REPORT
issued by an Accredited Testing Laboratory

Contact person
Johan Post
Fire Technology
+46 10 516 58 45
Johan.Post@sp.se

SWEDAC ACKREDITERING 1002 ISO/IEC 17025

Ide Trading Sverige AB
Askims Verkstadsväg 1
436 34 ASKIM

Smoke generation according to ISO 5659-2 with additional gas analysis

(2 appendices)

Introduction

SP has by request of Ide Trading Sverige AB performed fire tests according to ISO 5659-2, with additional gas analysis. The tests are for informatory purpose.

Products

According to the client:

Floor covering material called "Jim-9".
Floor covering material called "Jim-10".

Sampling

The samples were delivered by the client. It is not known to SP Fire Technology if the products received are representative of the mean production characteristics.

The samples were received May 27, 2013 at SP Fire Technology.

Test procedure

The products were tested in two different modes according to ISO 5659-2:1994 :

- One test was performed at an irradiance of 50 kW/m^2 in the absence of pilot flame.
- One test was performed at an irradiance of 25 kW/m^2 in the absence of pilot flame.

Additional to the test method, FTIR gas analysis was performed to indicate the concentration of certain gas species specified in IMO FTP Code Resolution MSC. 61(67), chapter 1, Annex 1, Part 2.

Tests results

The test results are given in appendix 1 - 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.

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Criteria

According to IMO FTP Code Resolution MSC. 61(67), chapter 1, Annex 1, Part 2 section 2.6 materials used as floor coverings shall not have a Dm exceeding 500 in any test mode. The gas concentration measured at each test condition shall not exceed the following limits: CO 1450 ppm, HCl 600 ppm, HBr 600 ppm, HF 600 ppm, HCN 140 ppm, NO_x 350 ppm and SO_2 200* ppm.

* Gas concentration criteria 200 ppm, SO_2 as adopted by the 47th meeting, Fire protection committee (FP 47), London 2003-02-10--14.

Deviation from standard

Only one test was carried out in two modes, instead of the three in each mode stipulated in the standard.

Note

This test does not comply with the standard as far as number of tests is concerned. It can therefore not be used as the sole basis for a classification or an approval.

SP Technical Research Institute of Sweden
Fire Technology - Fire Dynamics

Performed by

Johan Post

Examined by

Per Thureson

Appendices

1 Test results, "Jim-9"
2 Test results, "Jim-10"

Appendix 1

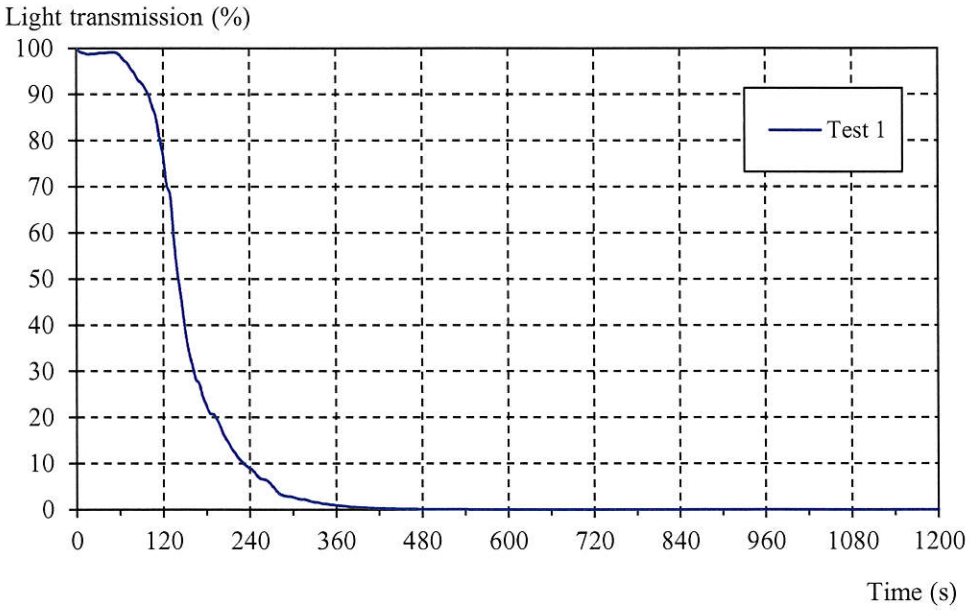
Test results ISO 5659-2:1994

Product

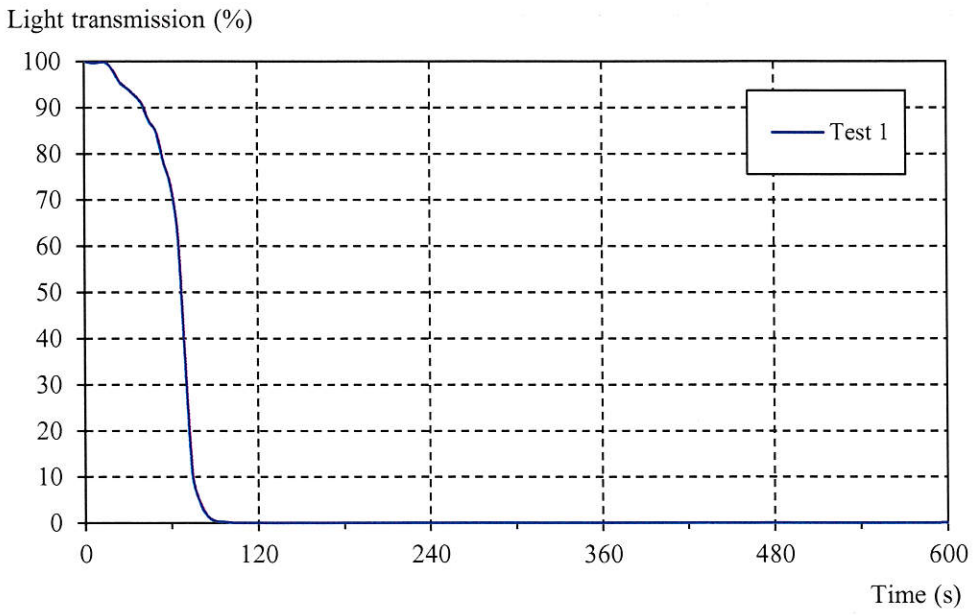
According to the client:

Floor covering material called "Jim-9".

Light Transmission – Irradiance of 25 kW/m^2 in the absence of pilot flame



Light Transmission – Irradiance of 50 kW/m^2 in the absence of pilot flame



Appendix 1

Smoke results

Mode 1	Irradiance 25kW/m², Non-flaming exposure			
Test no	1	2	3	Mean
$D_{s,max}$	584			
D_s10	512			
D_c	544			
Duration of test, s	1200			

Mode 3	Irradiance 50kW/m², Non-flaming exposure			
Test no	7	8	9	Mean
$D_{s,max}$	480			
D_s10	373			
D_c	408			
Duration of test, s	605			

Note

None of the specimens tested in mode 1 (irradiance of 25 kW/m^2 in the absence of pilot flame) ignited.

One of the specimens tested in mode 3 (irradiance of 50 kW/m^2 in the absence of pilot flame) ignited.
In test no 7 the sample ignited at 57 seconds and extinguished at 600 seconds.

Table of sign

D_S Specific optical density, calculated as follows:

$$D_S = 132 \log \frac{100}{T}$$ where T = percent light transmittance.

$D_{S,max}$ Maximum specific optical density.

D_{S10} Specific optical density at 10 minutes.

D_c Specific optical density correction factor for the smoke absorbed on the glass windows of the optical system.

Appendix 1

Gas analysis

The following gas concentrations were measured in the test chamber. The gas samples were taken from the geometrical centre of the test chamber. The concentrations of the different gas species were measured with FTIR gas analysis.

Gas species	Measured concentration during non-flaming exposure (irradiance 25 kW/m^2). [ppm]	Measured concentration during non-flaming exposure (irradiance of 50 kW/m^2). [ppm]
CO	263	682
HF	< 5	< 5
HCl	97	337
HBr	< 10	< 10
HCN	3	9
NO_X	< 20	44
SO_2	< 10	< 10

Measured data

Thickness 2.7 – 2.9 mm.

Area weight 4.9 kg/m^2.

Conditioning

Temperature (23 ± 2) °C.

Relative humidity (50 ± 5) %.

Date of test

June 11, 2013.

Appendix 2

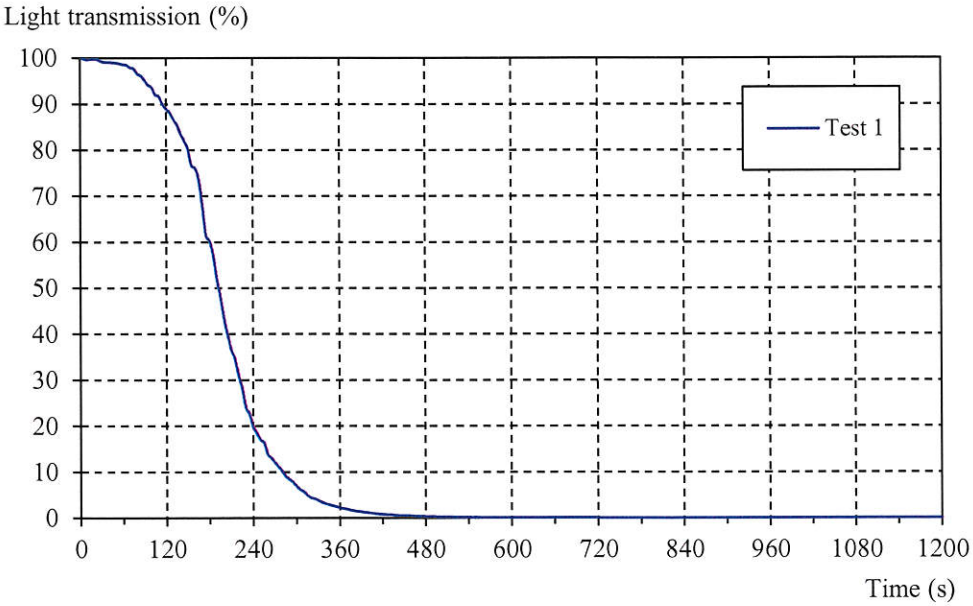
Test results ISO 5659-2:1994

Product

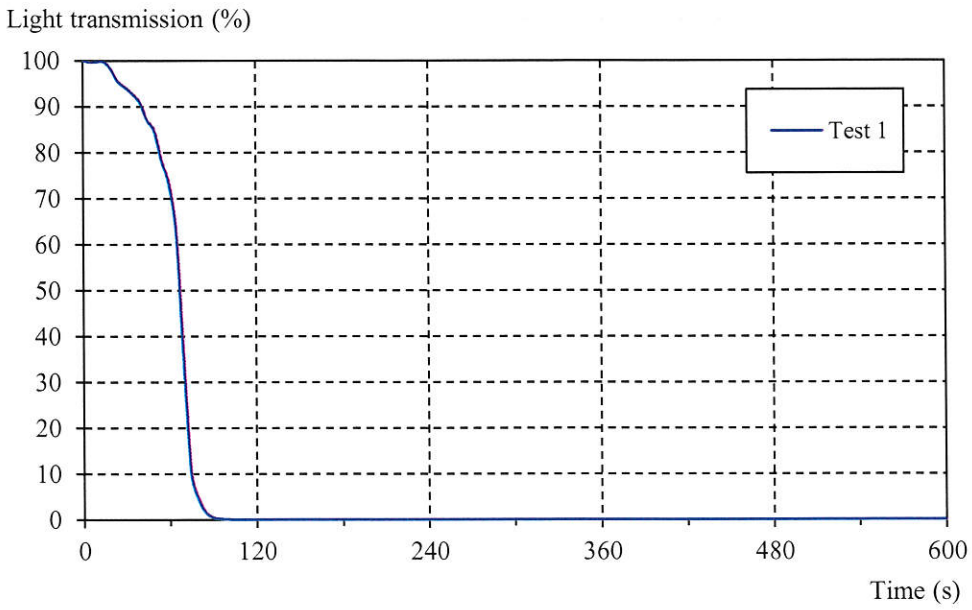
According to the client:

Floor covering material called "Jim-10".

Light Transmission – Irradiance of 25 kW/m^2 in the absence of pilot flame



Light Transmission – Irradiance of 50 kW/m^2 in the absence of pilot flame



Appendix 2

Smoke results

Mode 1	Irradiance 25kW/m², Non-flaming exposure			
Test no	1	2	3	Mean
$D_{s,max}$	531			
D_s10	410			
D_c	499			
Duration of test, s	1200			

Mode 3	Irradiance 50kW/m², Non-flaming exposure			
Test no	7	8	9	Mean
$D_{s,max}$	513			
D_s10	433			
D_c	450			
Duration of test, s	600			

Note

None of the specimens tested in mode 1 (irradiance of 25 kW/m^2 in the absence of pilot flame) ignited.

One of the specimens tested in mode 3 (irradiance of 50 kW/m^2 in the absence of pilot flame) ignited.
In test no 7 the sample ignited at 65 seconds and extinguished at 244 seconds.

Table of sign

D_S Specific optical density, calculated as follows:

$$D_S = 132 \log \frac{100}{T}$$ where T = percent light transmittance.

$D_{S,max}$ Maximum specific optical density.

D_{S10} Specific optical density at 10 minutes.

D_c Specific optical density correction factor for the smoke absorbed on the glass windows of the optical system.

Appendix 2

Gas analysis

The following gas concentrations were measured in the test chamber. The gas samples were taken from the geometrical centre of the test chamber. The concentrations of the different gas species were measured with FTIR gas analysis.

Gas species	Measured concentration during non-flaming exposure (irradiance 25 kW/m^2). [ppm]	Measured concentration during non-flaming exposure (irradiance of 50 kW/m^2). [ppm]
CO	246	889
HF	< 5	< 5
HCl	114	613
HBr	< 10	< 10
HCN	< 2	8
NO_X	< 20	32
SO_2	< 10	< 10

Measured data

Thickness 2.8 – 2.9 mm.

Area weight 5.5 kg/m^2.

Conditioning

Temperature (23 ± 2) °C.

Relative humidity (50 ± 5) %.

Date of test

June 11, 2013.