

**Test Report**

**WARRES NO. 300820**

**BS 6853: 1999 Appendix D, Clause D.8.4  
Code Of Practice For Fire Precautions  
In The Design And Construction Of  
Passenger Carrying Trains**

**Methods For Measuring Smoke Density**

**Sponsored By**

**3M UK Plc  
3M House  
P O Box 1  
Bracknell  
Berks  
RG12 1JU**

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**The Professionals in Fire Safety**

**Test Report****WARRES NO. 300820****BS 6853: 1999 Appendix D, Clause D.8.4  
Code Of Practice For Fire Precautions  
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Passenger Carrying Trains****Methods For Measuring Smoke Density****Sponsored By****3M UK Plc  
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P O Box 1  
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RG12 1JU****1 Purpose Of Test**

To determine the performance of a specimen of a coated panel 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" Annex D.8.4 "Panel test".

**2 Scope Of Test**

BS 6853: 1989 Annex D.8.4 details a test procedure, the results being expressed as Ao(on) and Ao(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 Table 2,3,5 and 6.

**3 Description Of Test Specimen**

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

The product was a 100 microns thick adhesive backed polymeric film 3M referenced "SH4CLARL" consisting of polyester base film coated with UV cured abrasion resistant coating applied on one face and a pressure sensitive adhesive applied on the other face.

The nominal mass of the product was 209g/m<sup>2</sup>.

The specimens delivered were marked "R" and consisted of the product bonded to one face of 6mm thick glass plate.

The sponsor of the test did not provide further details of the composition of the coating system.

The specimen was supplied by the sponsor of the test. Warrington Fire Research Centre was not involved in any selection or sampling procedure.

#### **4 Conditioning Of Test Specimens**

The specimens were received on 17 January 2000.

The test specimens were conditioned by maintaining them in door 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  $50 \pm 5\%$ .

#### **5 Date Of Test**

The test was performed on 8 and 9 February 2000.

#### **6 Test Procedure**

The test was performed in accordance with the procedure specified in BS 6853: 1999 Appendix D, Clause D.8.4 and this report should be read in conjunction with that Standard. Restraining clips were used to prevent excessive movement of the test specimen.

#### **7 Exposed Face**

The face with 3M product was exposed to the flame.

#### **8 Test Results**

The test 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 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.

Ao values are calculated as follows:

$$A_c = A_m V / (nl)$$

Where

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

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

$$n = 1$$

The value of  $A_m$  decreased from a maximum value during the ON phase.  $A_m(\text{off})$  is corrected by adding the difference between  $A_m(\text{on max})$  and  $A_m(\text{on end})$  to  $A_m(\text{off})$ . Thus:  $A_m(\text{off}) = A_m(\text{off end}) + A_m(\text{on max}) - A_m(\text{on end})$ .

All figures are rounded down to the second decimal place.

	Specimen No:1	Specimen No:2	Average
Ao(on max) :	0.79	0.68	0.73
Ao(on end) :		0.67	
Ao(off) :	0.87	0.76	0.81

Visual observations made during the test are given in Appendix 1 and 2.

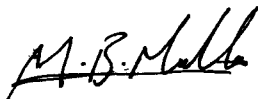
The changes in Ao with time were continuously recorded and graphs are presented in Figures 1 and 2.

## 9 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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### Tested by



**M B MULLA**

### Approved



**S. KUMAR**  
Technical Manager  
for and on behalf of  
**WARRINGTON FIRE RESEARCH CENTRE**

**Date of issue: 28 March 2000.**

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### OBSERVATIONS DURING TEST

Specimen No: 1

TIME (MINS-SEC)	OBSERVATIONS
2-10	Laminate shrinking.
2-40	Glass cracks but still holding in single piece.
10-00	Only alcohol flaming.
20-00	Only alcohol flaming.
30-30	Alcohol fuel consumed.

**OBSERVATIONS DURING TEST**

Specimen No:2

TIME (MINS-SEC)	OBSERVATIONS
1-15	Glass shatters but still in contact.
2-15	Laminated cracks but still holding in single piece.
10-00	Only alcohol flaming.
20-00	Only alcohol flaming.
30-10	Alcohol fuel consumed.

Warres: 300820 Specimen No: 1  
Ao V Time

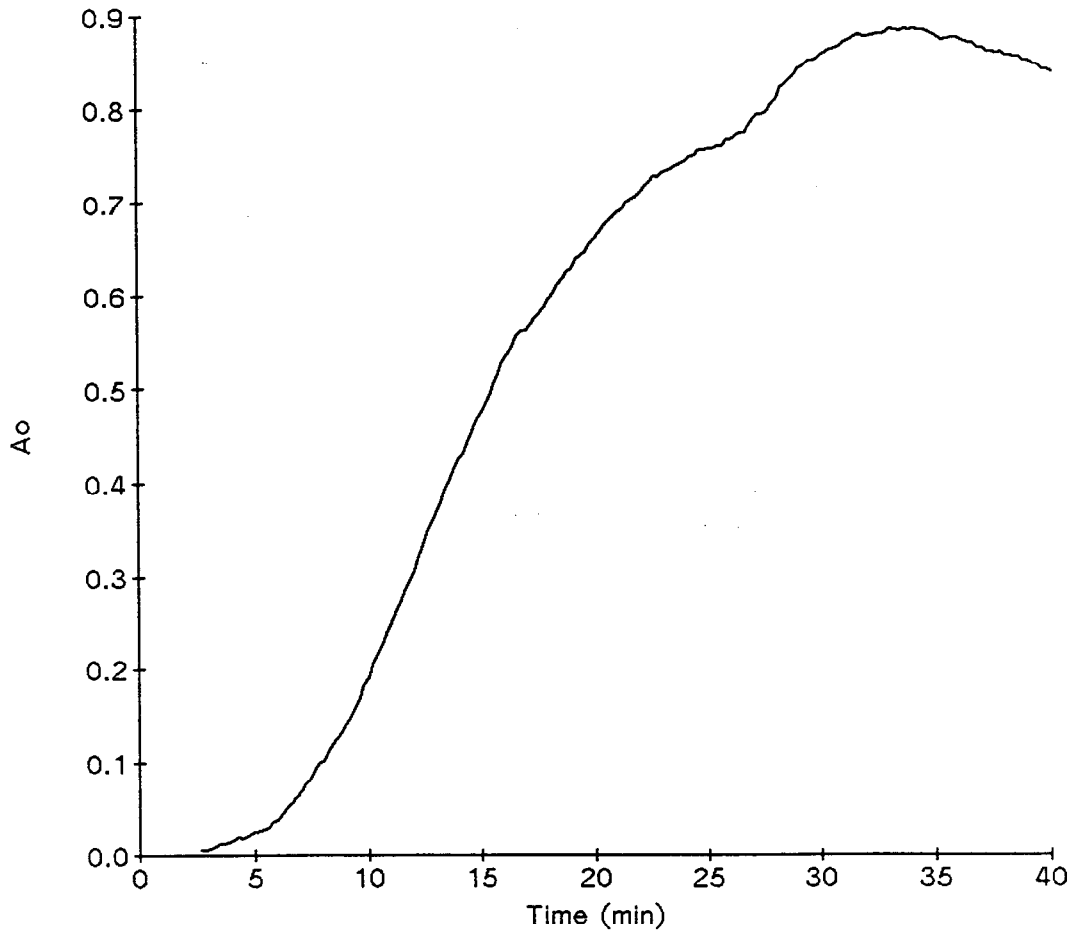


Figure 1 Variation of Absorbance (Ao) with time (Specimen No: 1)

Warres: 300820 Specimen No: 2  
Ao V Time

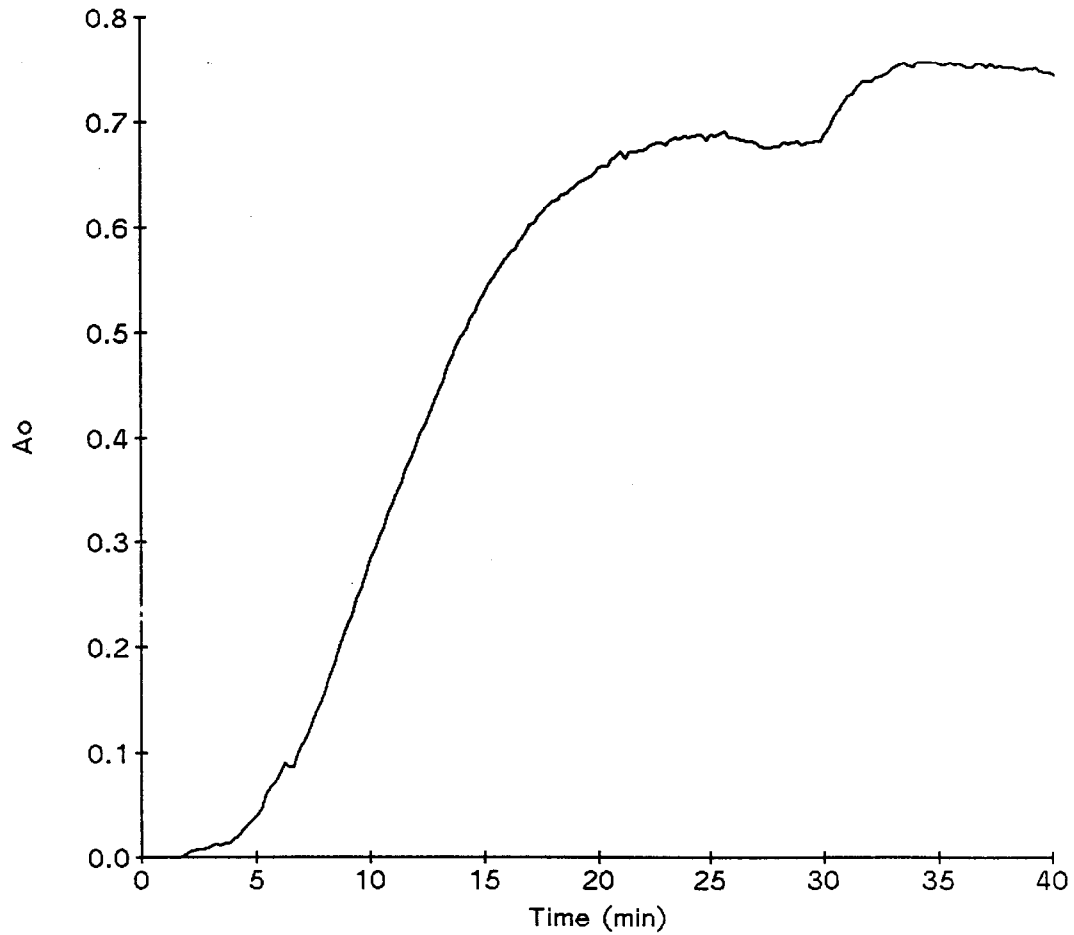


Figure 2 Variation of Absorbance (Ao) with time (Specimen No: 2)