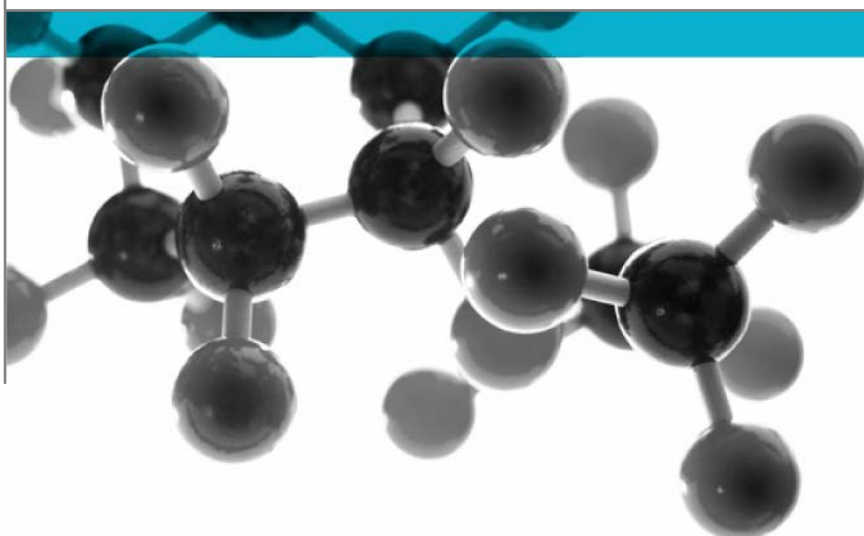


BS 6853: 1999: Annex D.8.4 (Withdrawn) / LUL S1085: 2015: Attachment B.6



Methods For Measuring Smoke Density – Panel Test

A Report To: Recoat B.V.

Document Reference: 412342

Date: 11th April 2019

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Page 1



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of the following product when tested in accordance with BS 6853: 1999 incorporating amendment No. 1 Annex D.8.4 (Withdrawn) / LUL S1085: 2015: Attachment B.6.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 Floor", is a matt, non-yellowing, 2 component waterborne floor coating with anti-slip properties.	"Recoat Floor Applied to Gypsum Fibreboard"	10.23mm *	11.78kg/m ² *
Individual components used to manufacture composite:			
Final coating product	"Recoat Floor"	25 – 35 µm	1260 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 ₀ (ON)	0.552	0.537	0.545
A ₀ (OFF)	0.965	0.924	0.945

Date of Test

15th 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	<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No.1, "Code of practice for fire precautions in the design and construction of passenger carrying trains" Annex D.8.4 (Withdrawn) / LUL S1085: 2015: Attachment B.6 "Panel test".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in accordance with the procedure specified in BS 6853: 1999 Annex D, Incorporating Amendment No. 1, Clause D.8.4 (Withdrawn) / LUL S1085: 2015: Attachment B.6 and this report should be read in conjunction with that Standard.</p>
Scope of test	<p>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_0 (ON) and A_0 (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.</p> <p>The requirements specified in these tables are detailed in Appendix 2.</p>
Instruction to test	<p>The test was conducted on the 15th March 2019 at the request of Recoat B.V., the sponsor of the test.</p>
Provision of test specimens	<p>The specimens were supplied by the sponsor of the test. Warringtonfire was not involved in any selection or sampling procedure.</p>
Conditioning of specimens	<p>The specimens were received on the 8th March 2019.</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 $23 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 5\%$.</p>
Exposed face	<p>The coated face of the specimens was exposed to the flame. Restraining clips were used to prevent excessive movement of the test specimen.</p>
Ignition source	<p>Fire source No 1, alcohol, as detailed in LUL S1085: 2015: clause B.3.1 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. 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 Floor", is a matt, non-yellowing, 2 component waterborne floor coating with anti-slip properties.
Overall thickness of the coated board		10.23mm (measured by Warringtonfire)
Overall weight per unit area of the coated board		11.78kg/m ² (measured by Warringtonfire)
Product reference of coating board		"Recoat Floor Applied to Gypsum Fibreboard"
Overall coating system thickness		70 – 80 µm DFT
Final coating product (Test face)	Generic type	2K waterborne polyurethane
	Product reference	"Recoat Floor"
	Name of manufacturer	Dercom
	Colour	Transparent
	Number of coats	One
	Application thickness	25 – 35 µm
	Application method	Roller
	Density	1260 g/L
	Flame retardant details	See note 1 below
	Curing process per coat	2 – 4 hours at room temperature
First coating product	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 ₀ (ON)	0.552	0.537	0.545
A ₀ (OFF)	0.965	0.924	0.945

Standard Deviation

A₀ (ON) = 0.0296

A₀ (OFF) = 0.0546

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

The changes in A₀ 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.

00:38 The surface of the specimen began to char.

01:24 The surface of the specimen ignited.

01:55 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.

23:11 Fire source consumed. All flaming ceased.

40:00 Test terminated.

Observations during test of Specimen 2

00:01 Ignition of fire source, test commenced.

00:45 The surface of the specimen began to char.

01:10 The surface of the specimen ignited.

01:57 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.

24:01 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 ₀ (ON)	2.6	4.2	9.4
	A ₀ (OFF)	3.9	6.3	14
Annex B Toxicity test	R (max)	1.0	1.6	3.6

Nc: no criterion, Note, values of A₀ 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 ₀ (ON)	2.6	4.2	9.4
	A ₀ (OFF)	3.9	6.3	14
Annex B Toxicity test	R (max)	1.0	1.6	3.6

Nc: no criterion, ^a No spread of flame, Note, values of A₀ 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 ₀ (ON)	4.4	7.0	nc
	A ₀ (OFF)	6.6	10.5	nc
Annex B Toxicity test	R (max)	1.7	2.7	nc

Nc: no criterion, Note, values of A₀ 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 ₀ (ON)	4.4	7.0	nc
	A ₀ (OFF)	6.6	10.5	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 ₀ (ON)	2.6	4.2	9.4
	A ₀ (OFF)	3.9	6.3	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	A ₀ (ON) < 2.4 m ² /burn area A ₀ (OFF) < 3.6 m ² /burn area
Vertical and ceiling surfaces in stations	S1085: 2015: Attachment B.6	A ₀ (ON) < 3.6 m ² /burn area A ₀ (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

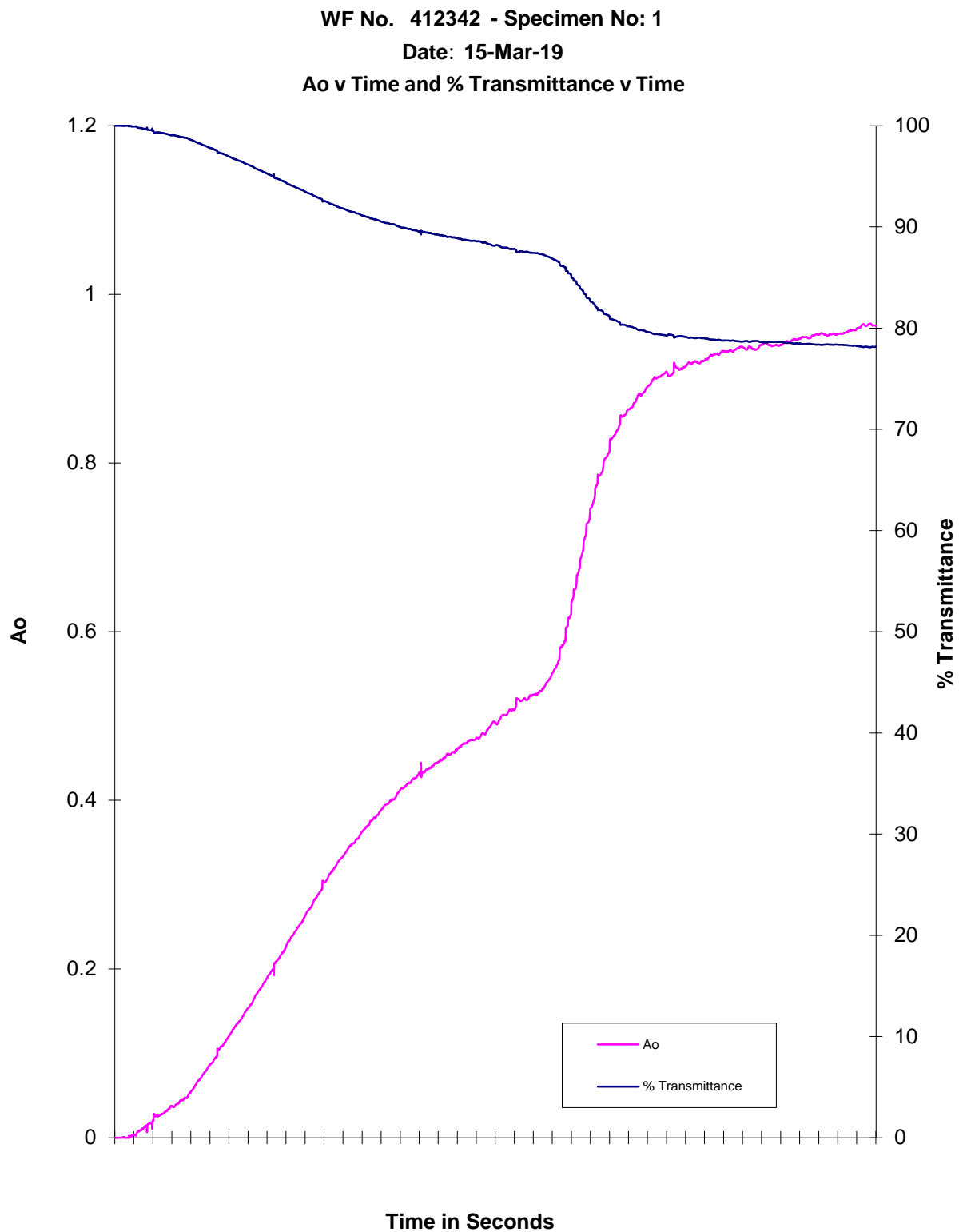
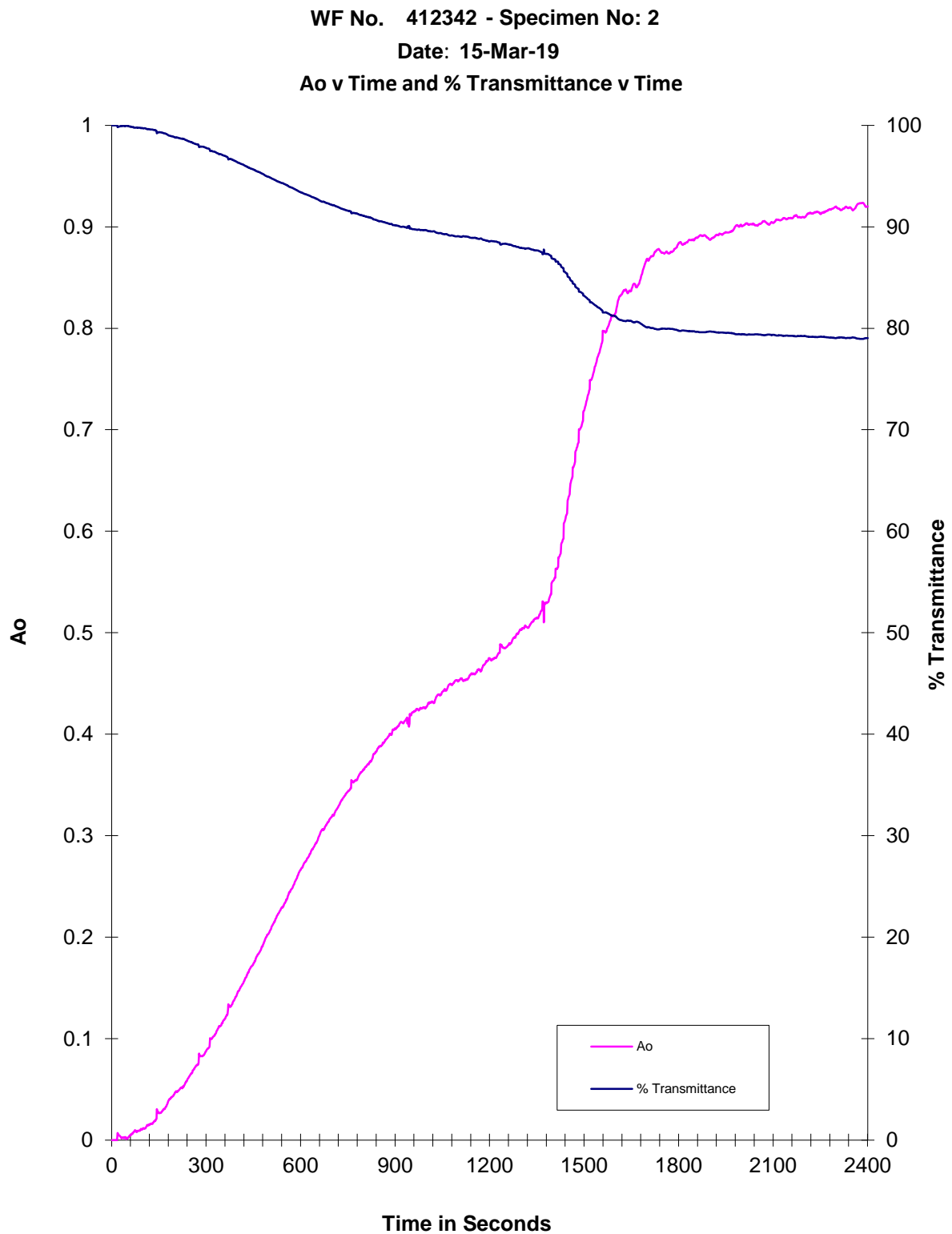


Figure 2



Revision History

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

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Revised By:	Approved By:
Reason for Revision:	