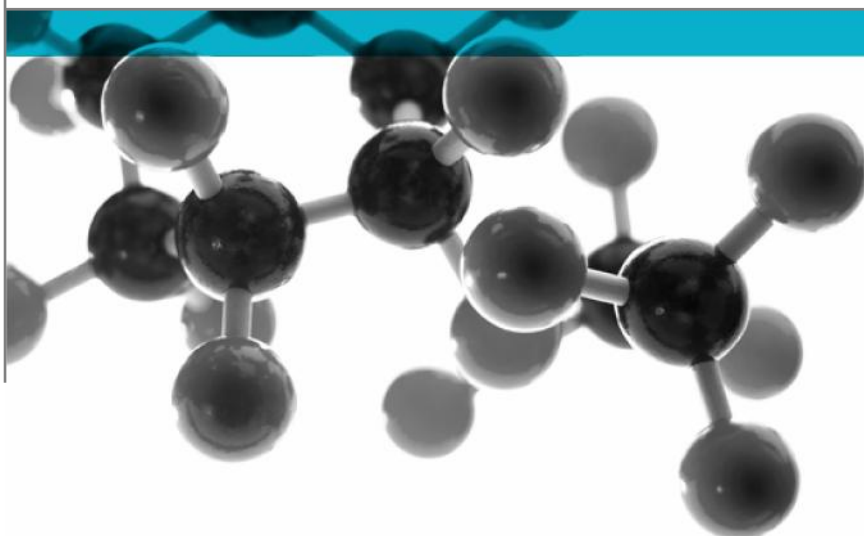


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# BS 6853: 1999: Annex D.8.4



## Methods For Measuring Smoke Density – Panel Test

A Report To: Fiberlock Technologies Inc.

Document Reference: 338608

Date: 16<sup>th</sup> June 2014

Issue No.: 1

Page 1

Testing  
Advising  
Assuring



## 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

Generic Description	Product reference	Thickness	Weight per unit area or density
A water-based coating product applied to a calcium silicate substrate	"SerpiMastic Sprayable - Part #2419"	13.2mm *	12.7kg/m <sup>2</sup> *
<b>Individual components used to manufacture composite:</b>			
Coating product (test face)	"Part #2419"	1mm	Not stated
Calcium silicate	"Promat-Brandschutzbauplatten; Promatect-H"	12mm	870kg/m <sup>3</sup>
<b>*Determined by Exova Warringtonfire</b>			
<b>Please see page 5 of this test report for the full description of the product tested</b>			


**Test Sponsor** Fiberlock Technologies Inc., 150 Dascomb Road, Andover, Massachusetts 01810, USA.

### Test Results:


	Specimen No. 1	Specimen No. 2	Average
A <sub>0</sub> (ON)	1.93	1.90	1.92
A <sub>0</sub> (OFF)	2.65	2.60	2.63

**Date of Test** 12<sup>th</sup> June 2014

## Signatories



Responsible Officer  
T. Kinder \*  
Technical Officer



Authorised  
T. Mort \*  
Senior Technical Officer

\* For and on behalf of **Exova Warringtonfire**.

Report Issued: 16<sup>th</sup> June 2014

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## Test Details

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<b>Purpose of test</b>	<p>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 "Panel test".</p> <p>The test was performed in accordance with the procedure specified in BS 6853: 1999 Annex D, Incorporating Amendment No. 1, Clause D.8.4 and this report should be read in conjunction with that Standard.</p>
<b>Scope of test</b>	<p>BS 6853: 1989, Incorporating Amendment No.1, Annex D.8.4 details a test procedure, the results being expressed as <math>A_{O(ON)}</math> and <math>A_{O(OFF)}</math> 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 and 10 and the requirements specified in these tables are detailed in Appendix 2.</p>
<b>Instruction to test</b>	<p>The test was conducted on the 12<sup>th</sup> June 2014 at the request of Fiberlock Technologies Inc., the sponsor of the test.</p>
<b>Provision of test specimens</b>	<p>The specimens were supplied by the sponsor of the test. <b>Exova Warringtonfire</b> was not involved in any selection or sampling procedure.</p>
<b>Conditioning of specimens</b>	<p>The specimens were received on the 4<sup>th</sup> March 2014.</p> <p>The test specimens were conditioned by maintaining them in indoor ambient conditions for 72 hours and then for a minimum of 16 hours at <math>23 \pm 2^{\circ}\text{C}</math> and a relative humidity of <math>50 \pm 5\%</math>.</p>
<b>Exposed face</b>	<p>The coated face of the specimens was exposed to the flame.</p>
<b>Ignition source</b>	<p>Fire source No 1, alcohol, as detailed in clause D.4.2 was used.</p>

## Description of Test Specimens

The description of the specimens given below has been prepared from information provided by the sponsor of the test. All values quoted are nominal, unless tolerances are given.

General description		A water-based coating product applied to a calcium silicate substrate
Thickness of composite including substrate		13.2mm (determined by <b>Exova Warringtonfire</b> )
Weight per unit area of composite including substrate		12.7kg/m <sup>2</sup> (determined by <b>Exova Warringtonfire</b> )
Product reference of overall coating		"SerpiMastic Sprayable - Part #2419"
Coating product (test face)	Generic type	Water-based, high solids, asbestos bridging encapsulant/mastic coating
	Product reference	"Part #2419"
	Name of manufacturer	Fiberlock Technologies, Inc.
	Colour reference	"Off White"
	Number of coats	1
	Application thickness per coat	1 mm
	Application rate per coat	0.4m <sup>2</sup> /l
	Application method	Airless spray
	Flame retardant details	<b>See Note 1 below</b>
Curing process per coat	14 days minimum	
Calcium silicate	Trade name	"Promat-Brandschutzbauplatten; Promatetect-H"
	Generic type	Calcium silicate based board
	Name of manufacturer	Promat
	Thickness	12mm
	Density	870kg/m <sup>3</sup>
Flame retardant details	This component is inherently flame retardant	
Brief description of manufacturing process		Dispersion and mixing of resins, pigments, and additives to form a water based coating

**Note 1. The sponsor was unwilling 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 <sub>0</sub> (ON)	1.93	1.90	1.92
A <sub>0</sub> (OFF)	2.65	2.60	2.63

Standard Deviation

A<sub>0</sub> (ON) = 0.0212

A<sub>0</sub> (OFF) = 0.0354

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

The changes in A<sub>0</sub> 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.
- 04:19 The surface of the specimen began to blister.
- 10:00 No change, the fire source continued to flame.
- 20:00 No change, the fire source continued to flame.
- 28:41 Fire source consumed. All flaming ceased.
- 40:00 Test terminated.

**Observations during test of Specimen 2**

- 00:01 Ignition of fire source, test commenced.
- 04:03 The surface of the specimen began to blister.
- 10:00 No change, the fire source continued to flame.
- 20:00 No change, the fire source continued to flame.
- 28:32 Fire source consumed. All flaming ceased.
- 40:00 Test terminated.

## Appendix 2

**Table 2 of BS 6853:1999 – 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 <sub>0</sub> (ON)	2.6	4.2	9.4
	A <sub>0</sub> (OFF)	3.9	6.3	14
Annex B Toxicity test	R (max)	1.0	1.6	3.6

Nc: no criterion, Note, values of A<sub>0</sub> are maxima

**Table 3 of BS 6853:1999 – 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 <sup>a</sup> (HPL surfaces Class 1)	Class 1	Class 1
Annex D Panel Smoke test	A <sub>0</sub> (ON)	2.6	4.2	9.4
	A <sub>0</sub> (OFF)	3.9	6.3	14
Annex B Toxicity test	R (max)	1.0	1.6	3.6

Nc: no criterion, <sup>a</sup> No spread of flame, Note, values of A<sub>0</sub> are maxima

**Table 5 of BS 6853:1999 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 <sub>0</sub> (ON)	4.4	7.0	nc
	A <sub>0</sub> (OFF)	6.6	10.5	nc
Annex B Toxicity test	R (max)	1.7	2.7	nc

Nc: no criterion, Note, values of A<sub>0</sub> are maxima



**Table 6 of BS 6853:1999 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 <sup>a</sup> (HPL surfaces Class 1)	Class 1 (HPL surfaces Class 2)	Class 1 (HPL surfaces Class 2)
Annex D Panel Smoke test	A <sub>0</sub> (ON) A <sub>0</sub> (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, <sup>a</sup> No spread of flame				

**Table 10 of BS 6853:1999 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 <sub>0</sub> (ON) A <sub>0</sub> (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 <sub>0</sub> are maxima				

Figure 1

**WF No: 338608 - Specimen No: 1**  
**Ao v Time and % Transmittance v Time**

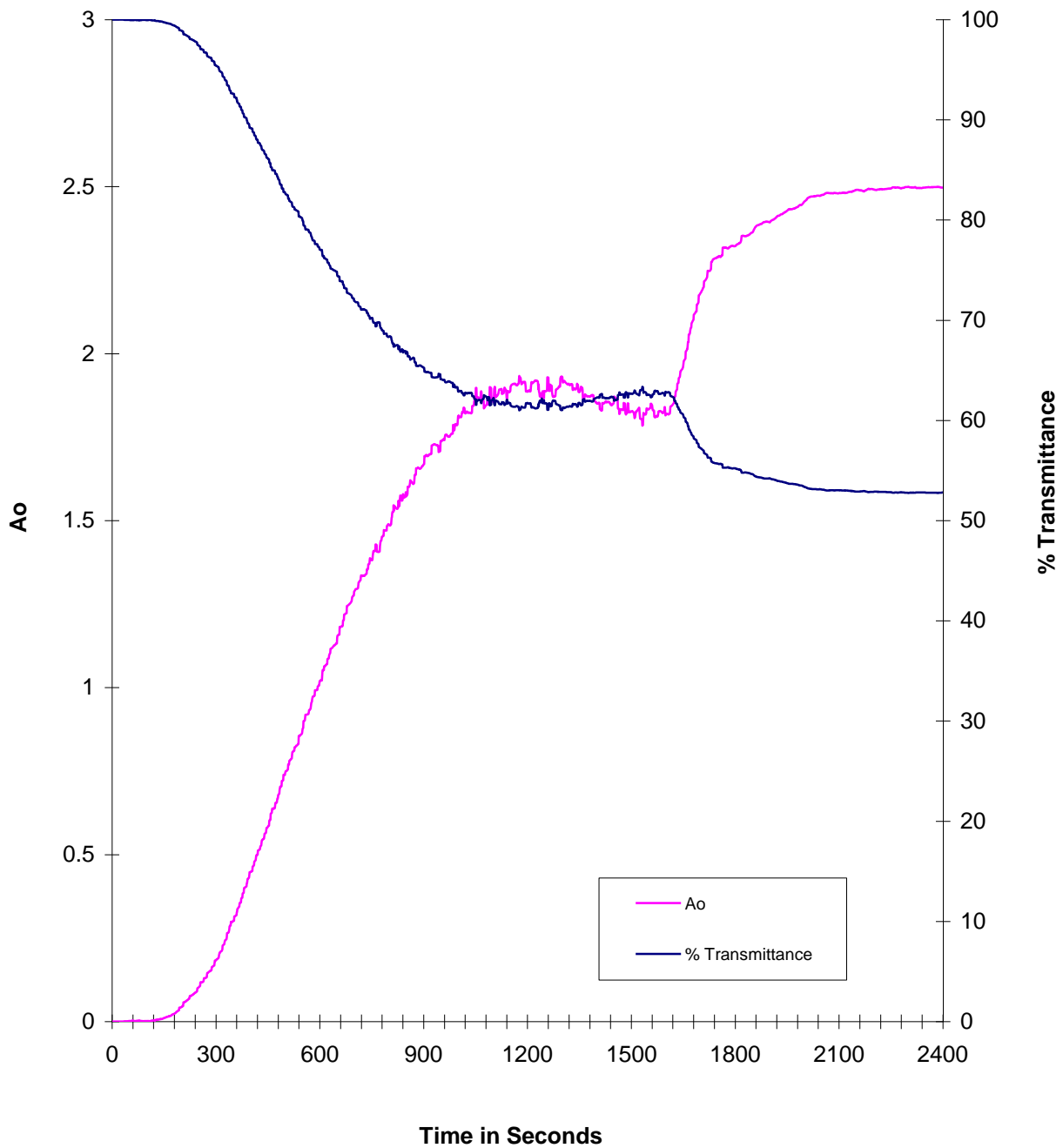
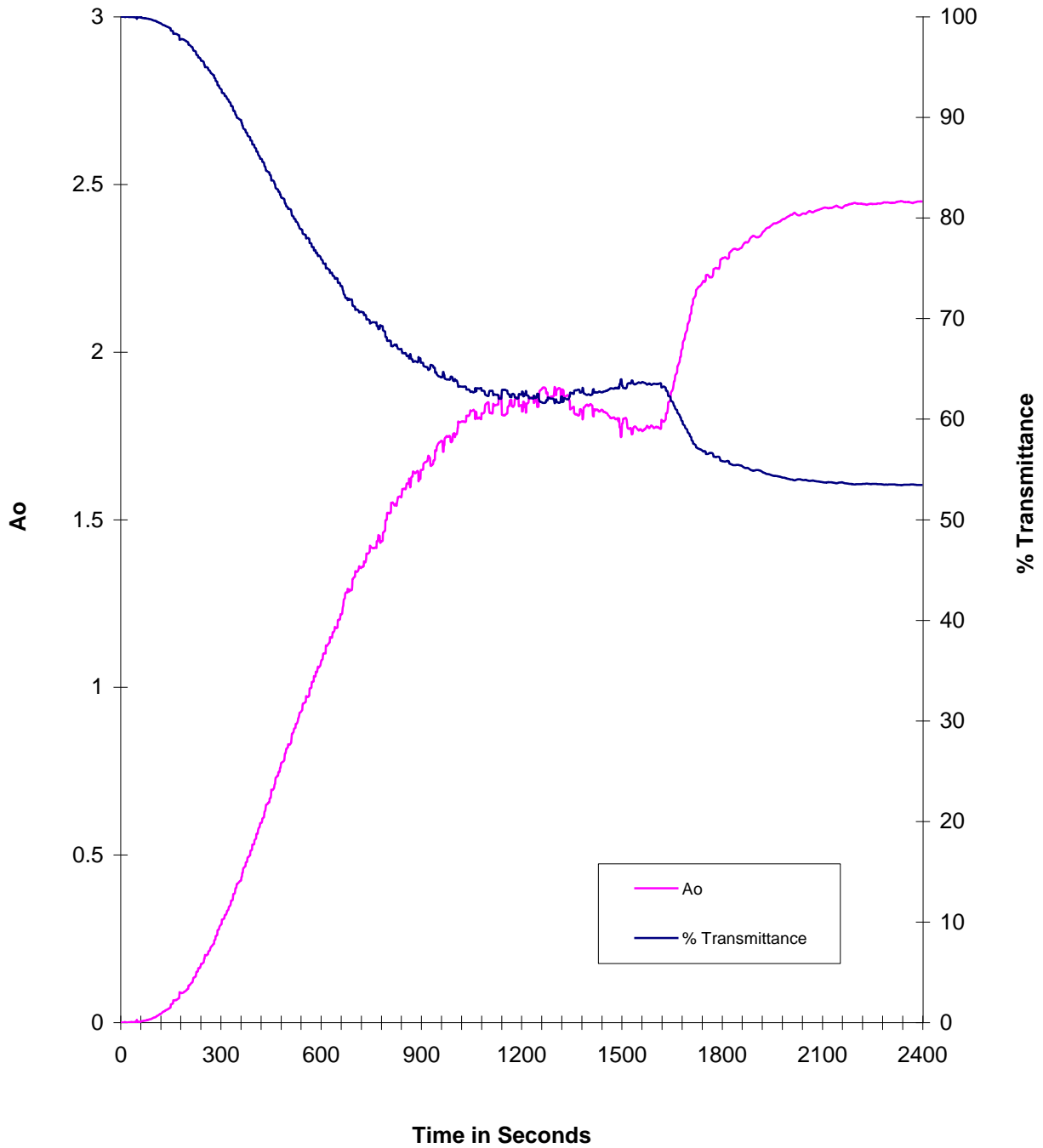


Figure 2

**WF No: 338608 - Specimen No: 2**  
**Ao v Time and % Transmittance v Time**



## Revision History

Issue No :	Issue Date:
Revised By:	Approved By:
Reason for Revision:	

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Revised By:	Approved By:
Reason for Revision:	