TESTS REPORT
REACTION TO FIRE OF A MATERIAL

According to the decree of November 21st, 2002 modified relating to the reaction to fire of construction and installation products

Seule la version française fait foi
Only the French version is legally acceptable

N° DSSF-21-05459

Valid 5 years from July 27th, 2021

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It comprises 10 pages.

REQUEST BY:

PALMEX INTERNATIONAL INC
2518 Chemin des Entreprises
SAINT-SAUVEUR, QC, J0R 1R7
CANADA

1 GENERALITIES

1.1 SUBJECT

The purpose of tests reported by this document is to determine the fire behaviour of materials, in compliance with tests specified by the Ordinance of the Minister referenced below.

1.2 REFERENCE TEXTS

Decree of November 21st, 2002 modified.
NF P 92-501:1995 “Radiation test used for rigid materials, or for materials on rigid substrates (flooring and finishes) of all thicknesses, and for flexible materials thicker that 5 mm”.
NF P 92-504:1995 “Flame persistance test and speed of the spread of flame”.
NF P 92-505:1995 “Building materials. Reaction to fire tests. Test used for thermalmelting materials. Dripping test”.

2 SOURCE AND IDENTIFICATION OF SAMPLES

The samples have been selected by the producer as representative of its standard production.

Date(s) of delivery:	June 08th, 2021
Conditionning:	The samples have been conditioned according to test standard for at least 7 days.
Date(s) of tests:	July 26th and 27th, 2021
Location of test:	Champs-sur-Marne
The responsible for the test:	Franck GOGUEL
The test operator:	Franck GOGUEL / Maxime PORTAIS
Identification No.:	21-05459
Brand name:	PALMEX RIOHA M1 leaf
Manufacturer:	PALMEX INTERNATIONAL INC 2518 Chemin des Entreprises SAINT-SAUVEUR, QC, J0R 1R7 CANADA

The test results concern only the behaviour of the product specimens in the specific conditions of the test; they are not intended to be the only criteria of evaluation of the fire danger presented by the product in final use.

Prepared at Champs-sur-Marne, September 02nd, 2021

Head of Tests Unit
Fire Studies and Tests

Franck GOGUEL

3 DESCRIPTION

3.1 SHORT DESCRIPTION

Synthetic flexible leaves for use in roofing (palm tree imitation).
Fire-retarded high-density polyethylene (HDPE) sheets, constituted of a full upper part and of a lower part in the form of rods thus creating the tropical roof finish.
Each row of sheets is spaced from 11 or 12.5 cm from the previous one, the roof being thus formed of a superposition of 2 sheets.

Nominal thickness of a sheet: 0.736 mm.
Overall dimension of a sheet: 1 x 0.6 m (with 1 x 0.26 m in the upper part and 1 x 0.34 m in the lower part).
Overall weight of a sheet (palm tree imitation): 376 g.
Nominal weight per unit area of a sheet (palm tree imitation): 874 g/m^2.
Quantity of sheets per m^2 of roofing: 8 to 9 so approximately from 7.0 to 7.9 kg/m^2.
Colour: dark beige.

*Unless otherwise stated (*L) and in accordance with the CGP, information relating to the description of products and associated data is provided by the applicant and under his only responsibility.*
*(*L): Data measured by the laboratory.*

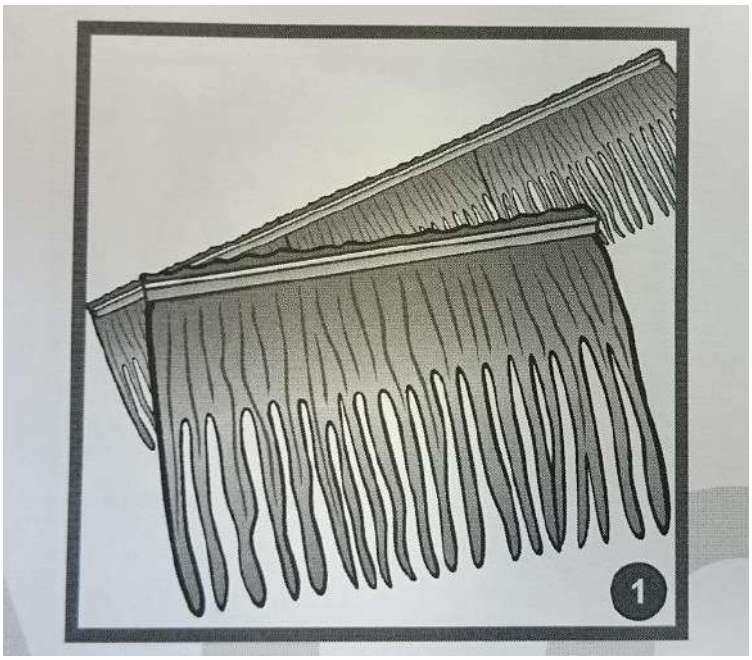
3.2 COMPLEMENTARY CHARACTERISTICS

The overall composition appears in the file, including the information relating to the fire-retarding of the product.

Reference of the tested sheet: RIOHA.
Measured thickness of a sheet *(* L)*: 0.9 mm.
Measured weight per unit area of a sheet *(* L)*: 1050 g/m².

*(*L): Data measured by the laboratory.*

Schematic view of a sheet (palm tree imitation)



Picture of a sample

4 TESTS DESCRIPTION

4.1 TEST BY RADIATION (NF P 92-501)

The test piece (30 x 40 cm), positioned at 45° is submitted to a specified radiation, emitted by an electric heat radiation emitter, the surface of which is 30 mm from the surface of the test piece. The gases released come into contact with the igniters, positioned on either side of the test piece.
Each test lasts 20 minutes.
The determining elements are: the initial flaming time, the heights of the flames, the duration of the flaming

DEFINITION OF THE RATING INDEX

ti_1, ti_2 is the time from the beginning of the test, where the flaming appears – on the exposed face (ti_1) – on the back of the test piece (ti_2).
e_1, e_2 is the time, since the beginning of the test, where either the flaming is extinguished, or the flames do not go beyond the radiating surface – on the exposed face (e_1) – on the back of the test piece (e_2).

$$q = \frac{100 \sum h}{t_i \sqrt{\Delta t}}$$

t_i is the time, since the beginning of the test, where the first actual flaming appears.
h is the maximum length expressed in centimeters, reached by the flames during each period of 30 seconds during each test.
Σh is the sum of the heights for the duration of each test.
Δt is the high combustion time, i.e. the total time of presence of flames going beyond the upper limit of the flat part of the radiating surface within one or several periods higher than or equal to 5 seconds on either side of the test piece or on both sides.
Conventionally, in the particular case of materials which do not effectively ignite (time lower than 5 seconds), index q is assumed to be equal to zero.

4.2 FLAME PERSISTENCE TEST (NF P 92-504)

The specimen (40 x 3.5 cm) for rigid materials or (23 x 46 cm) for flexible materials, is subjected to the effect of a flame of a burner.
The determining elements are: the flame persistences and the falling of flaming droplets.

4.3 FUSIBLES MATERIALS TEST (NF P 92-505)

The test piece (7 x 7 cm) laid on a specified metal grid, is subjected to the radiation from a radiating heat source, located 3 cm above it.
For five minutes, the radiator is withdrawn at each flaming, then brought back into position after extinguishing. During five additional minutes, the radiator remains in place.
The determining elements are: falling of droplets, flaming or not, and flaming of the cellulose wadding positioned under the test piece.

5 TESTS RESULTS

5.1 TEST BY RADIATION (NF P 92-501)

4 tests carried out on product referenced PALMEX RIOHA M1 leaf**.**
The arrangement of the sheets has been carried out in accordance with the product description on page 5 (the stems of the upper sheet cover the full part of the lower sheet).

Dimensions of each specimen are checked before each test.

Measured characteristics of the tested specimens: weight / overall thickness *(*L)*
Test 1 (specimen no. 1): 283 g / 9 mm / Colour dark beige
Test 2 (specimen no. 2): 265 g / 9 mm / Colour dark beige
Test 3 (specimen no. 3): 269 g / 9 mm / Colour dark beige
Test 4 (specimen no. 4): 282 g / 9 mm / Colour dark beige

*(*L): Data measured by the laboratory.*

TEST 1

Flame heights according to time				List of ignition times (face exposed)					List of ignition times (unexposed side)				
0 to 5 min	5 to 10 min	10 to 15 min	15 to 20 min	$t_{exceeding}$		$t_{extinction}$		List Δt	$t_{exceeding}$		$t_{extinction}$		List Δt
cm	cm	cm	cm	minutes	seconds	minutes	seconds	seconds	minutes	seconds	minutes	seconds	seconds
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
Σ heights (cm)								0					0
0								0					0
								0					0
								0					0
								0					0
				Σ times (s)			0			Σ times (s)		0	
				Σ times (s) overall taken into account (if simultaneous on 2 sides									

1st inflammation time		
T_i		
minutes	seconds	Ti (s)
		0

calculation q = (100 x Σh) / (Ti x √Δt)	0.00

TEST 2

Flame heights according to time				List of ignition times (face exposed)					List of ignition times (unexposed side)				
0 to 5 min	5 to 10 min	10 to 15 min	15 to 20 min	$t_{exceeding}$		$t_{extinction}$		List Δt	$t_{exceeding}$		$t_{extinction}$		List Δt
cm	cm	cm	cm	minutes	seconds	minutes	seconds	seconds	minutes	seconds	minutes	seconds	seconds
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
Σ heights (cm)								0					0
0								0					0
								0					0
								0					0
								0					0
				Σ times (s)			0			Σ times (s)		0	
				Σ times (s) overall taken into account (if simultaneous on 2 sides									

1st inflammation time		
T_i		
minutes	seconds	Ti (s)
		0

calculation q = (100 x Σh) / (Ti x √Δt)	0.00

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TEST 3

Flame heights according to time				List of ignition times (face exposed)					List of ignition times (unexposed side)				
0 to 5 min	5 to 10 min	10 to 15 min	15 to 20 min	$t_{exceeding}$		$t_{extinction}$		List Δt	$t_{exceeding}$		$t_{extinction}$		List Δt
cm	cm	cm	cm	minutes	seconds	minutes	seconds	seconds	minutes	seconds	minutes	seconds	seconds
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
Σ heights (cm)								0					0
0								0					0
								0					0
								0					0
								0					0
				Σ times (s)		**0**			**Σ times (s)**		**0**		
				Σ times (s) overall taken into account (if simultaneous on 2 sides									
				calculation q = (100 x Σh) / (Ti x√Δt)				**0.00**					

1st inflammation time		
T_i		
minutes	seconds	Ti (s)
		0

TEST 4

Flame heights according to time				List of ignition times (face exposed)					List of ignition times (unexposed side)				
0 to 5 min	5 to 10 min	10 to 15 min	15 to 20 min	$t_{exceeding}$		$t_{extinction}$		List Δt	$t_{exceeding}$		$t_{extinction}$		List Δt
cm	cm	cm	cm	minutes	seconds	minutes	seconds	seconds	minutes	seconds	minutes	seconds	seconds
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
-	-	-	-					0					0
Σ heights (cm)								0					0
0								0					0
								0					0
								0					0
								0					0
				Σ times (s)		**0**			**Σ times (s)**		**0**		
				Σ times (s) overall taken into account (if simultaneous on 2 sides									
				calculation q = (100 x Σh) / (Ti x√Δt)				**0.00**					

1st inflammation time		
T_i		
minutes	seconds	Ti (s)
		0

Classification index:

$$\bar{q} = \frac{\sum q}{n} = \mathbf{0.00}$$

n is the number of tests

Observations:

On all tests, we observe penetration of the product facing the radiating heat source, but without any effective ignition. In order to determine the classification, we proceed to complementary tests for fusible materials.

5.2 FLAME PERSISTENCE TEST (NF P 92-504)

30 attacks minimum carried out on product referenced PALMEX RIOHA M1 leaf (smooth flexible sheet), mixing tested sides**.**

Dimensions of each specimen are checked before each test.

Measured characteristics of the tested specimens: weight / overall thickness *(*L)*
Test 1 (specimen no. 1): 15.2 g / 0.9 mm
Test 2 (specimen no. 2): 15.1 g / 0.9 mm
Test 3 (specimen no. 3): 15.2 g / 0.9 mm
Test 4 (specimen no. 4): 15.3 g / 0.9 mm

*(*L): Data measured by the laboratory.*

Designation	Number of attacks	Number of persistences 2 s < t < 5 s	Number of persistences t > 5 s	Drop or flaming material during persistences
Test no. 1 Smooth side Dark beige colour	21	—	—	—
Test no. 2 Rough side Dark beige colour	13	—	—	—
Test no. 3 Smooth side Dark beige colour	4	—	—	—
Test no. 4 Rough side Dark beige colour	3	—	—	—

Results:
On all tests (41 attacks):
- We do not observe flame persistence time higher than 2 seconds,
- We do not observe falling droplets and/or debris.

5.3 TEST FOR FUSIBLES MATERIALS (NF P 92-505)

4 tests have been carried out on samples referenced PALMEX RIOHA M1 leaf (smooth flexible sheet), mixing sides.

Dimensions of each specimen are checked before each test.

Measured characteristics of the tested specimens: weight / overall thickness *(*L)*
Test 1 (specimen no. 1): 4.9 g / 0.9 mm (1 specimen of 70 x 70 mm)
Test 2 (specimen no. 2): 4.6 g / 0.9 mm (1 specimen of 70 x 70 mm)
Test 3 (specimen no. 3): 4.7 g / 0.9 mm (1 specimen of 70 x 70 mm)
Test 4 (specimen no. 4): 4.8 g / 0.9 mm (1 specimen of 70 x 70 mm)

*(*L): Data measured by the laboratory.*

Designation	Falling of droplets without flaming (Yes / No)	Falling of flaming droplets (Yes / No)	Ignition of cotton wadding (Yes/No)
Test no. 1 Smooth side Dark beige colour	No	No	No
Test no. 2 Smooth side Dark beige colour	No	No	No
Test no. 3 Rough side Dark beige colour	No	No	No
Test no. 4 Rough side Dark beige colour	No	No	No

Results:
On all specimens, we do not observe ignition of cotton wadding.

End of report