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BS 6853: 1999: Annex D.8.4 (Withdrawn) / LUL S1085: 2015: Attachment B.6

Methods For Measuring Smoke Density – Panel Test

A Report To: Recoat B.V.

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Executive Summary

Objective

To determine the smoke density of the following product when tested in accordance with BS 6853: 1999 incorporating amendment No. 1 Annex D.8.4 (Withdrawn) / LUL S1085: 2015: Attachment B.6.

Generic Description	Product reference	Thickness	Weight per unit area or density
Coating system applied to gypsum fibreboard. The final coating product, "Recoat Wall Sealer", is a matt 1 component coating that seals porous walls.	"Recoat Wall Sealer Applied to Gypsum Fibreboard"	10.26mm *	12.02kg/m^2 *
Individual components used to manufacture composite:			
Final coating product	"Recoat Wall Sealer"	50 – 60 µm	1090 g/L
First coating product	"Recoat Multiprimer"	Two coats, each 60 – 70 µm	1090 g/L
Substrate	"Firepanel A1"	10mm	1200 kg/m^3
* measured by Warringtonfire			
Please see page 5 of this test report for the full description of the product tested			

Test Sponsor

Recoat B.V., Schaafdries 12, 5371 NJ Ravenstein, Netherlands.

Test Results:

	Specimen No. 1	Specimen No. 2	Average
A_O (ON)	0.96	1.19	**1.08**
A_O (OFF)	1.59	1.89	**1.74**

Date of Test

18th March 2019

Signatories

Responsible Officer T. Kinder * Senior Technical Officer	Authorised T. Mort * Senior Technical Officer

* For and on behalf of Warringtonfire.

Report Issued: 11th April 2019

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Test Details

Purpose of test

To determine the performance of a specimen when it is subjected to the conditions of test specified in BS 6853: 1999, Incorporating Amendment No.1, "Code of practice for fire precautions in the design and construction of passenger carrying trains" Annex D.8.4 (Withdrawn) / LUL S1085: 2015: Attachment B.6 "Panel test".

The test was performed in accordance with the procedure specified in BS 6853: 1999 Annex D, Incorporating Amendment No. 1, Clause D.8.4 (Withdrawn) / LUL S1085: 2015: Attachment B.6 and this report should be read in conjunction with that Standard.

Scope of test

BS 6853: 1999, Incorporating Amendment No.1, Annex D.8.4 (Withdrawn) / LUL S1085: 2015: Attachment B.6 details a test procedure, the results being expressed as A_O (ON) and A_O (OFF) values, for the measurement of the density of smoke emitted from a panel burning under the defined conditions of test. The results are used to determine compliance with the criteria given in BS 6853: 1999 Incorporating amendment No. 1 Tables 2, 3, 5, 6 & 10 (Withdrawn) and LUL S1085: 2015: Table 2.

The requirements specified in these tables are detailed in Appendix 2.

Instruction to test

The test was conducted on the 18th March 2019 at the request of Recoat B.V., the sponsor of the test.

Provision of test specimens

The specimens were supplied by the sponsor of the test. Warringtonfire was not involved in any selection or sampling procedure.

Conditioning of specimens

The specimens were received on the 8th March 2019.

The test specimens were conditioned by maintaining them in indoor ambient conditions for 72 hours and then for a minimum of 16 hours at 23 ± 2°C and a relative humidity of 50 ± 5%.

Exposed face

The coated face of the specimens was exposed to the flame. Restraining clips were used to prevent excessive movement of the test specimen.

Ignition source

Fire source No 1, alcohol, as detailed in LUL S1085: 2015: clause B.3.1 was used.

Description of Test Specimens

The description of the specimens given below has been prepared from information provided by the sponsor of the test. This information has not been independently verified by Warringtonfire**.** All values quoted are nominal, unless tolerances are given.

General description		Coating system applied to gypsum fibreboard. The final coating product, "Recoat Wall Sealer", is a matt 1 component coating that seals porous walls.
Overall thickness of the coated board		10.26mm (measured by Warringtonfire)
Overall weight per unit area of the coated board		12.02kg/m^2 (measured by Warringtonfire)
Product reference of coating system		"Recoat Wall Sealer Applied to Gypsum Fibreboard"
Overall coating system thickness		80 – 90 µm DFT
Final coating product (Test face)	Generic type	1K waterborne acrylic
	Product reference	"Recoat Wall Sealer"
	Name of manufacturer	Dercom
	Colour	Transparent
	Number of coats	One
	Application thickness	50 – 60 µm
	Application method	Roller
	Density	1190 g/L
	Flame retardant details	**See note 1 below**
	Curing process per coat	1 hour at room temperature
First coating product (if applicable)	Product reference	"Recoat Multiprimer"
	Name of manufacturer	Dercom
	Colour	Transparent
	Number of coats	Two
	Application thickness per coat	60 – 70 µm
	Application method	Roller
	Density	1090 g/L
	Flame retardant details	**See note 1 below**
	Curing process per coat	1 hour at room temperature
Substrate	Product reference	"Firepanel A1"
	Generic type	Gypsum fibreboard
	Name of manufacturer	Fermacell
	Thickness	10 mm
	Density	1200 kg/m^3
	Flame retardant details	**See note 2 below**
	Preparation details	Degreased with "Recoat Cleaner"
Brief description of manufacturing process of coatings		Fillers, additives and resin are finely dispersed into a homogeneous mixture.

Note 1 – The sponsor of the test has confirmed that no flame retardant additives were utilised in the production of the product / component.

Note 2 – The sponsor of the test was unable to provide this information.

Test Results

Applicability of test results

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

The test results relate only to the specimens of the product in the form in which they were tested. Small differences in the composition or thickness of the product may significantly affect the performance during the test and may therefore invalidate the test results. Care should be taken to ensure that any product which is supplied or used is fully represented by the specimens which were tested.

Test results

	Specimen No. 1	Specimen No. 2	Average
A_O (ON)	0.96	1.19	**1.08**
A_O (OFF)	1.59	1.89	**1.74**

Standard Deviation
Ao (ON) = 0.161
Ao (OFF) = 0.210

Visual observations made during the test are given in Appendix 1.

The changes in A_O with time and % transmittance with time were continuously recorded and graphs are presented in Figures 1 and 2.

Validity

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over five years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

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Appendix 1

Observations during test of Specimen 1

00:01 Ignition of fire source, test commenced.

00:43 The surface of the specimen began to char.

01:09 Flashes of ignition on the surface of the specimen.

01:45 Flashes of ignition on the surface of the specimen ceased.

10:00 No change, the fire source continued to flame.

20:00 No change, the fire source continued to flame.

24:06 Fire source consumed. All flaming ceased.

40:00 Test terminated.

Observations during test of Specimen 2

00:01 Ignition of fire source, test commenced.

00:30 The surface of the specimen began to char.

01:06 The surface of the specimen ignited.

01:49 Flaming on the surface of the specimen ceased.

10:00 No change, the fire source continued to flame.

20:00 No change, the fire source continued to flame.

23:47 Fire source consumed. All flaming ceased.

40:00 Test terminated.

Appendix 2

Table 2 of BS 6853:1999 (Withdrawn) – Interior Vertical Surfaces

Test	Parameter	Pass / Fail Criteria		
		Vehicle Cat 1a	Vehicle Cat 1b	Vehicle Cat 2
BS 476: Part 6	Index I1 (max) Index I (max)	6 (VL surfaces: nc) 12 (VL surfaces: nc)	6 (VL surfaces: nc) 12 (VL surfaces: nc)	nc nc
BS 476: Part 7	Worst permissible Class	Class 1 (VL surfaces Class 2)	Class 1 (VL surfaces Class 2)	Class 1 (VL surfaces Class 2)
Annex D Panel Smoke test	A_O (ON) A_O (OFF)	2.6 3.9	4.2 6.3	9.4 14
Annex B Toxicity test	R (max)	1.0	1.6	3.6
Nc: no criterion, Note, values of A_O are maxima				

Table 3 of BS 6853:1999 (Withdrawn) – Interior Horizontal Prone Surfaces

Test	Parameter	Pass / Fail Criteria		
		Vehicle Cat 1a	Vehicle Cat 1b	Vehicle Cat 2
BS 476: Part 6	Index I1 (max) Index I (max)	6 (HPL surfaces: nc) 12 (HPL surfaces: nc)	6 (HPL surfaces: nc) 12 (HPL surfaces: nc)	nc nc
BS 476: Part 7	Worst permissible Class	Class 1 0mm [a] (HPL surfaces Class 1)	Class 1	Class 1
Annex D Panel Smoke test	A_O (ON) A_O (OFF)	2.6 3.9	4.2 6.3	9.4 14
Annex B Toxicity test	R (max)	1.0	1.6	3.6
Nc: no criterion, [a] No spread of flame, Note, values of A_O are maxima				

Table 5 of BS 6853:1999 (Withdrawn) Exterior Vertical Surfaces

Test	Parameter	Pass / Fail Criteria		
		Vehicle Cat 1a	Vehicle Cat 1b	Vehicle Cat 2
BS 476: Part 7	Worst permissible Class	Class 1 (VL surfaces Class 2)	Class 1 (VL surfaces Class 2)	Class 2
Annex D Panel Smoke test	A_O (ON) A_O (OFF)	4.4 6.6	7.0 10.5	nc nc
Annex B Toxicity test	R (max)	1.7	2.7	nc
Nc: no criterion, Note, values of A_O are maxima				

Table 6 of BS 6853:1999 (Withdrawn) Exterior Horizontal Prone Surfaces

Test	Parameter	Pass / Fail Criteria		
		Vehicle Cat 1a	Vehicle Cat 1b	Vehicle Cat 2
BS 476: Part 7	Worst permissible Class	Class 1, 0mm[a] (HPL surfaces Class 1)	Class 1 (HPL surfaces Class 2)	Class 1 (HPL surfaces Class 2)
Annex D Panel Smoke test	A_O (ON) A_O (OFF)	4.4 6.6	7.0 10.5	nc nc
Annex B Toxicity test	R (max)	1.7	2.7	nc
Nc: no criterion, [a] No spread of flame				

Table 10 of BS 6853:1999 (Withdrawn) Seat Shell (Back and Base)

Test	Parameter	Pass / Fail Criteria		
		Vehicle Cat 1a	Vehicle Cat 1b	Vehicle Cat 2
BS 476: Part 6	Index I1 (max) Index I (max)	6 (VL and HPL surfaces: nc) 12 (VL and HPL surfaces: nc)	6 (VL and HPL surfaces: nc) 12 (VL and HPL surfaces: nc)	nc nc
BS 476: Part 7	Worst permissible Class	Class 1 (VL and HPL surfaces Class 2)	Class 1 (VL and HPL surfaces Class 2)	Class 1 (VL and HPL surfaces Class 2)
Annex D Panel Smoke test	A_O (ON) A_O (OFF)	2.6 3.9	4.2 6.3	9.4 14.0
Annex B Toxicity test	R (max)	1.0	1.6	3.6
Nc: no criterion, NOTE Values of A_0 are maxima				

Table 2 of LUL S1085: 2015: – Smoke emission requirements for all vertical and ceiling surfaces

Location	**Test method**	**Requirement**
Option 1		
Vertical and ceiling surfaces in tunnels	S1085: 2015: Attachment B.6	Ao(ON) < 2.4 m^2/burn area Ao(OFF) < 3.6 m^2/burn area
Vertical and ceiling surfaces in stations	S1085: 2015: Attachment B.6	Ao(ON) < 3.6 m^2/burn area Ao(OFF) < 5.4 m^2/burn area
Option 2		
Vertical and ceiling surfaces in stations	EN ISO 5659-2: 50 kWm^{-2}, without pilot flame	a) *D*s maximum, dimensionless, ≤150 b) VOF4 minutes ≤ 300

Figure 1

WF No. 412344 - Specimen No: 1
Date: 18-Mar-19
Ao v Time and % Transmittance v Time
Ao
% Transmittance
Time in Seconds
Ao
% Transmittance
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
0
10
20
30
40
50
60
70
80
90
100
0
300
600
900
1200
1500
1800
2100
2400

Figure 2

WF No. 412344 - Specimen No: 2
Date: 18-Mar-19
Ao v Time and % Transmittance v Time
Ao
% Transmittance
Time in Seconds
Ao
% Transmittance
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
10
20
30
40
50
60
70
80
90
100
0
300
600
900
1200
1500
1800
2100
2400

Revision History

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