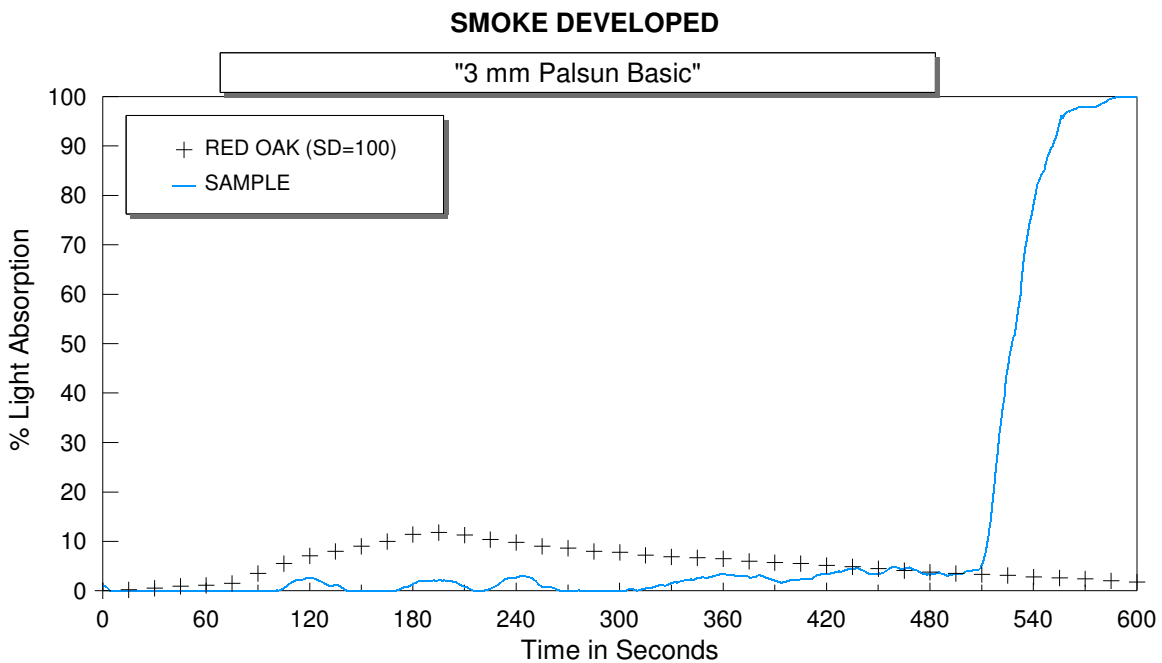
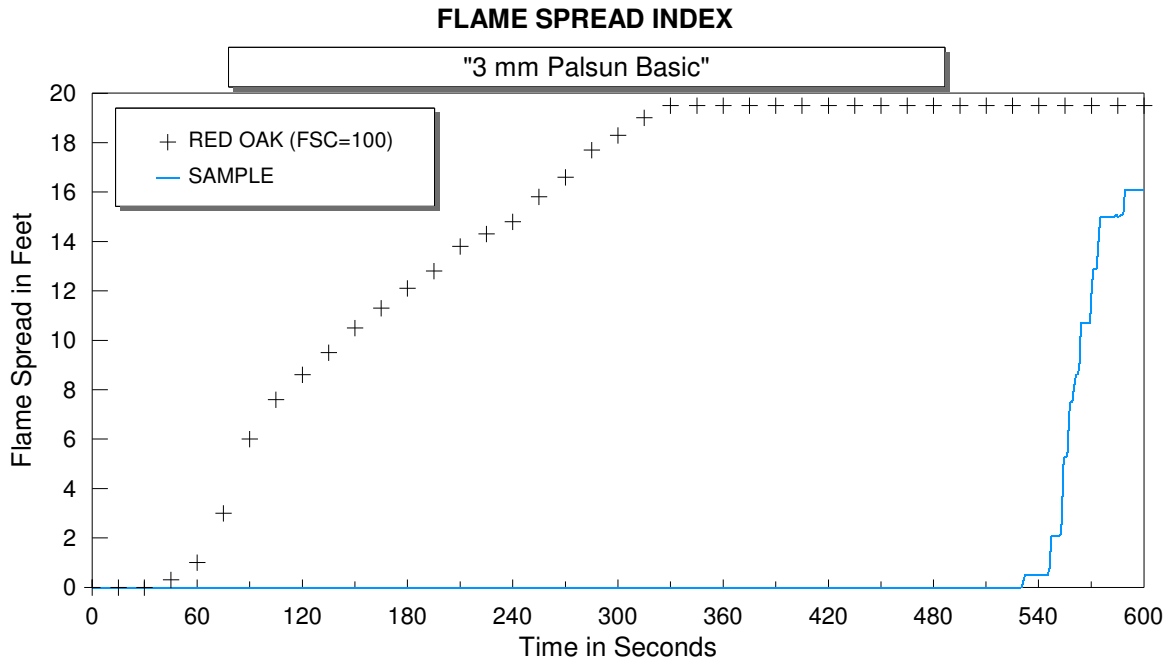
For light-transmitting plastics intended for use as light-transmitting materials in building and structures, the International Building Code (Section 2606.4) requires a maximum Smoke Developed (SD) value not greater than 450.

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

Robert A. Carleton,
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), or by calling 1-866-263-9268.



**Flame Spread
Index (FSI)**
5

**Smoke
Developed (SD)**
250

**Maximum Air
Temperature (°F)**
544