REPORT
issued by an Accredited Testing Laboratory

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Fürstenberg Amfi-Top Ltd
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Smoke and toxicity test according to IMO 2010 FTP Code, part 2

(2 appendices)

Introduction

SP has been commissioned by Fürstenberg Amfi-Top Ltd to perform a fire test according to IMO 2010 FTP Code, part 2 "Smoke and toxicity test", reffering to ISO 5659-2:2006.
The purpose of the test is basis for technical fire classification.

Product

According to the client:

Composite material called "Amfi-Top", consisting of 70% ATH(aluminiumtrihydrate) and 30% modified acrylic polyester. The product has a nominal area weight of 16 kg/m^2 and a nominal thickness of 20 mm. The product has a white colour.
The material is attached to a 1 mm aluminium sheet.

Manufacturer

Fürstenberg Amfi-Top Ltd, Riga, Latvia.

Sampling

The sample was delivered by the client. It is not known to SP Fire Technology if the product received is representative of the mean production characteristics.

The sample was received January 16, 2014 at SP Fire Technology.

Test procedure

The specimen is placed horizontally within a closed chamber and exposed to a constant irradiance level with or without a pilot flame. The smoke evolved is trapped in the chamber and measured using photometric equipment, results are reported in terms of specific optical density. Adjacent to the test toxic flue gases are analysed using spectroscopy with the Fourier transform infrared technique (FTIR). The gas samples are taken from the geometrical centre of the test chamber. Seven compounds are quantified: CO, HCl, HF, NO_X, HBr, HCN, and SO_2. If any of the compounds HCl, HF, and/or HBr are detected, analysis of filtering materials used in the gas sampling line is carried out and maximum gas concentrations (C) are corrected (C + C_{ca}).

The sample was tested under each of the following conditions:

1. Irradiance of 25 kW/m^2 in the absence of pilot flame.
2. Irradiance of 25 kW/m^2 in the presence of pilot flame.
3. Irradiance of 50 kW/m^2 in the absence of pilot flame.

Tests results

The test results are given in appendix 1 and an explanation of the test parameters is given in appendix 2.

These results relate only to the behaviour of the specimens of the product under the particular conditions of test; they are not intended to be the sole criterion for assessing the potential smoke obscuration hazard of the product in use.

Criteria

According to IMO 2010 FTP Code, annex 1, part 2, section 2.4 materials used as surface of bulkhead, linings or ceilings shall not have a D_m exceeding 200 in any test condition. The average value of the maximum value of the gas concentration measured at each test condition shall not exceed the following limits: CO 1,450 ppm, HCl 600 ppm, HF 600 ppm, NO_X 350 ppm, HBr 600 ppm, HCN 140 ppm and SO_2 120 ppm.

Assessment

The tested samples of the product called " Amfi-Top", meets the technical fire requirements according to the criteria mentioned above.

Note

The accreditation referred to is valid for IMO 2010 FTP Code, part 2 "Smoke and toxicity test".

SP Technical Research Institute of Sweden
Fire Technology - Fire Dynamics

Performed by

Johan Post

Examined by

Per Thureson

Appendices

1 Test results.

2 Test parameters explanation.

Appendix 1

Test results ISO 5659-2:2006

Product

According to the client:

Composite material called "Amfi-Top", consisting of 70% ATH(aluminiumtrihydrate) and 30% modified acrylic polyester. The product has a nominal area weight of 16 kg/m^2 and a nominal thickness of 20 mm. The product has a white colour.
The material is attached to a 1 mm aluminium sheet.

Test specifications

Sampling response period, SRP:	9.5 s
Inner volume of the gas cell:	0.2 l.
Inner volume of the gas sampling line:	0.28 l.
Capacity of the gas sampling pump:	3.5 l/min.
Backing:	No other backing than the non-combustible required by the standard.
Specimen:	The aluminium side was exposed.

Measured data

Thickness 20.1 – 20.3 mm of the total specimen.

Area weight 35.5 – 35.6 kg/m^2 of the total specimen.

Conditioning

Temperature (23 ± 2) °C.

Relative humidity (50 ± 5) %.

Date of test

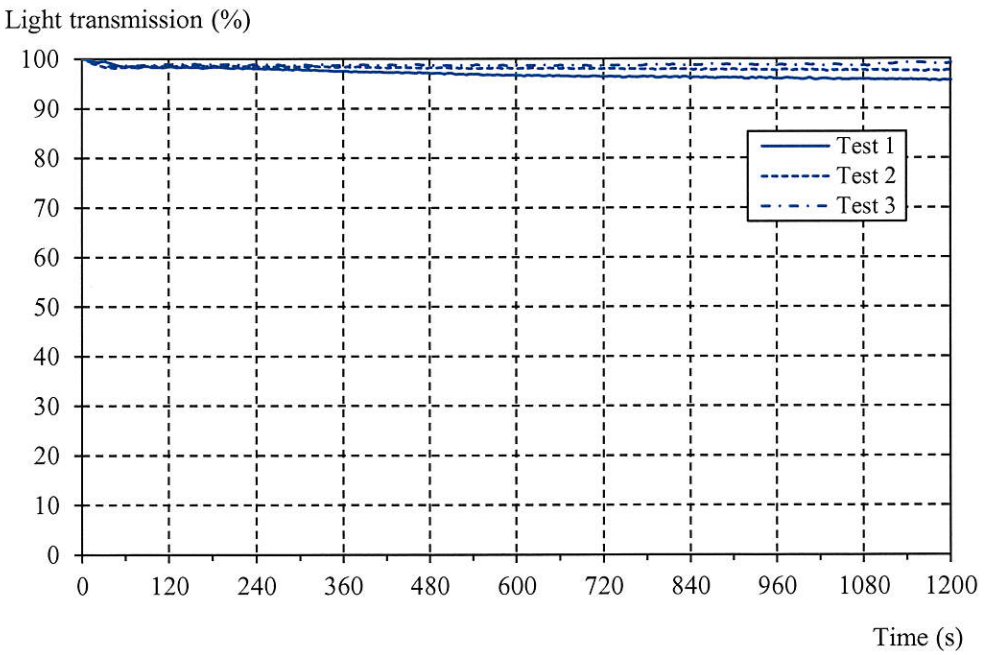
January 27 - 28, 2014.

Test results, test condition 1: Irradiance 25 kW/m^2, in the absence of pilot flame

Test no	1	2	3	Mean
$D_{s\,max}$	3	2	1	$2 = D_m$
D_C	2.2	1.0	0.2	-
Time to ignition, s	NI	NI	NI	-
Time to extinguishment, s	-	-	-	-
Duration of test, s	1200	1200	1200	-

NI = No Ignition

Light Transmission, test condition 1



Maximum gas concentration (C) for each gas, test condition 1

Maximum smoke density sampling time, D_mST: 1194 s.

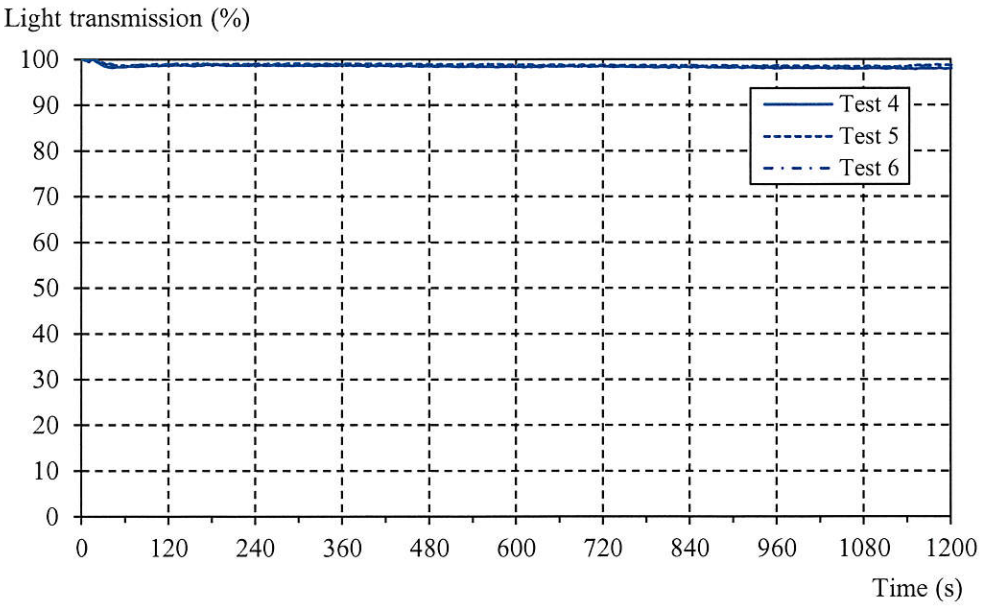
Gas species	Test 1 C (ppm)	Test 2 C (ppm)	Test 3 C (ppm)	Average C (ppm)
CO		< 5	< 5	< 5
HF		< 5	< 5	< 5
HCl		< 5	< 5	< 5
HBr		< 10	< 10	< 10
HCN		< 3	< 3	< 3
NO_X		< 20	< 20	< 20
SO_2		< 10	< 10	< 10

Test results, test condition 2: Irradiance 25 kW/m^2, in the presence of pilot flame

Test no	4	5	6	Mean
$D_{s\,max}$	1	1	1	1 = D_m
D_C	0.6	0.3	0.4	-
Time to ignition, s	NI	NI	NI	-
Time to extinguishment, s	-	-	-	-
Duration of test, s	1200	1200	1200	-

NI = No Ignition

Light Transmission, test condition 2



Maximum gas concentration (C) for each gas, test condition 2

Maximum smoke density sampling time, D_mST: 1133 s.

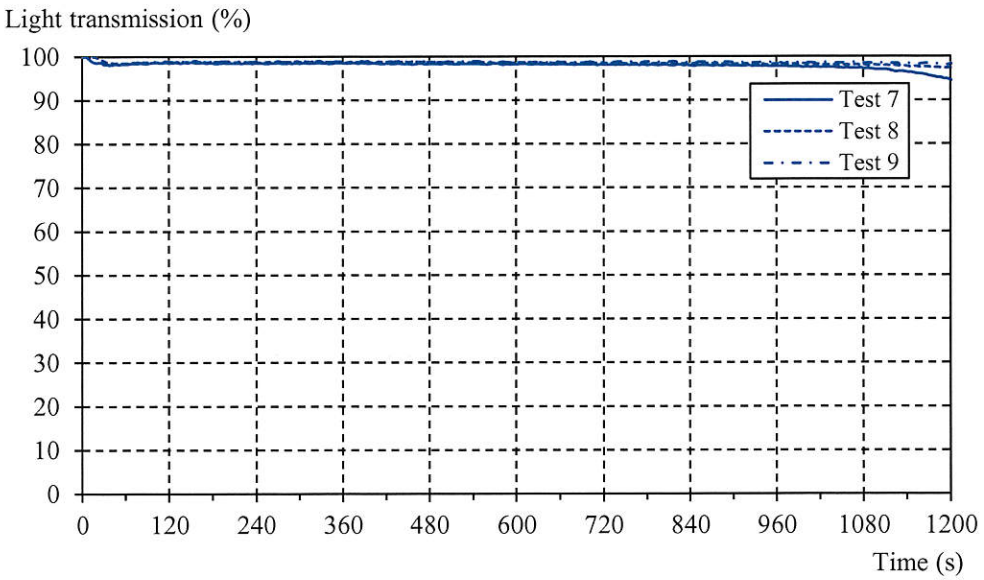
Gas species	Test 4 C (ppm)	Test 5 C (ppm)	Test 6 C (ppm)	Average C (ppm)
CO		13	13	13
HF		< 5	< 5	< 5
HCl		< 5	< 5	< 5
HBr		< 10	< 10	< 10
HCN		< 3	< 3	< 3
NO_X		< 20	< 20	< 20
SO_2		< 10	< 10	< 10

Test results, test condition 3: Irradiance 50 kW/m^2, in the absence of pilot flame

Test no	7	8	9	Mean
$D_{s\,max}$	3	2	1	$2 = D_m$
D_C	0.6	0.7	0.6	-
Time to ignition, s	NI	NI	NI	-
Time to extinguishment, s	-	-	-	-
Duration of test, s	1200	1200	1200	-

NI = No Ignition

Light Transmission, test condition 3



Maximum gas concentration (C) for each gas, test condition 3

Maximum smoke density sampling time, D_mST: 1200 s.

Gas species	Test 7 C (ppm)	Test 8 C (ppm)	Test 9 C (ppm)	Average C (ppm)
CO		8	7	8
HF		< 5	< 5	< 5
HCl		< 5	< 5	< 5
HBr		< 10	< 10	< 10
HCN		< 3	< 3	< 3
NO_X		< 20	< 20	< 20
SO_2		< 10	< 10	< 10

Appendix 2

Test parameter explanation – IMO 2010 FTP Code, part 2

Sign	Explanation
D_S	Specific optical density, calculated as follows: $D_S = 132 \log \frac{100}{T}$ where T = per cent light transmittance.
$D_S max$	Maximum specific optical density.
D_C	Specific optical density correction factor for the smoke absorbed on the glass windows of the optical system.
$D_m ST$	Maximum smoke density sampling time.
SRP	Sampling response period.