

INSTITUTO DE CIÊNCIA E INOVAÇÃO EM ENGENHARIA MECÂNICA E ENGENHARIA INDUSTRIAL

Laboratório de Fumo e Fogo



FIRE REACTION TESTS

SONAE – INDÚSTRIA DE REVESTIMENTOS, S.A.

TEST REPORT Nr LFF.2019.074.02

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0 Document Control and Identification

0.1 Document Identification

Project	---
Document Name	Test Report Nr LFF.2019.074.02
Document File Name	---

0.2 Version Control

Version	Edition	Revision	Date	Description	Approved by
1	1	0	2019-04-12	Original version	JMG

0.3 Author(s)

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0.6 Distribution list

Name	Initials	Entity
Laboratório de Fumo e Fogo	LFF	INEGI
---	---	Sonae – Indústria de Revestimentos, S.A.



0.7 Identification

Client: Sonae – Indústria de Revestimentos, S.A.

Address: Lugar do Espido – Via Norte
4470-177 Maia

Request: Tests according to standard EN 13823:2010 A1 November 2014

Request Reference: PE30190306

Request Date: 2019-03-22

Material Reference: Surforma CPL (0.4 - 0.8 mm)

Reception Date: 2019-03-28

Test Date: 2019-04-05 and 2019-04-08

Report Date: 2019-04-12



1 - Introduction

This report refers to exploratory fire reaction tests and the potential classification of materials with the reference "Surforma CPL (0.4 - 0.8 mm)".

2 - Methodology

Test	Test procedure
Reaction to fire tests for building products. Building products exposed to the thermal attack by a single burning item.	EN 13823:2010 A1 November 2014

3 - Specimens

3.1 - Dimension and conditioning

The specimens were prepared by the client, having the following dimensions:

Reference	Length (mm)	Width (mm)	Thickness (mm)	Mass (g)
LFF.2019.074.01 (N1)	1500	1001	0.5	1210
LFF.2019.074.02 (N1)	1500	500	0.5	420
LFF.2019.075.01 (N2)	1502	1001	0.6	1360
LFF.2019.075.02 (N2)	1501	502	0.6	450
LFF.2019.076.01 (N3)	1500	1000	0.7	1310
LFF.2019.076.02 (N3)	1500	501	0.7	620

Prior to testing, the specimens were conditioned for a period of 190 hours at 23 ± 2 °C and 50 ± 5 % relative humidity, having met the constant mass criterion.

3.2 - Mounting of specimen

Specimens were tested free standing according (according to 5.2.2.a of the norm EN 13823).

4 - Results

Specimens	LFF.2019.074.01 and LFF.2019.074.02	LFF.2019.075.01 and LFF.2019.075.02	LFF.2019.076.01 and LFF.2019.076.02
FIGRA _{0,2 MJ} (W/s)	694.3	396.1	415.8
FIGRA _{0,4 MJ} (W/s)	643.3	350.4	231.8
THR _{600 s} (MJ)	2.7	2.6	2.1
LFS (m)	No	No	No
FIRE BEHAVIOUR	D	D	C
SMOGRA (m ² /s ²) (*)	67.2	81.4	41.4
TSP _{600s} (m ²) (*)	33.6	35.7	28.8
SMOKE PRODUCTION	s2	s2	s2
FLAMING DROPLETS/PARTICLES	No	Yes	No
FLAMING DROPLETS	d0	d1	d0

FIGRA: Fire growth rate THR: Total heat release LFS: Lateral flame spread (*): With smoke correction
SMOGRA: Smoke growth rate TSP: Total smoke production TNR: Threshold not reached

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

5 - Limitations

This document does not represent any type of approval or certification of the product.

This document is valid for 5 (five) years.

Porto, April 12, 2019



José Mesquita Guimarães
Laboratory Technical Director

ANNEX 1

Photographs



Figure 1 – View of mounting (N1).



Figure 2 – SBI test (N1).



Figure 3 – View of mounting (N2).



Figure 4 – SBI test (N2).

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Figure 5 – View of mounting (N3).



Figure 6 – SBI test (N3).

ANNEX 2
SBI Test Report

Report produced with the Fire Testing Technology SBICalc software

page 1

SBI Test Report

Laboratory name INEGI - LFF
 Operator Bruno Nogueira
 Filename C:\SBICALC\DATA\19040006.RW1
 Report identification LFF.2019.074
 Product identification SURFORMA-N1

Test		Pre-test conditions		Specimen conditioning	
Standard used	EN 13823:2010	Baseline duct temperature	294.93 K	Method	Constant mass
Date of test	05/04/2019	Ambient temperature	294.98 K	Time interval	193 hours
Date of report	05/04/2019	Ambient pressure	99.012 kPa	Mass 1	2420 g
E'	17.2 MJ/m ²	Relative humidity	49%	Mass 2	840 g
Apparatus specifications		Baseline conditions		Temperature	23°C
kt	0.823	Baseline ambient oxygen	20.677%	RH	49%
kp	1.08	Baseline oxygen	20.949%		
Duct diameter	0.315 m	Baseline carbon dioxide	0.0880%		
O2 calibration delay time	11 s	Baseline smoke	100.06%		
CO2 calibration delay time	13 s				

Specimen information			
Thickness	0.8 mm	Mounting method	5.2.2a) in EN 13823:2002
Density	1448 kg/m ³	Joints	none
Surface mass/area		Fixed to substrate?	No
Specimen number	1	Fixing method	N/A
Date of arrival	28/03/2019	Substrate	none
		Manufacturer	SONAE INDÚSTRIA REVESTIMENTOS SA
		Sponsor	SONAE INDÚSTRIA REVESTIMENTOS SA

Test validity criteria				Burner details	
Test drifts				Burner HRR	27.997 kW
	Initial	Final	Change	Burner HRR std. dev.	0.558 kW
Oxygen	20.949%	20.890%	0.059%	Burner CO2/O2 ratio	0.812
CO2	0.088%	0.098%	0.010%	Burner SPR	0.024 m ² /s
Smoke	100.06%	99.26%	0.008	Burner SPR std. dev.	0.005 m ² /s
Exposure time	1254 s			Burner response time	9 s
Synchronisation details				Other checks	
Duct temp. dropped by 2.5 K from baseline of 320.14 K at 303 s				Minimum duct flow	0.471 m ² /s
Oxygen rose by 0.05% from baseline of 20.637% at 300 s				Maximum duct flow	0.548 m ² /s
CO2 dropped by 0.02% from baseline of 0.341% at 300 s				No T/C failure	

Classification results		Classification observations		Potential classification	
FIGRA(0.2)	694.3 W/s at 336 s	LFS to edge?	No	Class	D
FIGRA(0.4)	643.4 W/s at 339 s	FDP flaming <= 10s?	No	Smoke production	s2
THR(600)	2.7 MJ	FDP flaming > 10s?	No	Flaming droplets/particles	d0
SMOGRA	67.2 m ² /s ² at 339 s				
TSP(600)	33.6 m ²				

Recorded events Surface flashes? No; Falling specimen parts? No; Smoke not entering hood? No
 Mutual fixing of backing board failed? No; Distortion/collapse of specimen? No

Pre-test comments

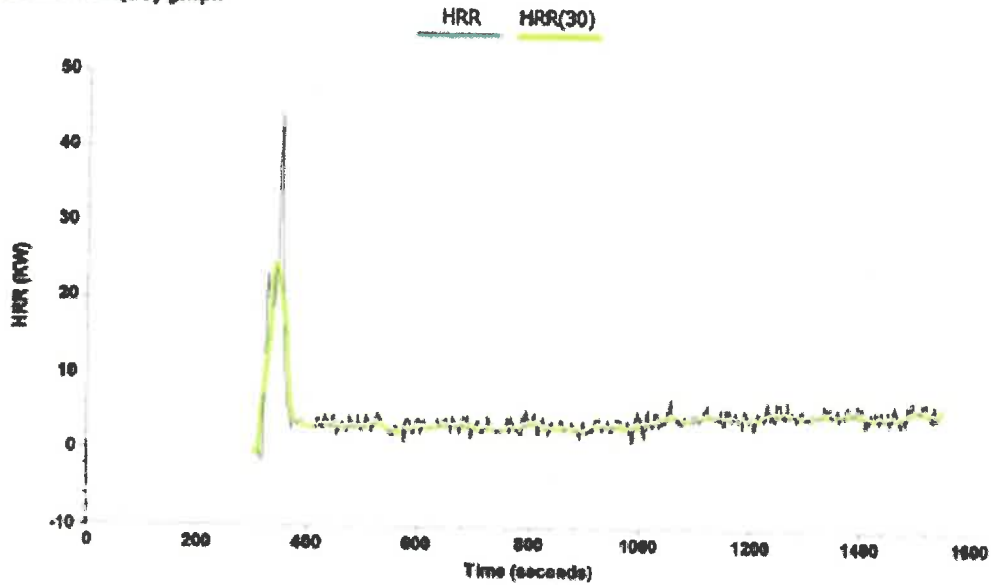
After-test comments Aos 350 s, destruição quase total do provete no canto até cerca de 1 m de altura.

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use

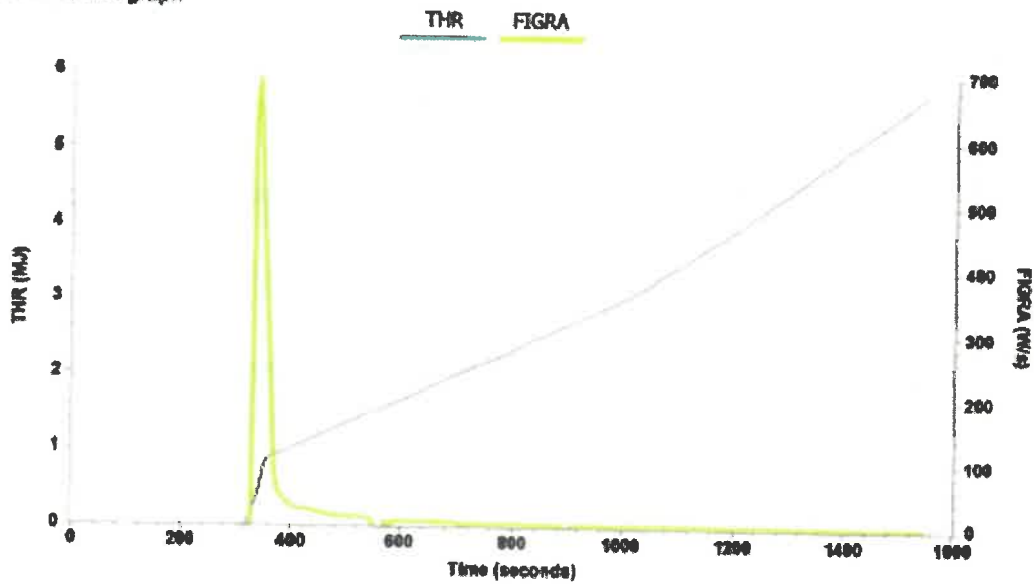
SBI Test Report

Laboratory name INEGI - LFF
Operator Bruno Nogueira
Filename C:\SBI\CALC\DATA\19040006.RW1
Report Identification LFF.2019.074
Product identification SURFORMA-N1

HRR and HRR(30) graph



THR and FIGRA graph



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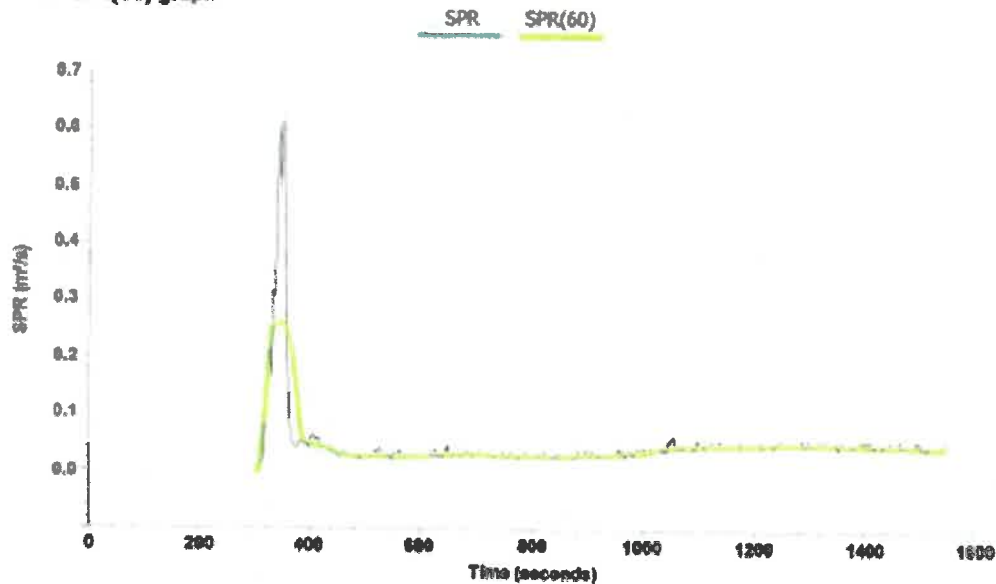
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page 3

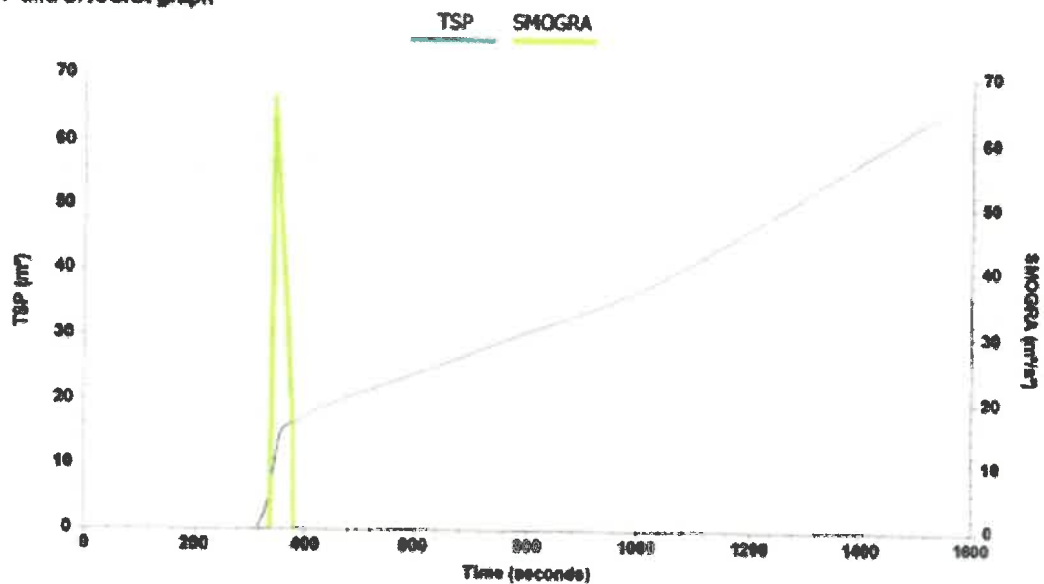
SBI Test Report

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Product Identification SURFORMA-N1

SPR and SPR(60) graph



TSP and SMOGRA graph



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SBI Test Report

Laboratory name INEGI - LFF
 Operator Bruno Nogueira
 Filename C:\SBI\CALC\DATA\19040007.RW1
 Report identification LFF.2019.074
 Product identification SURFORMA CPL 0.4 A 0.8 MM

Test	Pre-test conditions	Specimen conditioning
Standard used EN 13823:2010	Baseline duct temperature 292.61 K	Method Constant mass
Date of test 05/04/2019	Ambient temperature 288.94 K	Time interval 195 hours
Date of report 05/04/2019	Ambient pressure 98.963 kPa	Mass 1 1810 g
E' 17.2 MJ/m ²	Relative humidity 46%	Mass 2 1810 g
		Temperature 23°C
		RH 50%
Apparatus specifications	Baseline conditions	
kt 0.823	Baseline ambient oxygen 20.730%	
kp 1.08	Baseline oxygen 20.951%	
Duct diameter 0.315 m	Baseline carbon dioxide 0.0840%	
O2 calibration delay time 11 s	Baseline smoke 99.60%	
CO2 calibration delay time 13 s		

Specimen information

Thickness 0.6 mm	Mounting method 5.2.2a) in EN 13823:2002
Density 1340 kg/m ³	Joints none
Surface mass/area 0.8 kg/m ²	Fixed to substrate? No
Specimen number 2	Fixing method N/A
Date of arrival 28/03/2019	Substrate none
	Manufacturer SONAE INDÚSTRIA REVESTIMENTOS SA
	Sponsor SONAE INDÚSTRIA REVESTIMENTOS SA

Test validity criteria

Test drifts

	Initial	Final	Change
Oxygen	20.951%	20.906%	0.045%
CO2	0.084%	0.092%	0.008%
Smoke	99.60%	97.64%	0.020

Exposure time 1254 s

Synchronisation details

Duct temp. dropped by 2.5 K from baseline of 317.08 K at 303 s
 Oxygen rose by 0.05% from baseline of 20.644% at 300 s
 CO2 dropped by 0.02% from baseline of 0.339% at 300 s

Burner details

Burner HRR	27.589 kW
Burner HRR std. dev.	0.669 kW
Burner CO2/O2 ratio	0.832
Burner SPR	0.027 m ² /s
Burner SPR std. dev.	0.005 m ² /s
Burner response time	9 s

Other checks

Minimum duct flow	0.474 m ² /s
Maximum duct flow	0.556 m ² /s
No T/C failure	

Classification results

FIGRA(0.2)	396.1 W/s at 339 s
FIGRA(0.4)	350.4 W/s at 351 s
THR(600)	2.6 MJ
SMOGRA	81.4 m ² /s ² at 336 s
TSP(600)	35.7 m ²

Classification observations

LFS to edge?	No
FDP flaming <= 10s?	Yes
FDP flaming > 10s?	No

Potential classification

Class	D
Smoke production	s2
Flaming droplets/particles	d1

Recorded events

Surface flashes? No; Felling specimen parts? No; Smoke not entering hood? No
 Mutual fixing of backing board failed? No; Distortion/collapse of specimen? No

Pre-test comments

After-test comments

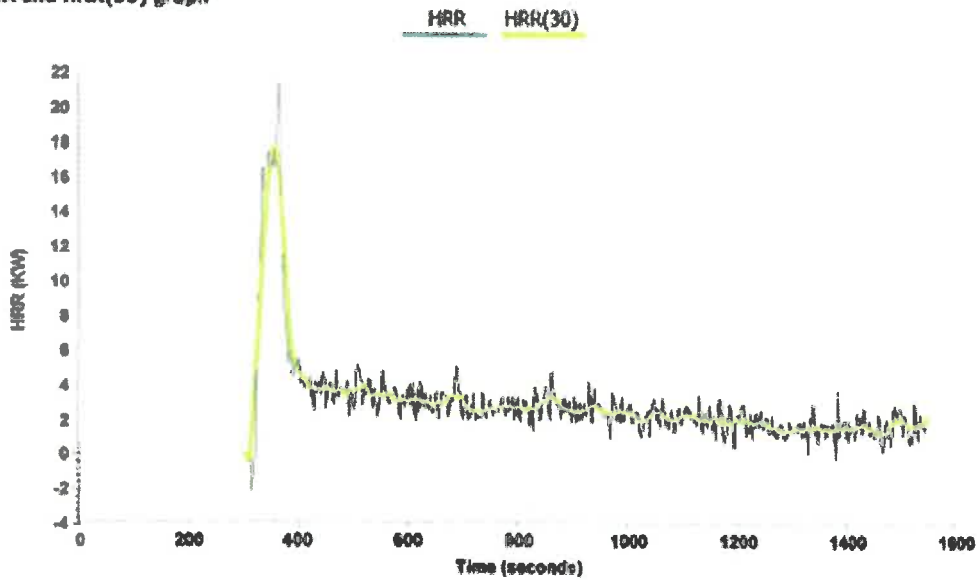
Aos 320 s, Abertura d fendas na camada superficial. Aos 340 s, início da destruição do material no canto. Aos 420 s, destruição do material no canto até à altura de 60 cm.

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test, they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

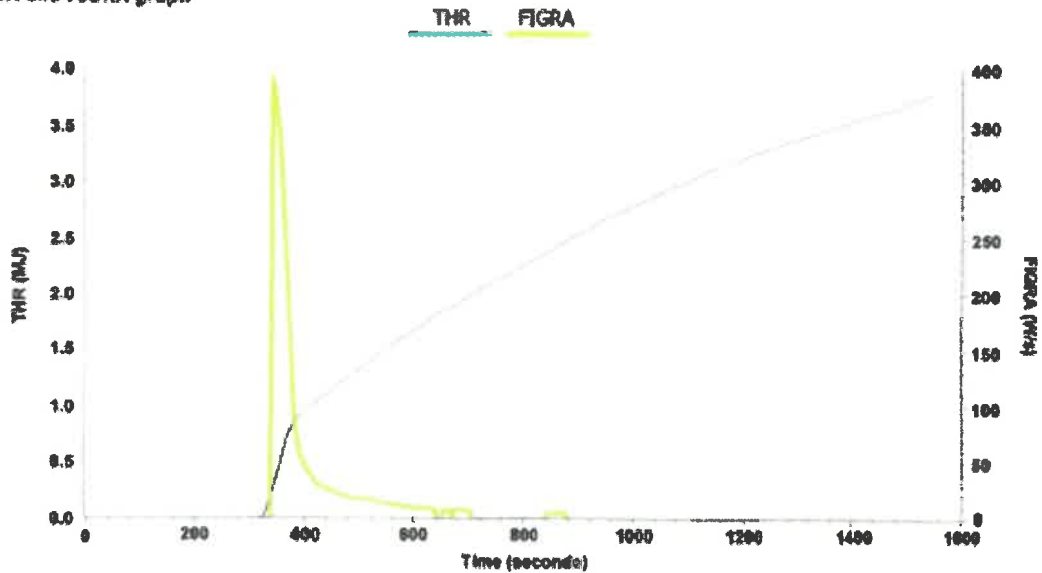
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HRR and HRR(30) graph



THR and FIGRA graph

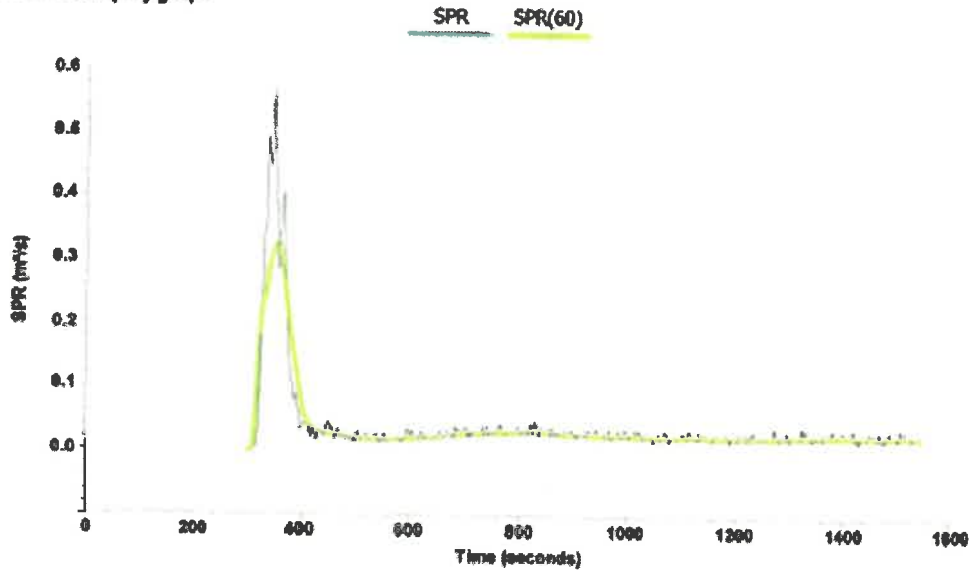


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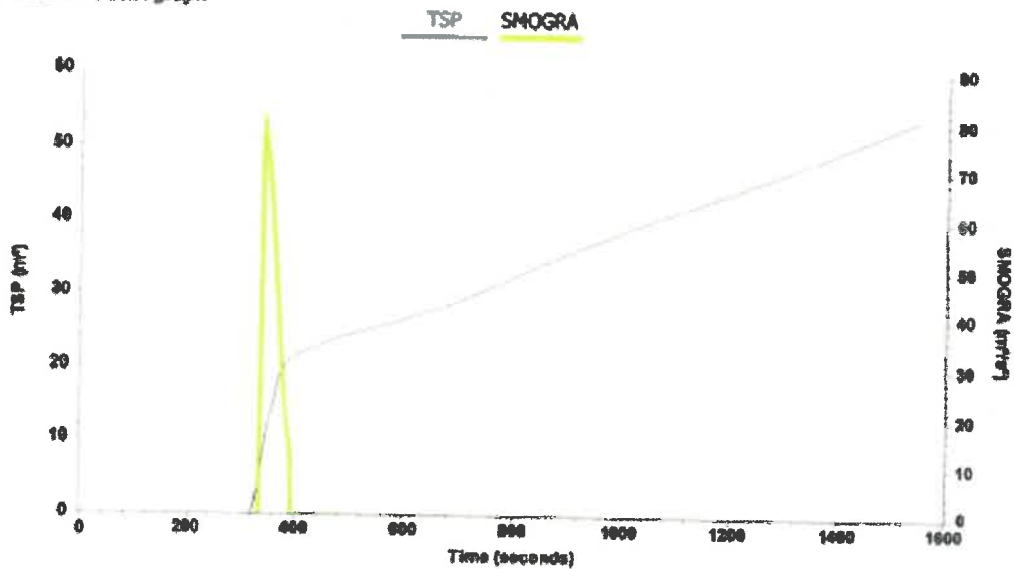
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SPR and SPR(60) graph



TSP and SMOGRA graph



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 Filename C:\SBI\CALC\DATA\19040008.RW1
 Report identification LFF.2019.074
 Product identification SURFORMA CPL 0.4 A 0.8 MM

Test	Pre-test conditions	Specimen conditioning
Standard used EN 13823:2010	Baseline duct temperature 295.51 K	Method Constant mass
Date of test 08/04/2019	Ambient temperature 296.00 K	Time Interval 265 hours
Date of report 08/04/2019	Ambient pressure 100.388 kPa	Mass 1 1930 g
E' 17.2 MJ/m ³	Relative humidity 48%	Mass 2 1930 g
		Temperature 23°C
		RH 50%
Apparatus specifications	Baseline conditions	
kt 0.823	Baseline ambient oxygen 20.678%	
kp 1.08	Baseline oxygen 20.950%	
Duct diameter 0.315 m	Baseline carbon dioxide 0.0804%	
O2 calibration delay time 11 s	Baseline smoke 99.96%	
CO2 calibration delay time 13 s		

Specimen information		Mounting method	
Thickness 0.7 mm	Density 1225 kg/m ³	5.2.2a) in EN 13823:2002	
Surface mass/area 0.85 kg/m ²	Specimen number 3	Joints none	
Date of arrival 28/03/2019		Fixed to substrate? No	
		Fixing method N/A	
		Substrate none	
		Manufacturer SONAE INDÚSTRIA DE REVESTIMENTOS SA	
		Sponsor SONAE INDÚSTRIA DE REVESTIMENTOS SA	

Test validity criteria				Burner details	
Test drifts				Burner HRR 27.186 kW	
	Initial	Final	Change	Burner HRR std. dev. 0.575 kW	
Oxygen	20.950%	20.943%	0.007%	Burner CO2/O2 ratio 0.827	
CO2	0.080%	0.089%	0.008%	Burner SPR 0.022 m ³ /s	
Smoke	99.96%	99.40%	0.006	Burner SPR std. dev. 0.004 m ³ /s	
Exposure time 594 s				Burner response time 9 s	
Synchronisation details				Other checks	
Duct temp. dropped by 2.5 K from baseline of 320.18 K at 303 s				Minimum duct flow 0.488 m ³ /s	
Oxygen rose by 0.05% from baseline of 20.647% at 300 s				Maximum duct flow 0.560 m ³ /s	
CO2 dropped by 0.02% from baseline of 0.331% at 303 s				No T/C failure	

Classification results	Classification observations	Potential classification
FIGRA(0.2) 415.8 W/s at 333 s	LFS to edge? No	Class C
FIGRA(0.4) 231.8 W/s at 348 s	FDP flaming <= 10s? No	Smoke production s2
THR(600) 2.1 MJ	FDP flaming > 10s? No	Flaming droplets/particles d0
SMOGRA 41.4 m ² /s ² at 342 s		
TSP(600) 28.8 m ²		

Recorded events Surface flashes? No; Falling specimen parts? Yes; Smoke not entering hood? No
 Mutual fixing of backing board failed? No; Distortion/collapse of specimen? No

Pre-test comments

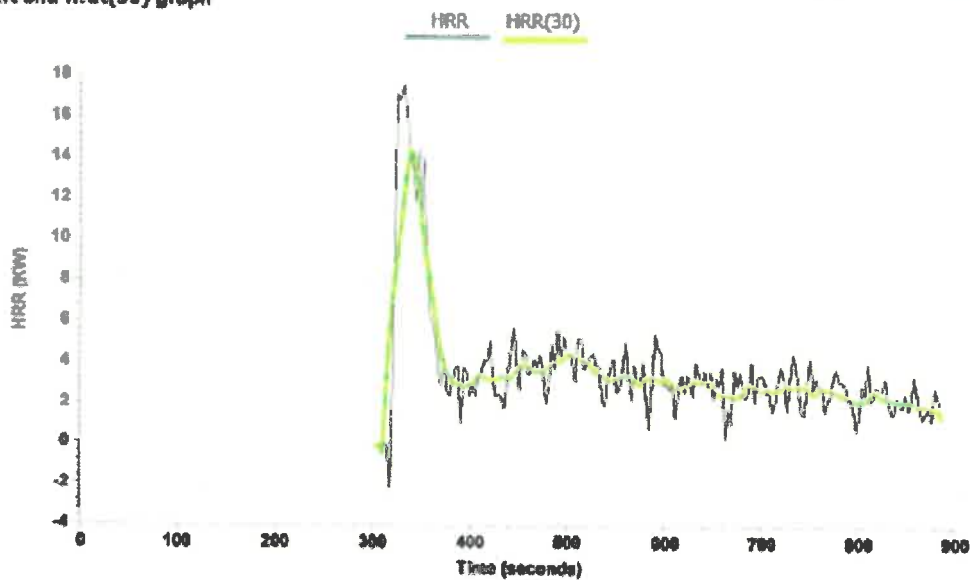
After-test comments Aos 340 s, início de destruição no canto. Aos 400 s, destruição completa no canto até 60 cm de altura. Queda de fragmentos queimados.

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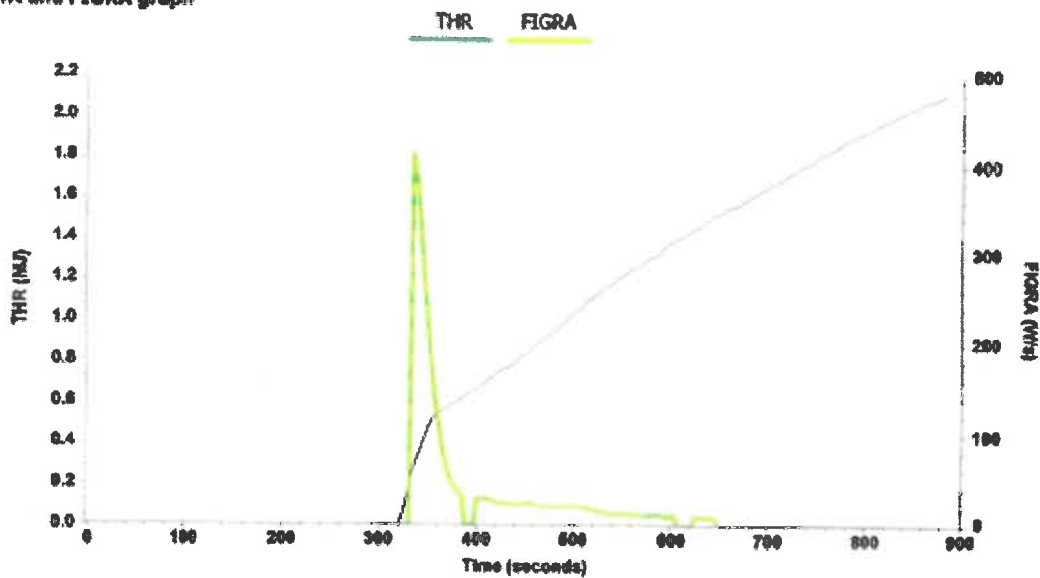
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Product identification SURFORMA CPL 0.4 A 0.8 MM

HRR and HRR(30) graph



THR and FIGRA graph



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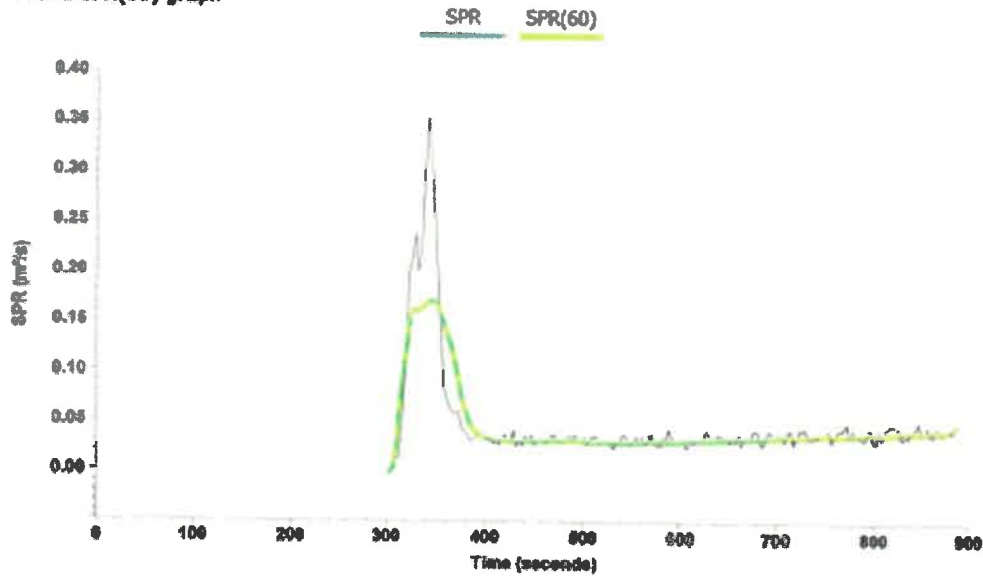
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page 3

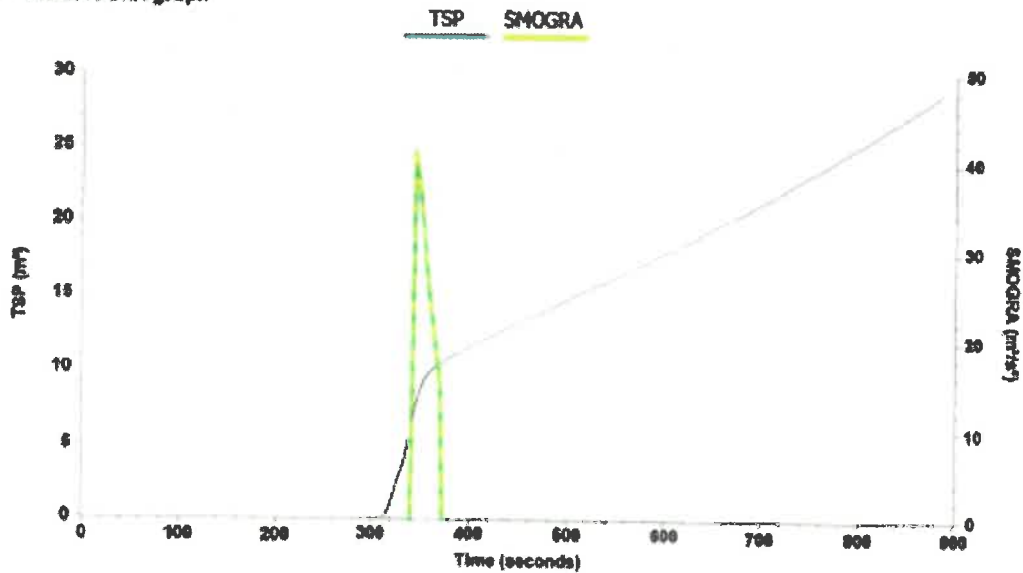
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Operator: Bruno Nogueira
Filename: C:\SBICALC\DATA\19040008.RW1
Report identification: LFF.2019.074
Product identification: SURFORMA CPL 0.4 A 0.8 MM

SPR and SPR(60) graph






TSP and SMOGRA graph



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