



TEST DATES: APRIL 28 – JUNE 30, 2006

REPORT DATE: JULY 18, 2006

Page 1 of 9

INTERTEK TEST REPORT NUMBER 3092623-001

SPREAD OF FLAME, INTERMITTENT FLAME, AND BURNING BRAND TESTS  
CONDUCTED ON

0.038" THICK POLYETHYLENE BORA LEAVES  
CLASS "C" APPLICATION

FOR:

PALMEX INTERNATIONAL  
170 RUE PRINCIPALE  
SAINT-SAUVEUR-DES-MONTS, QUEBEC J0R 1R6  
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## INTRODUCTION

Intertek Testing Services NA (Intertek) Fire Testing Laboratory in Middleton, Wisconsin conducted an investigation of the external fire resistance characteristics of 0.038" thick polyethylene Bora Leaves for a class "C" application. The samples were received at the laboratory March 6, May 2, and June 28, 2006 in good condition.

The tests were conducted in accordance with the criteria of ASTM E108 (2004) "*Standard Test Methods for Fire Tests of Roof Coverings*", UL 790 (1997), and UBC 15-2 (1997) for Spread of Flame, Intermittent Flame, and Burning Brand tests with the exception of the deck construction.

## TEST ASSEMBLY CONSTRUCTION

The decks were constructed by Intertek employees according to the specifications of test standard ASTM E108 (2004) "*Standard Test Methods for Fire Tests of Roof Coverings*" with the exception of the decks having no plywood applied to them. The roofing materials were applied directly to the nominal 2" x 4" substructure of the deck as they would be applied in the field.

1. The test material was submitted by the client.
2. The test materials were applied by intertek personnel at the laboratory per the installation instructions of the materials manufacturers.

### Deck Construction

Deck	Nominal 2" x 4" rafter deck (no plywood sheathing under the leaves)
Underlayment	None
Surface	0.038" thick polyethylene Bora Leaves

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## TEST OBSERVATIONS AND RESULTS

### Test Deck #1 – Intermittent Flame (Class C)

#### Test Conditions

Test Date	4/28/2006
Air Velocity	1056 +/-44 fpm
Slope of Test Deck	5:12
Surface Material	0.038" thick polyethylene Bora Leaves
Underlayment	None

#### Test Observations

Cycle		Time To:		Observations/Comments (Include Off Cycles)
No.	Min.	Ignition (min : sec)	Flame Out (min : sec)	
1	Start			0:30 – Material beginning to melt.
2	3	3:50	4:00	3:00 – Attached flame. 4:00 – Flaming stopped. 4:37 – All smoking stopped.
3	6	6:38	7:13	6:38 – Attached flame. 7:13 – Flaming stopped. 10:00 – No flaming or smoke observed. 20:00 – Test stopped.

Acceptance Level: Class "C" – No flaming of the underside of the deck.

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## Test Deck #2 – Spread of Flame (Class C)

### Test Conditions

Test Date	5/31/2006
Air Velocity	1056 +/-44 fpm
Slope of Test Deck	5:12
Surface Material	0.038" thick polyethylene Bora Leaves
Underlayment	None

### Test Observations

Time (min:sec)	Distance (feet-inches)	Observations/Comments
00:00		Burner ignited.
	1'	
2:21	2'	
3:19	3'	
3:36	4'	
3:46	5'	
4:00	6' 1"	Gas turned off, end of test.

Acceptance Level: Class "C" – Maximum flame spread 6' 1", less than 13' allowed by the test standards.

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## Test Deck #3 – Burning Brand (Class C)

Test Date	5/31/2006
Air Velocity	1056 +/-44 fpm
Ambient Air Temperature	74°F
Brand Type	Class C
Slope of Test Deck	5:12 Inches
Surface Material	0.038" thick polyethylene Bora Leaves
Underlayment	None

Brand#	Time (min:sec)	Observations			
		Ignition	Flame Out	Glow Out	Smoke Out
1	00:00	Upon placement	01:49	05:00	
2	01:00	Upon placement	01:47	05:00	
3	02:00	Upon placement	05:00	06:00	
4	03:00	Upon placement	05:00	07:00	
5	05:00	Upon placement	07:45	10:00	
6	06:00	Upon placement	08:00	13:00	
7	08:00	Upon placement	14:00	14:20	
8	09:00	Upon placement	14:00	14:40	
9	10:00	Upon placement	14:00	14:50	
10	11:00	Upon placement	14:00	15:00	
11	12:00	Upon placement	14:00	16:00	
12	13:00	Upon placement	13:50	18:00	
13	14:00	Upon placement		21:00	
14	15:00	Upon placement		22:00	
15	16:00	Upon placement		27:50	
16	17:00	Upon placement		27:32	
17	18:00	Upon placement		33:00	
18	19:00	Upon placement		28:40	
19	20:00	Upon placement		28:40	
20	21:00	Upon placement		33:05	33:20

All smoke out by 33:20, test stopped at 45:00.

Acceptance Level: Class "C" – No flaming of the underside of the deck.

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## Test Deck #4 – Intermittent Flame (Class C)

### Test Conditions

Test Date	6/23/2006
Air Velocity	1056 +/-44 fpm
Slope of Test Deck	5:12
Surface Material	0.038" thick polyethylene Bora Leaves
Underlayment	None

### Test Observations

Cycle		Time To:		Observations/Comments (Include Off Cycles)
No.	Min.	Ignition (min : sec)	Flame Out (min : sec)	
1	Start			No attached flame. No smoke during off cycle.
2	3			No attached flame or smoking.
3	6			No attached flame, light smoking of the top surface.

Test stopped at 20:00 (no flames or smoking).

**Acceptance Level: Class "C" – No flaming of the underside of the deck.**

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## Test Deck #5 – Spread of Flame (Class C)

### Test Conditions

Test Date	6/23/2006
Air Velocity	1056 +/-44 fpm
Slope of Test Deck	5:12
Surface Material	0.038" thick polyethylene Bora Leaves
Underlayment	None

### Test Observations

Time (min:sec)	Distance (feet-inches)	Observations/Comments
00:00		Burner ignited.
3:50	1'	Attached flame.
3:55	2'	
4:00	2' – 2' 6"	Test continued.
6:00	4' 1"	Test stopped.

Acceptance Level: Class "C" – Maximum flame spread 2' 6", less than 13' allowed by the test standards during the 4 minute period.

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Test Deck #6 – Burning Brand (Class C)

Test Date	6/30/2006
Air Velocity	1056 +/-44 fpm
Ambient Air Temperature	81°F
Brand Type	Class C
Slope of Test Deck	5:12 Inches
Surface Material	0.038" thick polyethylene Bora Leaves
Underlayment	None

Brand#	Time (min:sec)	Observations			
		Ignition	Flame Out	Glow Out	Smoke Out
1	00:00		01:04		
2	01:00		02:26		
3	02:00		03:24		
4	03:00		06:24		
5	05:00		11:15		
6	06:00		12:01		
7	08:00		13:20		
8	09:00		14:03		
9	10:00		14:54		
10	11:00		15:59		
11	12:00		16:44		
12	13:00		18:00		
13	14:00		19:00		
14	15:00		19:42		
15	16:00		23:50		
16	17:00		26:53		

All smoke out by 30:00, test stopped at 45:00.

**Acceptance Level: Class "C" – No flaming of the underside of the deck.**



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## SUMMARY

Test Deck #	Test	Acceptance Level
1	Intermittent Flame	Class "C"
2	Spread of Flame	Class "C"
3	Burning Brand	Class "C"
4	Intermittent Flame	Class "C"
5	Spread of Flame	Class "C"
6	Burning Brand	Class "C"

## CONCLUSION

The 0.038" thick polyethylene Bora Leaves, as described herein, complied with the acceptance criteria of ASTM E108 (2004) *“Standard Test Methods for Fire Tests of Roof Coverings”*, UL 790 (1997), and UBC 15-2 (1997) for a “Class C” rating.

Many building codes require a sheathing to be installed beneath the roofing material. Based on Intertek’s experience, it is the opinion of Intertek engineers that sheathing increases fire resistance during fire penetration tests (Burning Brand and Intermittent Flame). Therefore, the 0.038" thick polyethylene Bora Leaves, as described herein, is eligible to be used as a Class "C" roof covering material installed on a roofing system with sheathing, with or without an approved underlayment, or without sheathing with the approval of the Authority Having Jurisdiction.