

**BS 6853: 1999
Appendix D, Clause
D.8.6**

**Methods For Measuring
Smoke Density**

**WF Additional Report
Number:**

166696

Date:

17th August 2007

Test Sponsor:

Copon E Wood



0249

Bodycote warringtonfire Additional**Test Report No. 166696****BS 6853: 1999 APPENDIX D,
CLAUSE D.8.6****Code Of Practice For Fire
Precautions****In The Design And Construction Of
Passenger Carrying Trains****Methods For Measuring Smoke
Density****Sponsored By****Copon E Wood Limited
Standard Way
Northallerton
North Yorkshire
DL6 2XA**

This test report is additional to that issued as WF No. 165389 dated the 17th August 2007 and has been issued at the request of the representative of the sponsor. The original test report remains valid and is not replaced by this additional test report. The product referred to in the original report and this additional test report has not been re-tested since the original test and neither has a technical review of the original test report resulting in any technical changes been carried out.

The sponsor's original name has been removed and E. Wood Limited has been inserted. The name of the manufacturer of the coating and product reference of the coating were omitted from the original report for confidential purposes. These details are included in this report. The sponsor of the test has stated that the material described in this additional report is identical to the material which was tested. The original and the alternative names and addresses of the sponsor have been documented and the documentation is maintained in the confidential file covering this investigation.

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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 "Code of practice for fire precautions in the design and construction of passenger carrying trains" Appendix D, Clause D.8.6, "Flooring test". The test was performed in accordance with the procedure specified in BS 6853: 1999 Appendix D, Clause D.8.6 and this report should be read in conjunction with that Standard.
Scope of test	BS 6853: 1999 Appendix D, Clause D.8.6 details a test procedure, the results being expressed as A_0 (max), for the measurement of the density of smoke emitted from a flooring material burning under the defined conditions of test. The results are used to determine compliance with the criteria given in BS 6853: 1999 Table 1 and Table 4 and the requirements specified in these tables are detailed in Appendix 4.
Fire test study group/EGOLF	Certain aspects of some fire test specifications are open to different interpretations. The Fire Test Study Group and EGOLF have identified a number of such areas and have agreed Resolutions which define common agreement of interpretations between fire test laboratories which are members of the Groups. Where such Resolutions are applicable to this test they have been followed.
Instruction to test	The test was conducted on the 10 th July 2007 at the request of Copon E Wood, the sponsor of the test.
Provision of test specimens	The specimens were supplied by a the sponsor of the test. Bodycote warringtonfire was not involved in any selection or sampling procedure.
Conditioning of specimens	The specimens were received on the 26 th June 2007. 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 $50 \pm 5\%$.
Exposed face	The coated face of the specimens was exposed to the heating conditions of the test.

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		Coated birch plywood (with WBP gluing)
Overall thickness		18mm (determined by Bodycote warringtonfire)
Overall weight per unit area		13.3 kg/m ² (determined by Bodycote warringtonfire)
Coating product (Test face)	Generic type	Waterborne intumescent
	Product reference	"Copon LS1000"
	Name of manufacturer	Copon E Wood Limited
	Colour	"White"
	Number of coats	Two
	Application rate per coat	6.7g/m ²
	Total thickness of coating	150 microns
	Application method	Spray
	Specific gravity	1.3
	Flame retardant details	See Note 2 below
Curing process per coat	Air dry	
Plywood	Product reference	"Finnish Birch Plywood"
	Generic type	Birch plywood
	Name of manufacturer	Rudolph Rost
	Thickness	18mm
	Density	680kg/m ³
Flame retardant details	See Note 2 below	
Brief description of manufacturing process of coatings		Made under high speed dispersion

Note 1. The representative of the sponsor of the test has provided this information, but at the specific request of the representative of the sponsor, these details have been omitted from the report and are held on the confidential file relating to this investigation

Note 2. The representative of the sponsor of the test has confirmed that no flame retardant additives were utilised in the production of the component

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.

A_D values are calculated as follows:

$$A_D = A_m V / (k \times l)$$

Where

$$V = 27\text{m}^3 \text{ (volume of the cube)}$$

$$l = 3\text{m} \text{ (length of the optical path between windows)}$$

$$k = 0.04$$

	Specimen No. 1	Specimen No. 2	Specimen No. 3	Average
A_D (max)	82.0	128	75.0	95

Standard Deviation = 288

Initially two specimens were tested. However due to the variation of the first two results exceeding 20%, a third specimen was tested as required by paragraph D.8.2 of BS 6853: 1999. The mean value of all three results is quoted above and should be used to establish the category of performance.

Visual observations made during the test are given in Appendix 1, 2 and 3. The changes in A_D with time and % Transmittance with time were continuously recorded and graphs are presented in Figures 1, 2 and 3.

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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Signatories



Responsible Officer
S Harris *



Approved
T Mort *
Senior Technical Officer



Authorised
C. Dean *
Operations Manager

* For and on behalf of **Bodycote warringtonfire**.

Report Issued: 17th August 2007

Appendix 1

Observations during test of Specimen 1

- 00:01 Ignition of charcoal, test commenced.
- 03:00 The surface of the specimen ignited and flames were visible on the surface of the specimen within the charcoal area
- 06:15 The flaming became intermittent
- 10:00 No change, the charcoal and specimen continued to flame.
- 20:00 No change, the charcoal and specimen continued to flame.
- 30:00 A small amount of flaming and glowing was visible around the charcoal area
- 40:00 Test terminated.

Appendix 2

Observations during test of Specimen 2

- 00:01 Ignition of charcoal, test commenced.
- 03:30 The surface of the specimen ignited and flames were visible on the surface of the specimen within the charcoal area
- 06:00 The flaming became intermittent
- 10:00 No change, the charcoal and specimen continued to flame.
- 20:00 No change, the charcoal and specimen continued to flame.
- 40:00 Test terminated.

Appendix 3

Observations during test of Specimen 3

- 00:01 Ignition of charcoal, test commenced.
- 06:30 The flaming became intermittent
- 10:00 No change, the charcoal and specimen continued to flame.
- 20:00 No change, the charcoal and specimen continued to flame.
- 40:00 Test terminated.

Appendix 4

Table 1 Of BS 6853:1999 – Interior Horizontal Supine Surfaces

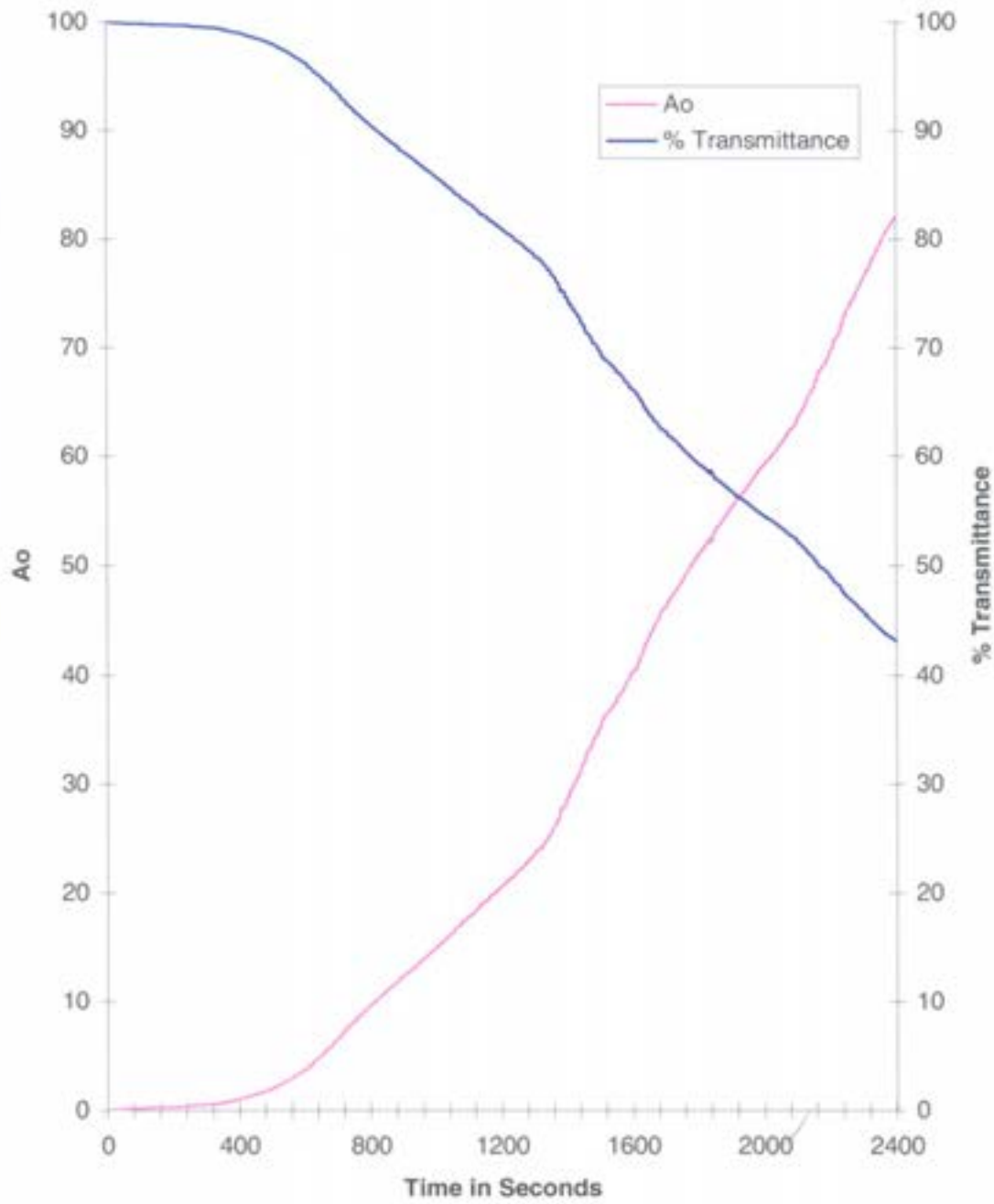
Test	Parameter	Pass / Fail Criteria		
		Vehicle Cat 1a	Vehicle Cat 1b	Vehicle Cat 2
BS 476 Part 7 OR BS ISO 9239-1	Worst permissible class	Class 2	Class 2	Class 2
	C.F.E (min)	7.5 kW/m ²	7.5 kW/m ²	7.5 kW/m ²
Annex D Smoke test	A ₀ (max.)	220	350	nc ^a
Annex B Toxicity test	R (max.)	5.0	8.0	18.0
nc: no criterion.				
^a The permissible level is outside the measuring range of the method. The value is so high that it has been decided not to offer a numerical criterion.				

Table 4 Of BS 6853:1999 – Exterior Horizontal Supine Surfaces

Test	Parameter	Pass / Fail Criteria		
		Vehicle Cat 1a	Vehicle Cat 1b	Vehicle Cat 2
BS 476 Part 7 OR BS ISO 9239-1	Worst permissible class	Class 2	Class 2	Class 2
	C.F.E (min)	7.5 kW/m ²	7.5 kW/m ²	7.5 kW/m ²
Annex D Smoke test	A ₀ (max.)	370	590	nc
Annex B Toxicity test	R (max.)	8.5	13.5	nc
nc: no criterion.				

Figure 1

WF No: 165389 - Specimen No: 1
Ao v Time and % Transmittance v Time

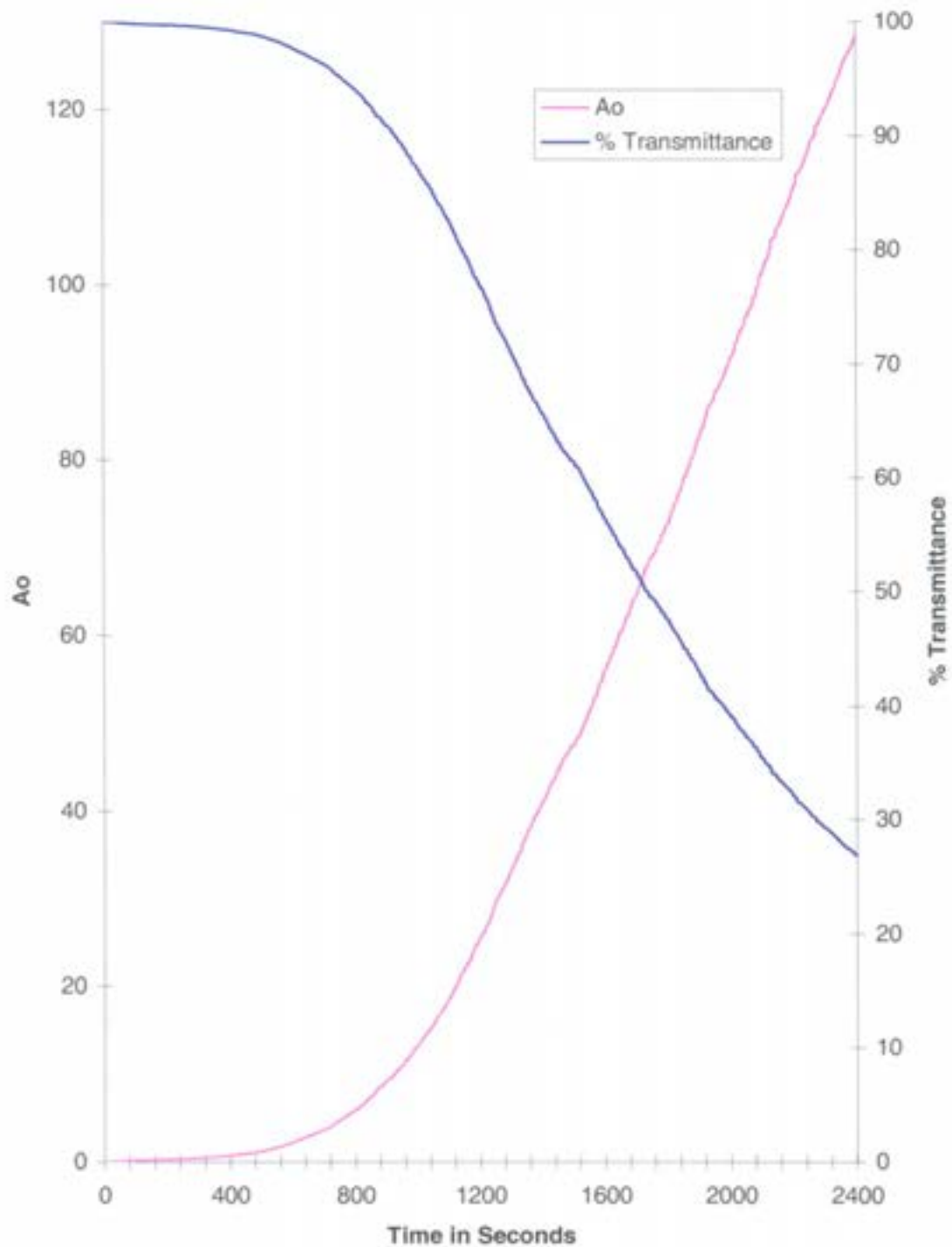


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Figure 2

WF No: 165389 - Specimen No: 2
Ao v Time and % Transmittance v Time

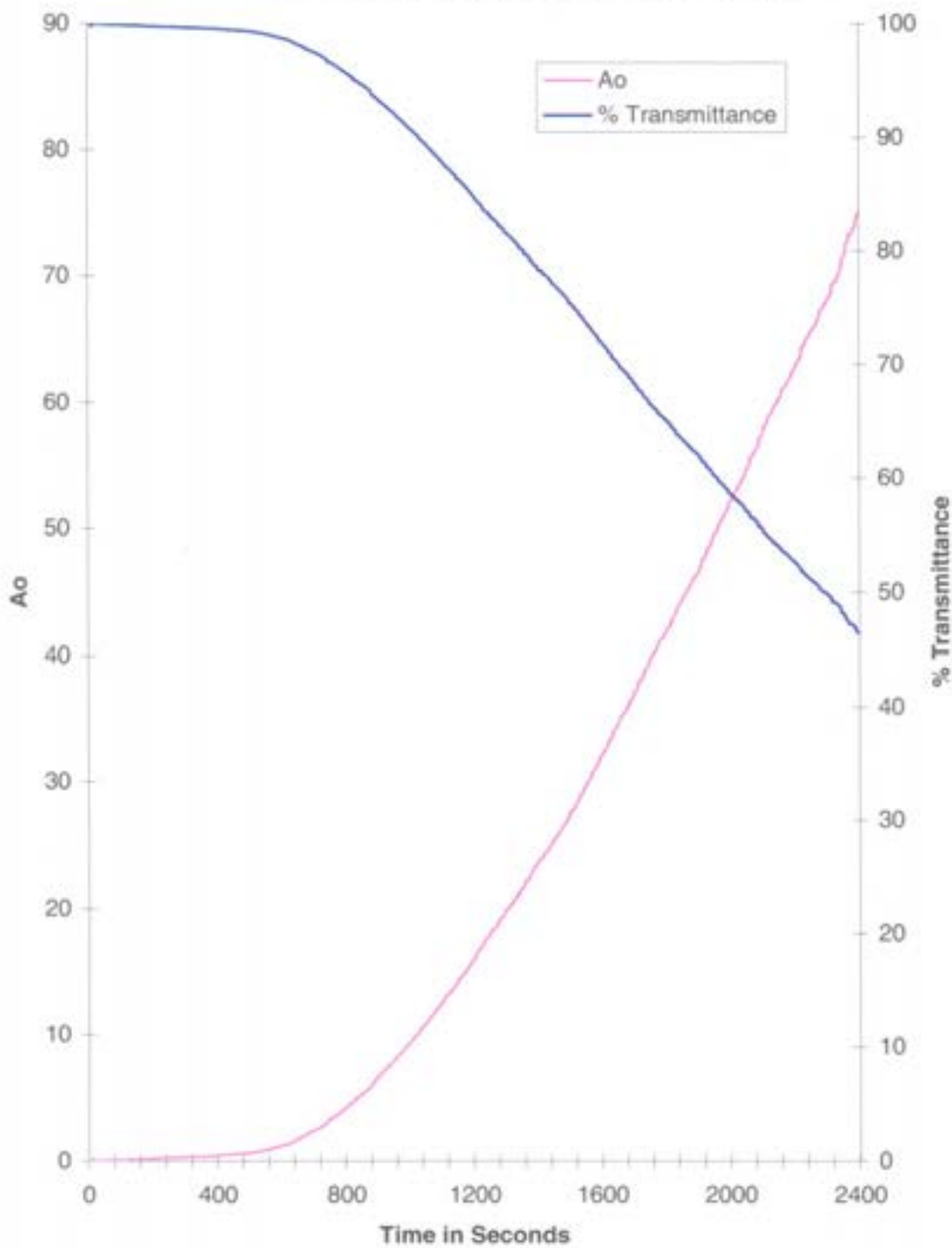


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Figure 3

WF No: 165389 - Specimen No: 3
Ao v Time and % Transmittance v Time



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