SAFETY, STRUCTURES AND FIRE DEPARTMENT
Reaction to Fire

REACTION TO FIRE OF A MATERIAL
TEST REPORT No. RA16-0159

According to the decree of November 21st, 2002 modified regarding the reaction to fire of building and furnishing products

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

Valid 5 years

The accreditation by the COFRAC Laboratory Section attests to the technical competence of the laboratory only for the tests covered by the accreditation

This Test Report attests only to the characteristics of the objet submitted for testing but does not prejudge the characteristics of similar products. So it does not constitute a product certification in the sense of Articles L 115-27 to L 115-33 and R115-1 to R115-3 of the Consumer Code.

In this report is being issued via an electronic channel and/or on physical electronic media, only the paper version of the report signed by CSTB shall be deemed authentic in case litigation. This report in paper form is kept at CSTB for a minimum period of 10 years.

It comprises 7 pages.

REQUESTED BY: **PALMEX INTERNATIONAL, INC.**
2518 chemin des Entreprises
SAINT-SAUVEUR, QC, J0R 1R7
CANADA

SUBJECT

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

REFERENCE TEXTS

Decree of November 21st, 2002 modified.
Appendix 2 of the decree of November 21st, 2002 modified.

NATURE OF THE TEST(S)

Test by radiation according to NF P 92-501:1995 standard.
Flame persistence test according to NF P 92-504:1995 standard.
Test for fusible materials according to NF P 92-505:1995 standard.

TEST (S) DATE(S)

June 14th and 15th, 2016.

SOURCE AND CHARACTERISTICS OF TEST SPECIMENS

Delivery date:	May 11th, 2016
Material submited by:	PALMEX INTERNATIONAL, INC. 2518 chemin des Entreprises SAINT-SAUVEUR, QC, J0R 1R7 CANADA
Identification No.:	ES541160251
Commercial brand(s):	PRODUITS PALMEX M1
Manufacturer(s):	PALMEX INTERNATIONAL, INC. 2518 chemin des Entreprises SAINT-SAUVEUR, QC, J0R 1R7 CANADA

The attention is drawn on the fact that the results obtained with the sample being the subject of the present test report can not be generalized without justification of the representativeness of the samples and tests.

Champs-sur-Marne, July 12th, 2016

The Technician Responsible for the test

Franck GOGUEL

The Head of Reaction to Fire Laboratory

Nicolas ROURE

BRIEF DESCRIPTION

Synthetic flexible leaves for use as a roof material (imitation palm thatching).
Fire-retarded high-density polyethylene (HDPE) leaves, composed of a solid upper part and a lower part in the form of plant leaves, creating a tropical roof finish.
Each row of leaves is spaced at a distance of 11 or 12.5 cm from the previous row, with the roofing thus composed of 2 superimposed leaves.

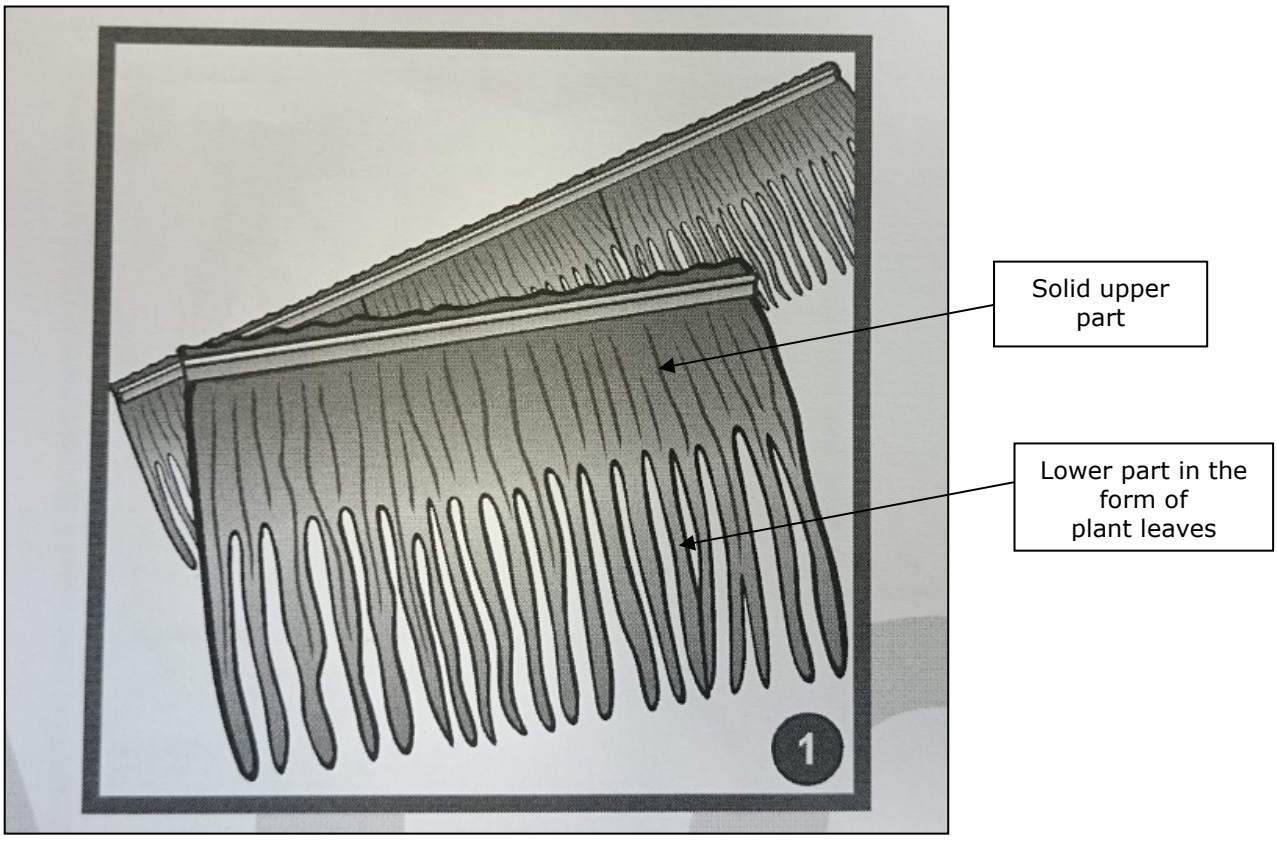
Nominal thickness of a leave: 0.74 mm.
Total dimension of a leave: 1 x 0.6 m (with 1 x 0.26 m on the upper part and 1 x 0.34 m on the lower part).
Total weight of a leave (imitation palm thatching): 376 g.
Nominal weight per unit area of a leave (imitation palm thatching): 874 g/m².
Quantity of leaves per m² of roof: from 8 to 9 so about 7.0 to 7.9 kg/m².
Color: dark beige.

COMPLEMENTARY CHARACTERISTICS

The global composition is listed in the file, including the formulation reference for the fire-retarded high-density polyethylene.
The "PRODUITS PALMEX M1" object of the present report represent all leaves manufactured using high-density polyethylene with the same fire-retardant. All these leaves are of identical composition and characteristics; only the finish (cut of leaves) differs.

Measured thickness of a leave: about 0.7 mm.
Measured weight per unit area of a leave: about 860 g/m².
Samples manufactured in April 2016 under the batch number "Ext. /série PolyOne".

Diagram of a leave (imitation palm thatching)



TEST BY RADIATION

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.

A.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.

B. OBSERVATIONS AND CLASSIFICATION CRITERIA FOR VARIOUS TESTS PERFORMED

4 tests have been performed on the product referenced "PRODUITS PALMEX M1" (imitation palm thatching). The leaves were arranged in accordance with the product description on page 3 (the leaves on the upper sheet being placed so as to cover the solid part of the lower leave).

The dimensions of each specimen are checked before each test.

Measured characteristics of the tested specimens: (Weight / Total thickness)
Specimen no. 1: about 214 g / about 30 mm
Specimen no. 2: about 236 g / about 30 mm
Specimen no. 3: about 219 g / about 30 mm
Specimen no. 4: about 227 g / about 30 mm

Specimen no. 1 Shiny face Colour: dark beige	ti_1	—	t_i	—
	td_1	—	Δt	—
	e_1	—	Σh	—
	ti_2	—	h_{max}	—
	td_2	—		
	e_2	—	**q =**	**0,00**

Specimen no. 2 Shiny face Colour: dark beige	ti_1	—	t_i	—
	td_1	—	Δt	—
	e_1	—	Σh	—
	ti_2	—	h_{max}	—
	td_2	—		
	e_2	—	**q =**	**0,00**

Specimen no. 3 Matte face Colour: dark beige	ti_1	—	t_i	—
	td_1	—	Δt	—
	e_1	—	Σh	—
	ti_2	—	h_{max}	—
	td_2	—		
	e_2	—	**q =**	**0,00**

Specimen no. 4 Matte face Colour: dark beige	ti_1	—	t_i	—
	td_1	—	Δt	—
	e_1	—	Σh	—
	ti_2	—	h_{max}	—
	td_2	—		
	e_2	—	**q =**	**0,00**

Classification index:

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

where n is the number of tests.

Observations: on all tests, we observe penetration of the product facing the radiant panel, but without any effective ignition. In order to determine the classification, we proceed to complementary tests for fusible materials.

FLAME PROPAGATION TEST

The test piece (40 x 3.5 cm) for rigid materials or (23 x 46 cm) for flexible materials, is subjected to the effect of a flame from a burner.

The determining elements are: the persistence of flames and the falling of flaming droplets.

31 attacks were performed on the product referenced "PRODUITS PALMEX M1" (smooth leave).

The dimensions of each specimen are checked before each test.

Measured characteristics of the tested specimens: (Weight / Total thickness)

Specimen no. 1: about 10.2 g / about 0.7 mm
Specimen no. 2: about 10.3 g / about 0.7 mm
Specimen no. 3: about 10.2 g / about 0.7 mm
Specimen no. 4: about 10.2 g / about 0.7 mm

Designation	Number of attacks	Number of persistent periods with 2 s < t < 5 s	Number of persistent periods with t > 5 s	Falling of droplet or ignited particle during the persistent periods
Specimen no. 1 Shiny face Dark beige colour	8	0	0	—
Specimen no. 2 Shiny face Dark beige colour	8	0	0	—
Specimen no. 3 Matte face Dark beige colour	7	0	0	—
Specimen no. 4 Matte face Dark beige colour	8	0	0	—

Results: on 31 attacks, we do not observe any periods of flame persistence higher to 2 seconds, or any falling of droplets or ignited particle.

TEST FOR FUSIBLE MATERIALS

The test piece (7 x 7 cm) laid on a specified metal grid, is subjected to the radiation from an epiradiator, located 3 cm above it.

During 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.

4 tests have been performed on the product referenced "PRODUITS PALMEX M1" (smooth leave).
Each specimen is constituted of two samples 70 x 70 mm superimposed, in accordance with the final application leave layout.

The dimensions of each specimen are checked before each test.

Measured characteristics of the tested specimens: (Weight / Total thickness)

Specimen no. 1: about 8.3 g / about 1.5 mm
Specimen no. 2: about 8.2 g / about 1.5 mm
Specimen no. 3: about 8.3 g / about 1.5 mm
Specimen no. 4: about 8.3 g / about 1.5 mm

Designation	Time of first ignition* (in seconds)	Last extinction time* (in seconds)	Falling of non-ignited droplets beginning at time (in seconds)	Cotton ignition time (in seconds)
Specimen no. 1 Shiny face Dark beige colour	52 / …	… / 600	52	—
Specimen no. 2 Matte face Dark beige colour	43 / …	… / 600	72	—
Specimen no. 3 Shiny face Dark beige colour	48 / …	… / 486	66	—
Specimen no. 4 Matte face Dark beige colour	51 / …	… / 600	61	—

* Given the very high number of product ignitions and extinctions during the test, only the time of first ignition and the last extinction time have been noted in the above table. The last extinction time recording "600 s" in the above table corresponds to the test stop.

Results: on all tests, we did not observe any ignition of the cotton.

..... END OF TEST REPORT