

# Fire Test Reports for Interpon D Powder Coatings

Explanations and collations of key reports and approvals for the UK market.

## 1. BS476

British Standard 476 refers to fire tests on building materials and structures. The parts of this standard that are of most relevance to powder coatings are Parts 6 and 7.

### Part 6 - Fire Propagation

The result of this test is a fire propagation index. It is a measure of the contribution to fire growth made by an essentially flat surface. The results of the test are specific to the test specimen i.e. the product on that particular substrate in the form in which it was tested. Therefore it cannot be used as a method for assessing the product in all situations.

### Part 7 - Surface Spread of Flame

This is a method of measuring flame spread along the surface of a specimen. Again the results of the test are specific to the test specimen i.e. the product on that particular substrate in the form in which it was tested. Therefore it cannot be used as a method for assessing the product in all situations.

As defined in the UK Building Regulations 2000 - Fire Safety Approved Document B, the highest product performance classification for wall or ceiling linings is Class 0. This is achieved if a material; (a) Achieves a class 1 rating in BS476 Part 7, and (b) Achieves a fire propagation index of not more than 12 and sub-index of not more than 6 in BS476 Part 6.

### Test Results

Interpon D1000 series and D2000 Series have been tested to BS476 Parts 6 and 7 and have met the criteria for Class 0 building regulation approval. The test reports are included in this document.

## 2. Reaction to Fire Report EN 13501-1

A further classification used in the building industry is given by EN 13501.

This is arrived at by carrying out two tests:

- EN 13823
- EN ISO 1716

The EN ISO 1716 (Calorific value) test determines the potential maximum amount of energy release which can be generated by a product when complete combustion occurs. The test is relevant for classes A1 and A2. Specimens are prepared from each individual component of a product by grinding them into powder. Each component is then tested in an oxygen bomb calorimeter by placing the specimen in a crucible within a stainless steel vessel filled with oxygen and pressure. A spark is then introduced; exploding the mixture and the resultant temperature rise will be used to calculate the calorific value of the specimen.

The classification is split into 3 components.

1. Combustibility. A2<sub>L</sub> means non-combustible.
2. Smoke Emission – s1 is best, s3 is worst
- 3. Release of droplets or particles – d0 is best, d2 is worst.

### Test Results

Interpon D polyester powders achieve A2<sub>L</sub>-s1, d0

The full test report is included in this document.

### 3. London Underground Approval

Approval for use in London Underground is a good indicator of fire safety. The product has to be tested for:

- Smoke Emission
- Toxic Fume Emission
- Qualitative analysis (what is emitted)
- Quantitative analysis (how much is emitted)
- Flammability
- Fire propagation
- Surface spread of flame

The test report is appended, plus a screen grab showing that we are still approved.

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### **Evaluation of Reaction to Fire Properties**

Akzo Nobel Powder Coatings Ltd and Cromadex  
 Unit 5 Redwood Business Park, Oldbury Road  
 Smethwick, West Midlands . B66 1NJ

**Product Reference:** 2.2 mm thick Aluminum sheet coated on both faces with a light grey coloured coating referenced “**Interpon D1000 (Light Grey Matt)**”

<b>BS 6853:1999 Table 2 for Category Ia.</b>			
<b>Test Type</b>	<b>ICL Job No</b>	<b>Test results</b>	<b>BS 6853:1999 Category Ia Requirements</b>
BS 476 Part 6	ICL/H13/2576	$i_1 = 0.1$ $I = 1.0$	$i_1$ (max) 6 $I$ (max) 12
BS 476 Part 7	ICL/H13/2580	Class 1	Class 1 1
BS 6853:1999 Annex B.2	ICL/H13/2584	R Value: 0.103	R (max) 1
BS 6853:1999 Annex D.8.4	ICL/H13/2588	Ao(on) 1.22 Ao(off) 1.37	Ao(on) 2.6 Ao(off) 3.9

**Note :** The product satisfies the requirements given for category Ia in BS 6853:1999 Table 2 for vertical surfaces . Category Ia has the highest requirements.

<b>EN 45545-2 Table 5 for HL 3 for vertical surfaces R 1</b>			
<b>Test Type</b>	<b>ICL Job No</b>	<b>Test results</b>	<b>EN 45545-2 Requirements R1 (HL3)</b>
ISO 5658-2	ICL/H13/2592	CFE ( kW/m <sup>2</sup> ) 39.13	CFE (minimum) 20
ISO 5660-1	ICL/H13/2596	MARHE(kW/m <sup>2</sup> ) 19.4	MARHE (max) 60
ISO 5659-2 (EN 45545-2)	ICL/H13/2602	$D_s(4)$ 89.52 VOF4 100.14	$D_s(4)$ (max) 150 VOF 4 (max) 300
EN 45545-2 Annex C	ICL/H13/2603	CITg (4mins) 0.003 CITg(8mins) 0.007	CIT <sub>G</sub> (max) 0.75

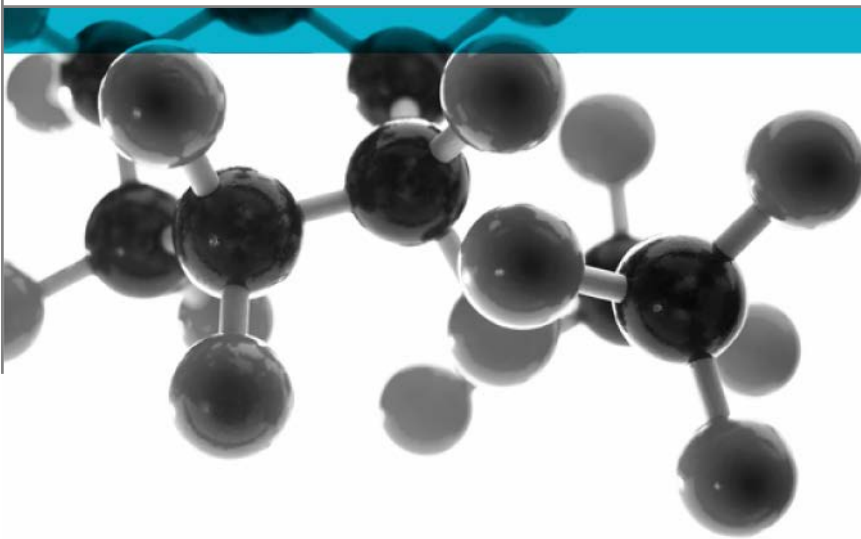
**Note :** The product satisfies the requirements given in EN 45545-2 Table 5 for HL 3. In EN 45545-2 HL3 has the highest requirements.

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# BS 476: Part 6: 1989+A1:2009



## Method Of Test For Fire Propagation For Products

A Report To: AkzoNobel Powder Coatings

Document Reference: 355372

Date: 13<sup>th</sup> August 2015

Issue No.: 1

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Testing  
Advising  
Assuring



## Executive Summary

**Objective** To determine the performance of the following product when tested in accordance with BS 476: Part 6: 1989+A1: 2009.

Generic Description	Product reference	Thickness	Weight per unit area or density
Polyester powder coating on an aluminium substrate	"YW213G On Aluminium"	2mm	2.48kg/m <sup>2</sup> *
<b>Individual components used to manufacture composite:</b>			
Coating (test face)	"YW213G"	60-80 microns	Unwilling to provide
Substrate	Unable to provide	2mm	Unable to provide
<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** AkzoNobel Powder Coatings, Stoneygate Lane, Felling, Gateshead, NE10 0JY.


**Test Results:**

<b>Fire propagation index, I</b>	=	<b>1.7</b>
<b>Sub index, i<sub>1</sub></b>	=	<b>0.0</b>
<b>Sub index, i<sub>2</sub></b>	=	<b>1.6</b>
<b>Sub index, i<sub>3</sub></b>	=	<b>0.1</b>

**Date of Test** 11<sup>th</sup> August 2015

## Signatories


Responsible Officer C. Meachin * Technical Officer


Authorised S. Deeming * Business Unit Head

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

Report Issued: 13<sup>th</sup> August 2015

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## Test Details

<b>Purpose of test</b>	<p>To determine the performance of a product when it is subjected to the conditions of the test specified in BS 476: Part 6: 1989+A1: 2009, "Fire tests on building materials and structures, method for fire propagation for products".</p> <p>The test was performed in accordance with the procedure specified in BS 476: Part 6: 1989+A1: 2009, and this report should be read in conjunction with that British Standard.</p>
<b>Scope of test</b>	<p>BS 476: Part 6: 1989+A1: 2009 specifies a method of test, the result being expressed as a fire propagation index, that provides a comparative measure of the contribution to the growth of fire made by an essentially flat material, composite or assembly. It is primarily intended for the assessment of the performance of internal wall and ceiling linings.</p>
<b>Fire test study group/EGOLF</b>	<p>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.</p>
<b>Instruction to test</b>	<p>The test was conducted on the 11<sup>th</sup> August 2015 at the request of AkzoNobel Powder Coatings, 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> August 2015 and were conditioned to constant mass at a temperature of <math>23 \pm 2^{\circ}\text{C}</math> and a relative humidity of <math>50 \pm 5\%</math> prior to testing.</p>
<b>Form in which the specimens were tested</b>	<p>Composite - Combination of materials which are generally recognised in building constructions as discrete entities e.g. coated or laminated materials.</p>
<b>Exposed face</b>	<p>The coated face of the specimens was exposed to the heating conditions of the test.</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		Polyester powder coating applied to an aluminium substrate
Product reference		"YW213G On Aluminium"
Name of manufacturer		Akzo Nobel Powder Coatings Ltd
Thickness		2mm (stated by sponsor) 1.14mm (determined by <b>Exova Warringtonfire</b> )
Weight per unit area		2.48kg/m <sup>2</sup> (determined by <b>Exova Warringtonfire</b> )
Coating (test face)	General description	Interpon D2000 Brilliance Series polyester powder coating
	Generic type	Polyester
	Product reference	"YW213G"
	Name of manufacturer	Akzo Nobel Powder Coatings
	Colour reference	"DBR201" (stated by sponsor) "Grey" (observed by <b>Exova Warringtonfire</b> )
	Number of coats	One
	Application thickness per coat	60-80 microns
	Density	<b>See Note 1 Below</b>
	Application method	Electrostatic spray
	Flame retardant details	<b>See Note 2 Below</b>
Curing process per coat		Heated to 180°C for 10 minutes
Substrate	Generic type	Aluminium sheet
	Product reference	<b>See Note 3 Below</b>
	Name of manufacturer	<b>See Note 1 Below</b>
	Thickness	2mm
	Density	<b>See Note 3 Below</b>
	Colour reference	"Mill Finish Grey"
Flame retardant details		The component is inherently flame retardant
Brief description of manufacturing process		Cutting of aluminium sheet

**Note 1: The sponsor was unwilling to provide this information.**

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

**Note 3: The sponsor was unable to provide this information.**

## Test Results

### Results

A total of three specimens were tested. The laboratory record sheet relating to each of the test specimens is appended to this report (refer to Tables 1, 2 and 3).

Throughout the test on each specimen careful observation was made of the product's behaviour within the apparatus and special note was taken of any of the phenomena listed in clause 9.2 of the Standard. None of the listed phenomena was observed and the test results on all three specimens tested were valid.

**The following test results were obtained for the product.**

<b>Fire propagation index, I</b>	<b>=</b>	<b>1.7</b>
<b>Sub index, <math>i_1</math></b>	<b>=</b>	<b>0.0</b>
<b>Sub index, <math>i_2</math></b>	<b>=</b>	<b>1.6</b>
<b>Sub index, <math>i_3</math></b>	<b>=</b>	<b>0.1</b>

**NOTE:** If a suffix 'R' is included in the above fire propagation index, I, then this indicates that the results should be treated with caution.

### Applicability of test result

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.

### 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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Table 1

Laboratory Record Sheet
**FIRE PROPAGATION TEST - BS476:PART 6:1989+A1:2009**

Specimen No. : 1

Date : 11-Aug-15

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	12	14	0.00	
1.00	19	20	0.00	
1.50	24	24	0.00	
2.00	29	28	0.05	
2.50	33	33	0.00	
3.00	37	37	0.00	0.05
4.00	68	68	0.00	
5.00	128	105	0.46	
6.00	165	131	0.57	
7.00	176	151	0.36	
8.00	191	168	0.29	
9.00	198	184	0.16	
10.00	202	193	0.09	1.92
12.00	216	209	0.06	
14.00	221	216	0.04	
16.00	232	224	0.05	
18.00	238	233	0.03	
20.00	240	239	0.01	0.18
<b>Total Index of Performance S</b>			<b>=</b>	<b>2.14</b>

SubIndex s1                      0.05

SubIndex s2                      1.92

SubIndex s3                      0.18

Index of Performance S        2.14

Table 2

Laboratory Record Sheet
**FIRE PROPAGATION TEST - BS476:PART 6:1989+A1:2009**

Specimen No. : 2

Date : 11-Aug-15

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	13	14	0.00	
1.00	18	20	0.00	
1.50	24	24	0.00	
2.00	28	28	0.00	
2.50	32	33	0.00	
3.00	37	37	0.00	0.00
4.00	64	68	0.00	
5.00	104	105	0.00	
6.00	148	131	0.28	
7.00	162	151	0.16	
8.00	177	168	0.11	
9.00	187	184	0.03	
10.00	196	193	0.03	0.62
12.00	207	209	0.00	
14.00	214	216	0.00	
16.00	223	224	0.00	
18.00	230	233	0.00	
20.00	234	239	0.00	0.00
<b>Total Index of Performance S</b>			<b>=</b>	<b>0.62</b>

SubIndex s1                      0.00

SubIndex s2                      0.62

SubIndex s3                      0.00

Index of Performance S        0.62

Table 3

Laboratory Record Sheet
**FIRE PROPAGATION TEST - BS476:PART 6:1989+A1:2009**

Specimen No. : 3

Date : 11-Aug-15

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	13	14	0.00	
1.00	19	20	0.00	
1.50	22	24	0.00	
2.00	24	28	0.00	
2.50	33	33	0.00	
3.00	38	37	0.03	0.03
4.00	75	68	0.18	
5.00	131	105	0.52	
6.00	162	131	0.52	
7.00	184	151	0.47	
8.00	194	168	0.33	
9.00	196	184	0.13	
10.00	199	193	0.06	2.20
12.00	209	209	0.00	
14.00	216	216	0.00	
16.00	222	224	0.00	
18.00	228	233	0.00	
20.00	233	239	0.00	0.00
<b>Total Index of Performance S</b>			<b>=</b>	<b>2.23</b>

SubIndex s1                      0.03

SubIndex s2                      2.20

SubIndex s3                      0.00

Index of Performance S        2.23

## Revision History

Issue No :	Re-issue Date:
Revised By:	Approved By:
Reason for Revision:	

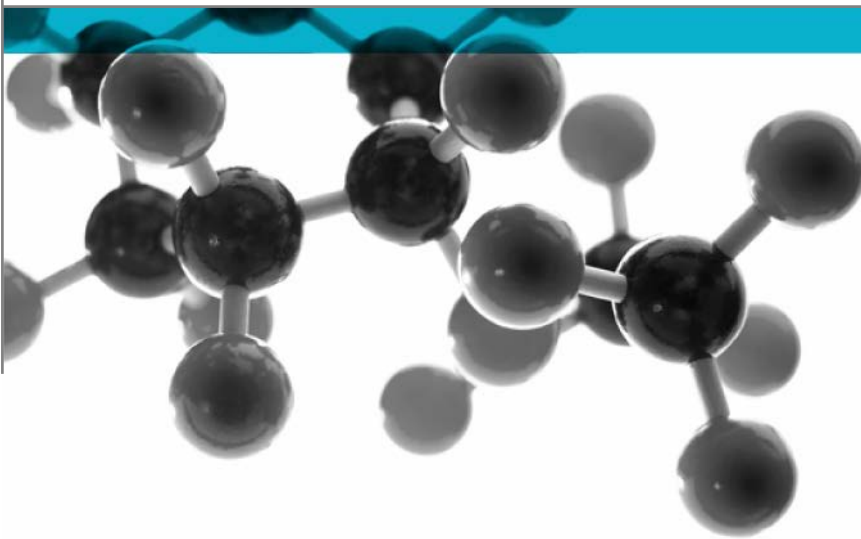
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Reason for Revision:	

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# BS 476: Part 7: 1997



## Method For Classification Of The Surface Spread Of Flame Of Products

A Report To: AkzoNobel Powder Coatings

Document Reference: 354569

Date: 27<sup>th</sup> July 2015

Issue No.: 1

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## Executive Summary

**Objective** To determine the surface spread of flame classification of the following product when tested in accordance with BS 476: Part 7: 1997.


Generic Description	Product reference	Thickness	Weight per unit area or density
Polyester powder coating on a steel substrate	"YLM01E On Steel"	3.2mm	8.33kg/m <sup>2</sup> *
<b>Individual components used to manufacture composite:</b>			
Coating (test face)	"YLM01E"	60-80 microns	Unwilling to provide
Substrate	Unable to provide	3.2mm	Unable to provide
<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** AkzoNobel Powder Coatings, Stoneygate Lane, Felling, Gateshead, NE10 0JY.

**Test Results:** **Class 1**

**Date of Test** 21<sup>st</sup> July 2015

## Signatories


Responsible Officer C. Meachin * Technical Officer


Authorised S. Deeming * Business Unit Head

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

Report Issued: 27 <sup>th</sup> July 2015
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## Test Details

<b>Purpose of test</b>	To determine the performance of a product when it is subjected to the conditions of the test specified in BS 476: Part 7: 1997, "Fire tests on building materials and structures, method for classification of the surface spread of flame of products". This test was therefore performed in accordance with the procedure specified in BS 476: Part 7: 1997 and this report should be read in conjunction with that British Standard.
<b>Scope of test</b>	BS 476: Part 7: 1997 specifies a method of test for measuring the lateral spread of flame along the surface of a specimen of a product orientated in the vertical position, and a classification system based on the rate and extent of flame spread. It provides data suitable for comparing the performances of essentially flat materials, composites, or assemblies, which are used primarily as the exposed surfaces of walls or ceilings.
<b>Fire test study group/EGOLF</b>	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.
<b>Instruction to test</b>	The test was conducted on the 21 <sup>st</sup> July 2015 at the request of AkzoNobel Powder Coatings, the sponsor of the test.
<b>Provision of test specimens</b>	The specimens were supplied by the sponsor of the test. <b>Exova Warringtonfire</b> was not involved in any selection or sampling procedure.
<b>Conditioning of specimens</b>	The specimens were received on the 9 <sup>th</sup> July 2015 and were conditioned to constant mass at a temperature of $23 \pm 2^{\circ}\text{C}$ and a relative humidity of $50 \pm 5\%$ prior to testing.
<b>Form in which the specimens were tested</b>	Composite - Combination of materials which are generally recognised in building constructions as discrete entities e.g. coated or laminated materials. Each specimen was tested in direct contact with a nominally 12mm thick non-combustible backing board.
<b>Exposed face</b>	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		Polyester powder coating on a steel substrate
Product reference		"YLM01E On Steel"
Name of manufacturer		Akzo Nobel Powder Coatings Ltd
Thickness		3.2mm (stated by sponsor) 3.2mm (determined by <b>Exova Warringtonfire</b> )
Weight per unit area		8.33kg/m <sup>2</sup> (determined by <b>Exova Warringtonfire</b> )
Coating (test face)	Generic type	Interpon D2000 Series polyester powder coating
	Product reference	"YLM01E"
	Name of manufacturer	Akzo Nobel Powder Coatings
	Colour reference	"RAL 7016" (stated by sponsor) "Grey" (observed by <b>Exova Warringtonfire</b> )
	Number of coats	One
	Application rate per coat	60-80 microns
	Density / specific gravity	<b>See Note 1 below</b>
	Application method	Electrostatic spray
	Flame retardant details	<b>See Note 2 below</b>
	Curing process per coat	Heated to 180°C for 10 minutes
Substrate	Generic type	Mild steel
	Product reference	<b>See Note 3 below</b>
	Name of manufacturer	Main Road Sheet Metal Limited
	Thickness	3.2mm
	Density / weight per unit area	<b>See Note 3 below</b>
	Colour reference	"Steel Grey"
	Flame retardant details	This component is inherently flame retardant
Brief description of manufacturing process		<b>See Note 3 below</b>

**Note 1: The sponsor was unwilling to provide this information.**

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

**Note 3: The sponsor was unable to provide this information.**

## Test Results

**Results and observations** The test results for the individual specimens, together with observations made during the test and comments on any difficulties encountered during the test are given in Appendix 1.

**Classification** **In accordance with the class definitions given in BS 476: Part 7: 1997; the specimens tested are classified as Class 1.**

**Criteria for classification** If the prefix 'D' or suffix 'R' or 'Y' is included in the classification, this indicates that the results should be treated with caution. An explanation of the reason for the prefix and suffixes is given in Appendix 2, together with the classification limits specified in the Standard.

**Applicability of test result** 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.

### 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 – Test Results

SPECIMEN No.	1	2	3	4	5	6
Maximum distance travelled at 1.5 minutes (mm)	<50	<50	<50	<50	<50	<50

Distance (mm)

Time to travel to indicated distance  
(minutes : seconds)
 75  
 165  
 190  
 215  
 240  
 265  
 290  
 375  
 455  
 500  
 525  
 600  
 675  
 710  
 750  
 785  
 825

Time to reach maximum distance travelled

1:00      1:00      1:00      1:00      1:00      1:00

Maximum distance travelled in 10 minutes (mm)

&lt;50      &lt;50      &lt;50      &lt;50      &lt;50      &lt;50

Note: Six specimens are usually tested. If the test on any specimen is deemed to be invalid, as defined in the Standard, it is permissible for up to a maximum of nine specimens to be tested in order to obtain the six valid test results.

### Observations made during test and comments on any difficulties encountered during the test:

None.

## Appendix 2 – Classification criteria

Classification of spread of flame	Spread of Flame at 1.5 min		Final Spread of Flame		
	Classification	Limit (mm)	Limit for one specimen (mm)	Limit (mm)	Limit for one specimen (mm)
	Class 1	165	165 + 25	165	165 + 25
	Class 2	215	215 + 25	455	455 + 45
	Class 3	265	265 + 25	710	710 + 75
	Class 4	Exceeding the limits for class 3			

### Explanation of prefix and suffixes which may be added to the classification

1. A suffix R is added to the classification if more than six specimens are required in order to obtain six valid test results (e.g. class 2R).
2. A prefix D is added to the classification of any product which does not comply with the surface characteristics specified in the Standard and has therefore been tested in a modified form (e.g. class D3).
3. A suffix Y is added to the classification if any softening and/or other behaviour that may affect the flame spread occurs (e.g. class 3Y).

For example, a classification of D3RY could be achieved indicating (a) a modified surface has been used; (b) a class 3 result has been obtained; (c) additional specimens have been used to obtain 6 valid results and; (d) softening and/or other behaviour has occurred which is considered to have affected the test result.

## Revision History

Issue No :	Re-issue Date:
Revised By:	Approved By:
Reason for Revision:	

Issue No :	Re-issue Date:
Revised By:	Approved By:
Reason for Revision:	





le futur en construction

**SAFETY, STRUCTURES AND FIRE DEPARTMENT**

Reaction to fire

# **REACTION TO FIRE CLASSIFICATION REPORT No. RA13-0167 ACCORDING TO THE EUROPEAN STANDARD NF EN 13501-1**

**Provided the Ordinance from the Ministry of the interior, November 21, 2002.  
Pilot laboratory approved by the Ministry of the Interior (Ordinance of February 5, 1959, amended)  
Seule la version française fait foi.**

**Only the French version is legally acceptable.**

**Valid 5 years from June 06<sup>th</sup>, 2013**

**Owner:** **AKZO NOBEL POWDER COATINGS SNC  
Z.I. de la Gaudrée  
91410 DOURDAN  
FRANCE**

**Commercial brand(s):** **INTERPON POLYESTER coatings**

**Brief description:** **Powder coating**  
(see detailed description in paragraph 2)

**Date of issue:** **June 06<sup>th</sup>, 2013**

The indicated classification does not prejudice the conformity of marketed materials with the samples submitted to the tests and under no circumstances, this document should not be considered as type approval or certification of the product in the sense of the L 115-27 to L 115-33 and R 115-1 to R 115-3 articles of the consumption's code.  
If this report is being issued by e-mail and/or on an electronic medium, only the hard copy of the report signed by CSTB shall prevail in the event of a dispute.  
The reproduction of this classification report is only authorised in its integral form.  
It comprises 3 pages.

**CENTRE SCIENTIFIQUE ET TECHNIQUE DU BATIMENT**

SIÈGE SOCIAL > 84 AVENUE JEAN JAURÈS | CHAMPS-SUR-MARNE | 77447 MARNE-LA-VALLÉE CEDEX 2

TÉL. (33) 01 64 68 84 12 | FAX. (33) 01 64 68 84 79 | [www.cstb.fr](http://www.cstb.fr)

MARNE-LA-VALLÉE | PARIS | GRENOBLE | NANTES | SOPHIA-ANTIPOLIS

## 1. Introduction

This classification report defines the classification assigned to the above-mentioned product(s) in accordance with the procedures given in the NF EN 13501-1 standard.

## 2. Product description

Thermohardenable powder coating consisting of polyester resin and mineral fillers, tested applied to aluminium sheet.

Applied nominal quantity: from 100 to 140 g/m<sup>2</sup> giving a thickness of 60 to 90 µm.

Nominal dry extract: 100 %.

Colours: various.

## 3. Tests reports and tests results in support of this classification

### 3.1 Tests reports

Name of laboratory	Name of sponsor	Test identification	Test report Nos.	Test method
<b>CSTB</b>	<b>AKZO NOBEL POWDER COATINGS SNC Z.I. de la Gaudrée 91410 DOURDAN FRANCE</b>	<b>ES541120844</b>	RA13-0167	EN 13823 EN ISO 1716

### 3.2 Tests results

Test method	Product	Number of tests	Parameters	Results	
				Continuous parameters : mean value	Compliance parameters
EN 13823	INTERPON POLYESTER coatings Various colours	3	FIGRA <sub>0.2MJ</sub> (W/s)	<b>45.0</b>	-
			FIGRA <sub>0.4MJ</sub> (W/s)	<b>16.8</b>	-
			LFS	-	<b>Not reached</b>
			THR <sub>600s</sub> (MJ)	<b>0.9</b>	-
			SMOGRA(m <sup>2</sup> /s <sup>2</sup> )	<b>0.0</b>	-
			TSP <sub>600s</sub> (m <sup>2</sup> )	<b>24.6</b>	-
			Flaming droplets or debris	-	<b>None</b>
EN ISO 1716	External non substantial component	3	PCS (MJ/kg)	<b>2.6</b>	-
	Whole product Worse case	-	PCS (MJ/kg)	<b>1.1</b>	-

(-) means: not applicable

**4. Classification and direct field of application**

**4.1 Reference of the classification**

This classification has been carried out in accordance with clauses 11.7.3, 11.9.2 and 11.10.1 of the NF EN 13501-1 standard.

**4.2 Classification**

Fire behaviour		Smoke production		Flaming droplets or debris
<b>A2</b>	-	<b>s1</b>	,	<b>d0</b>

**Classification: A2 - s1, d0**

**4.3 Field of application**

This classification is valid for the following product parameters:

- The product described in paragraph 2.
- An applied maximum nominal quantity of 140 g/m<sup>2</sup>.
- Various colours.

This classification is valid for the following end use conditions:

- The product applied to any A1 class metallic substrate with a thickness  $\geq 0.8$  mm and a density  $\geq 2025$  kg/m<sup>3</sup>.

Champs-sur-Marne, June 06<sup>th</sup>, 2013

**The Head of laboratory  
Responsible for the test**



**Nicolas ROURE**

**The Head of Reaction to Fire  
Unit**



**Gildas CREACH**

.....END OF THE CLASSIFICATION REPORT



Reference: TSL0108-GP-R17895

Prepared for: Akzo Nobel Powder Coatings Ltd  
Stoneygate Lane  
Felling, Gateshead  
Tyne & Wear. NE10 0JY

Issue Date: 14<sup>h</sup> July 2004

Prepared by: G Patel

Signature:  .....

Certified by: Hush J Patel (Senior Consultant)

  
Signature: .....

## TEST REPORT

TSL No. R17895

Fire testing of "Interpon  
D36 Polyester Powder  
Coating", in accordance  
with the London  
Underground Limited  
Engineering Standard 2-  
01001-002: Issue A1:  
December 2003.

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**Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.**

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**CONDITIONS OF ISSUE OF REPORTS.**

THIS REPORT IS ISSUED TO THE CLIENT IN CONFIDENCE AND SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF TRANSFIRE SERVICES LIMITED.

**QUERIES OR FURTHER INFORMATION.**

ANY QUERIES OR REQUESTS FOR ADDITIONAL INFORMATION ON THE SUBJECT OF THIS REPORT SHOULD BE ADDRESSED TO THE AUTHOR WHO MAY BE CONTACTED AT THE ADDRESS GIVEN ON THE TITLE PAGE.

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**Fire testing of "Interpon D36 Polyester Powder Coating", in accordance  
with the London Underground Limited Engineering Standard  
2-01001-002: Issue A1: December 2003.**

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**Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.**

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**1. INTRODUCTION**

Sample panels of aluminium coated with polyester powder coating were submitted on 4<sup>th</sup> May 2004, by Mr A Moseley of Akzo Nobel Powder Coatings Limited, for smoke emission, toxic fume emission and flammability testing, in accordance with London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.

**2. MATERIAL DESCRIPTION**

1mm thick, aluminium panels, coated with 'SA210E Interpon D36 Polyester Powder coating', supplied by Akzo Nobel Powder Coatings Limited.

No additional information was submitted by the client.

*Laboratory sample reference is TSL0108.*

**3. TEST METHOD**

**3.1 SMOKE EMISSION**

The above specimen was tested for smoke emission on 12<sup>th</sup> May 2004, in accordance with BS6853: 1999: D8.6 – "Code of Practice for Fire Precautions in the design and construction of passenger carrying trains".

**3.2 TOXIC FUME EMISSION**

**3.2.1 QUALITATIVE ANALYSIS**

The above specimen was tested on 18<sup>th</sup> May 2004 for qualitative analysis using scanning electron microscopy and energy dispersive X-Rays.

**3.2.2 QUANTITATIVE ANALYSIS**

The above specimen was tested on 18<sup>th</sup> May 2004, for quantitative determination of Nitrogen, Carbon and Sulphur using Carlo Erba EA1108 Elemental analyser'.

**3.3 FLAMMABILITY**

**3.3.1 FIRE PROPAGATION**

The above specimen boards were tested to determine the fire propagation index of specimens of a product when tested in accordance with BS476: Part 6: 1989 "Fire tests on building materials and structures, method of test for fire propagation for products".

**Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.**



3.3.2 SURFACE SPREAD OF FLAME

The above specimen boards were tested to determine the classification of specimens of a product when tested in accordance with BS476: Part 7: 1997 "Fire tests on building materials and structures, method of test to determine the classification of the surface spread of flame of products".

**4. RESULTS**

The tests relate to the behaviour of test specimens of the products under particular conditions of test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use. In particular, differences in the thickness, orientation or design may significantly affect fire performance and care should be taken to ensure that any differences between the test conditions and application conditions are not adversely significant.

**4.1 SMOKE EMISSION**

The measured absorbance  $A_m$  is calculated in accordance with the Beer-Lambert Law as follows:

$$A_m = \log_{10} (I_o / I_t)$$

Where:  $I_o$  = Initial Luminous intensity  
 $I_t$  = transmitted Luminous intensity

$A_m$  is converted to Standard absorbance  $A_o$  (Figures 1-3; Page 11-12), using the equation:

$$A_o = (A_m \times V) / (n \times L)$$

Where:  $V$  = volume of the cube ( 27m<sup>3</sup> )  
 $L$  = optical path length ( 3m )  
 $N$  = is the number of units comprising the specimen.

The calculated results are as follows:

Sample Reference	Test	Result Ao abs (m <sup>2</sup> /burn area)	
		Ao(ON)	Ao(OFF)
TSL0108	1	0.538	0.698
	2	0.445	0.651
	Average	0.492	0.675
	S.D.	0.0658	0.0332



**Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.**



REQUIREMENTS:

The requirements for smoke emission as stated in the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003 for category ST/SU/v & p "Station/Surface/vertical & prone is:

$$A_o(ON) < 3.6 \text{ m}^2/\text{burn area} \ \& \ A_o(OFF) < 5.4 \text{ m}^2/\text{burn area}$$

The test data show that the referenced specimen meets the smoke emission criterion for category ST/SU/v & p application.

**4.2 TOXIC FUME EMISSION**

4.2.1 QUALITATIVE ANALYSIS

The qualitative analysis of the sample shows the following elements (Figure 4; Page 14)

Sample reference	Elements detected
TSL0108	Carbon, Oxygen, Silicon, Aluminium, Titanium, Sulphur.

4.2.2 QUANTITATIVE ANALYSIS

Sample reference	% Nitrogen	% Carbon	% Sulphur
TSL0108	0.19	36.02	1.88

The above results are expressed as a percentage wt/wt.

**Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.**



REQUIREMENTS

The Engineering Standard states that "For unrestricted use of a material, covered by Standard 2-01001-002: Issue A1: December 2003, neither it nor its constituents shall have deliberately incorporated by selection, addition or modification any significant amounts of organically bound halogens, nitrogen, sulphur or phosphorus; typical chemical groups proscribed are:-

C-X (where X = Halogen)  
C-N  
C-P  
C-O-P  
C-S  
C-O-S

Trace levels of such chemical groups are acceptable – the criterion for "trace level" shall be that the summation of the weight for weight percentage of the chemical group divided by the atomic weight for the group shall not exceed 0.015".

Thus, applying the 'Trace level' i.e.

$$\sum \frac{w / w\% \text{ of Chemical Group}}{\text{Atomic weight of Group}} \leq 0.015$$

The calculated value for the specimen gives a value of 0.0723, based on 0.19% Nitrogen and 1.88% Sulphur content.

Hence, the specimen material under this category fails to meet the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003, due to the presence of nitrogen and sulphur above the required limit.

However, considering that the respective standard calls for keeping the concentrations of any toxic gases below the relevant IDLH levels (Immediately Dangerous to Life or Health), it is therefore possible to calculate the potential toxic hazard presented by this material. Such calculations would need to assume that the *dispersal volume in which the product is installed is 700m<sup>3</sup> for Stations*.

Following assumptions would also need to be made:

*The single material is the sole contributor to the fire atmosphere.*

*All of the Nitrogen and sulphur in the material would convert to Hydrogen cyanide, i.e. 100% conversion of nitrogen to hydrogen cyanide.*

*Size of Fire region is 1.25m<sup>2</sup> fixed locations (stations).*

*The specific density of the material is 1.68g/cm<sup>3</sup>*

**Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.**



Hence, the expected concentrations of hydrogen cyanide and sulphur dioxide is calculated, according to "Users Guide to the LUL Code of Practice - Fire Safety of Materials Used in the Underground - Issue 1; 1994", which gives the following expected concentration of Hydrogen cyanide.

Sample	Expected concentration (ppm)	Location (ST/SU/v & p)
TSL0108	HCN	0.78
	SO2	7.73

The total expected toxicity,  $T_x$ , is given by the equation:

$$T_{Total} = \sum \frac{C_N}{H_N}$$

Where,  $C_N$  = Concentration of any one toxic species, and  
 $H_N$  = IDLH for value for that toxic species.

The calculated values and the requirements are:

Sample	Total expected toxicity, $T_x$	Requirements
TSL0108	0.09	<1.0

### 4.3 FLAMMABILITY

#### 4.3.1 FIRE PROPAGATION

Sample reference	Fire propagation index, I	Subindex, $i_1$	subindex, $i_2$	Subindex, $i_3$
TSL0108	0	0	0	0

See Appendix A for full results.

**Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.**



4.3.2 SURFACE SPREAD OF FLAME

Sample reference	Result
TSL0108	Class 1

See Appendix A for full results

REQUIREMENTS:

Requirements for Category:	Fire Propagation (BS476: Part 6: 1989)	Surface Spread of Flame (BS476: Part 7: 1997)
ST/SU/v&p (Station/Surface/vertical & prone)	$I < 12; i_1 < 6$	Class 1

The material, therefore, meet the flammability requirements for LUL Engineering Standard 2-01001-002: Issue A1: December 2003

**5. CONCLUSION**

The material described in Section 2.0 of this report meets the smoke emission, toxic fume emission and flammability requirements for Category ST/SU/v&p "Station/Surface/vertical & prone" of the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.

Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.



## OBSERVATIONS

SAMPLE REFERENCE TSL0108

TEST: BS6853: 1999: APPENDIX D8.6

### TEST 1.

Time (min.sec)	Observations
0.00 - 40.00	Nothing significant.

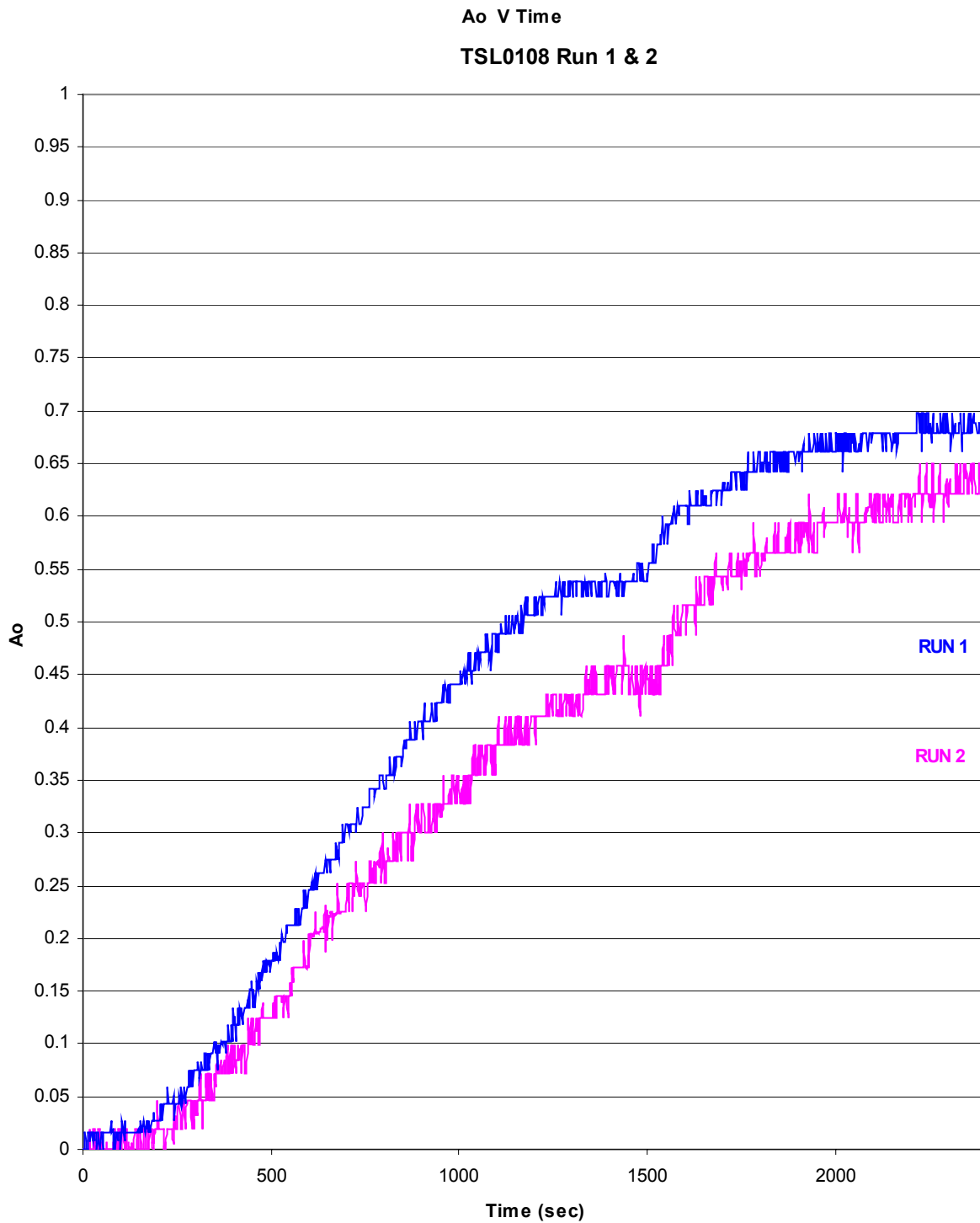
### TEST 2.

Time (min.sec)	Observations
0.00 - 40.00	Nothing significant.

Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.



Figure 1: Variation of Absorbance (Ao) with two specimens (Specimen No.2)



Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.



Figure 2: Variation of Absorbance ( $A_o$ ) with time (specimen No: 2)

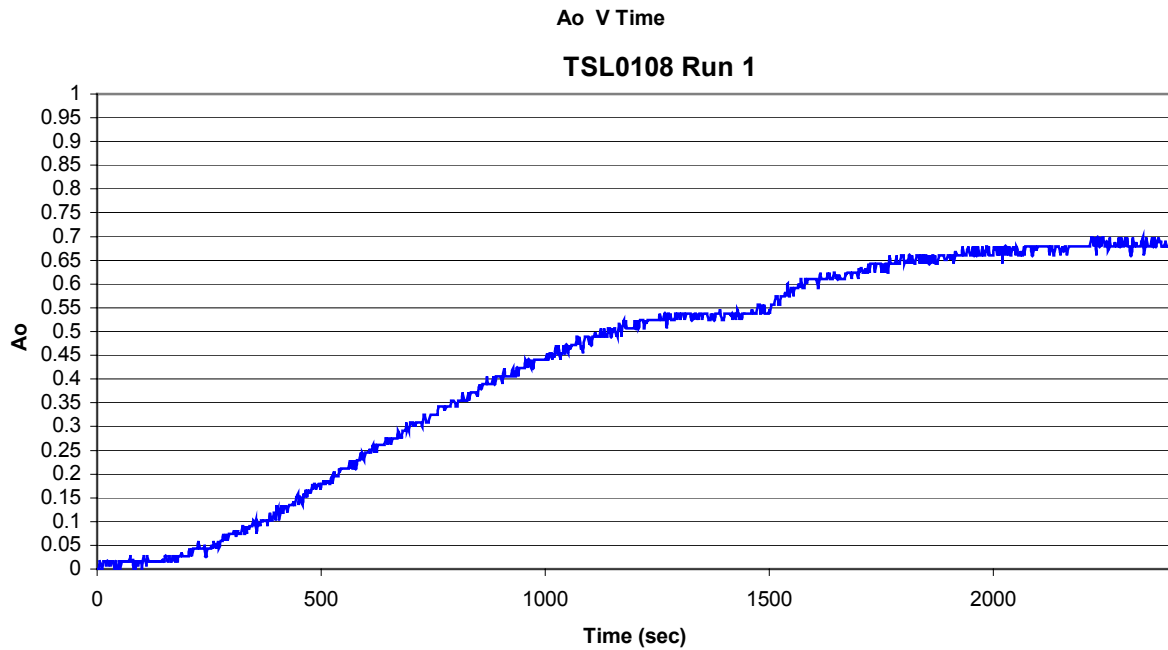


Figure 3: Variation of Absorbance ( $A_o$ ) with time (specimen No: 2)

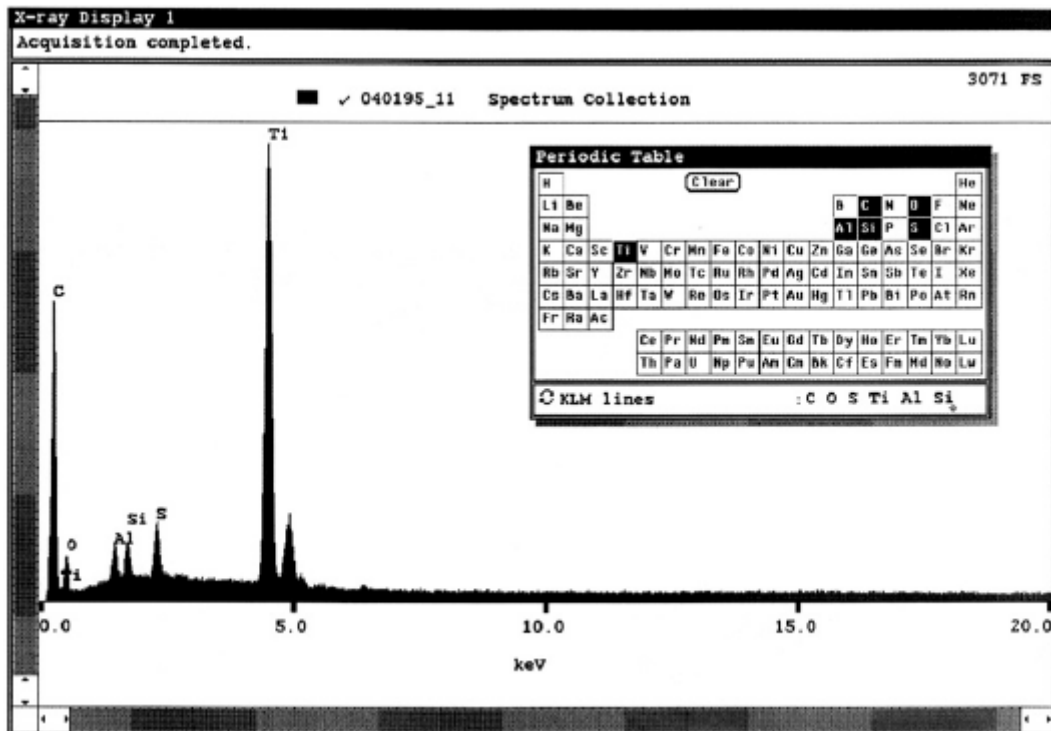


Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.



Figure 4: X-ray spectrum for 'Interpon D36 Polyester Powder Coating'.

Laboratory sample reference TSL0108





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Fire testing of "Interpon D36 Polyester Powder Coating", in accordance  
with the London Underground Limited Engineering Standard  
2-01001-002: Issue A1: December 2003.

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## Appendix A

### Test Data

(BS476: Part 6 : 1987 and BS476: Part 7: 1997)

Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.



TEST DATA

FIRE PROPAGATION TEST – BS476: PART 6: 1989

SPECIMEN No. 1

TIME/MINS INDEX OF PERFORMANCE	SPECIMEN	CALIBRATION TEMPERATURE	TEMPERATURE	SUB
(t)	DEG C $\Theta_s$	Deg C $\Theta_c$	$\Theta_s - \Theta_c / 10t$	
0.50	12.1	13.9	-0.4	
1.00	17.6	19.9	-0.2	
1.50	22.2	26.1	-0.3	
2.00	27.4	30.8	-0.2	
2.50	30.6	34.7	-0.2	
3.00	34.4	38.1	-0.1	S1 = 0
4.00	54.6	61.0	-0.2	
5.00	82.4	90.9	-0.2	
6.00	105.2	114.0	-0.1	
7.00	126.1	136.2	-0.1	
8.00	143.3	154.6	-0.1	S2 = 0
9.00	156.8	169.4	-0.1	
10.00	172.9	180.5	-0.1	
12.00	193.8	201.4	-0.1	
14.00	209.8	212.5	0.0	
16.00	215.9	221.1	0.0	
18.00	224.5	227.2	0.0	
20.00	228.2	232.2	0.0	S3 = 0
				S = 0
	SUB INDEX S1 =	0		
	SUB INDEX S2 =	0		
	SUB INDEX S3 =	0		
	INDEX OF PERFORMANCE =	3.14		

Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.



TEST DATA

FIRE PROPAGATION TEST – BS476: PART 6: 1989

SPECIMEN No. 2

TIME/MINS INDEX OF PERFORMANCE	SPECIMEN	CALIBRATION TEMPERATURE	TEMPERATURE	SUB
(t)	DEG C $\Theta_s$	Deg C $\Theta_c$	$\Theta_s - \Theta_c / 10t$	
0.50	12.6	13.9	-0.3	
1.00	17.7	19.9	-0.2	
1.50	23.0	26.1	-0.2	
2.00	27.4	30.8	-0.2	
2.50	31.6	34.7	-0.1	
3.00	34.2	38.1	-0.1	S1 = 0
4.00	54.9	61.0	-0.2	
5.00	82.1	90.9	-0.2	
6.00	105.4	114.0	-0.1	
7.00	127.5	136.2	-0.1	
8.00	146.0	154.6	-0.1	S2 = 0
9.00	162.0	169.4	-0.1	
10.00	175.6	180.5	0.0	
12.00	197.7	201.4	0.0	
14.00	210.0	212.5	0.0	
16.00	217.4	221.1	0.0	
18.00	222.3	227.2	0.0	
20.00	228.5	232.2	0.0	S3 = 0
				S = 0
	SUB INDEX S1 =	0		
	SUB INDEX S2 =	0		
	SUB INDEX S3 =	0		
	INDEX OF PERFORMANCE =	0		

Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.



TEST DATA

FIRE PROPAGATION TEST – BS476: PART 6: 1989

SPECIMEN No. 3

TIME/MINS INDEX OF PERFORMANCE	SPECIMEN	CALIBRATION TEMPERATURE	TEMPERATURE	SUB
(t)	DEG C $\Theta_s$	Deg C $\Theta_c$	$\Theta_s - \Theta_c / 10t$	
0.50	12.2	13.9	-0.3	
1.00	17.2	19.9	-0.3	
1.50	22.3	26.1	-0.3	
2.00	26.7	30.8	-0.2	
2.50	29.9	34.7	-0.2	
3.00	33.8	38.1	-0.1	S1 = 0
4.00	55.7	61.0	-0.1	
5.00	85.0	90.9	-0.1	
6.00	107.9	114.0	-0.1	
7.00	128.8	136.2	-0.1	
8.00	147.2	154.6	-0.1	S2 = 0
9.00	163.2	169.4	-0.1	
10.00	171.9	180.5	-0.1	
12.00	202.6	201.4	0.0	
14.00	212.5	212.5	0.0	
16.00	216.2	221.1	0.0	
18.00	221.1	227.2	0.0	
20.00	228.5	232.2	0.0	S3 = 0
				S = 0
	SUB INDEX S1 =	0		
	SUB INDEX S2 =	0		
	SUB INDEX S3 =	0		
	INDEX OF PERFORMANCE =	0		

Fire testing of "Interpon D36 Polyester Powder Coating", in accordance with the London Underground Limited Engineering Standard 2-01001-002: Issue A1: December 2003.



TEST DATA

SURFACE SPREAD OF FLAME TEST – BS476: PART 7: 1997

Specimen No.	1	2	3	4	5	6
Maximum distance at 1.5 minutes (mm)	0	0	0	0	0	0
Distance (mm)	Time to travel to indicated distance (minutes, seconds)					
75						
165						
190						
215						
240						
265						
290						
375						
455						
500						
525						
600						
675						
710						
750						
785						
825						
900						
Maximum distance travelled in 10 minutes (mm)	0	0	0	0	0	0

**Observations made during test and comments on any difficulties encountered during the test.**

No ignition was observed.

Workflow Commands:

Edit/Display Options:

**Product Description**

ProductID=1902; Status=Authorised For Use; Title=Interpon D1036

Displaying

ProductID: 1902  
 Status: Authorised For Use

Supersedes ProductID:  
 Superseded By ProductID:

Uniclass 2015 Code: P100000000

Product Description: Legacy Product - Authorised before Uniclass2015 implementation

Product Title: Interpon D1036

Primary Use: Architectural grade powder coating for general use within stations, above and below ground.

Additional Info/KeyWords: Alzo Powder Coatings Ltd, Stonegate Lane, Felling, Tyne & Wear, NE10 0JY, Tel: 0191 460 6111  
 www.interpon.co.uk Complies with LU Standard 1-1385 'Fire Safety Performance of Materials'. Potential use includes cladding and metal ceilings.

Asset Classification: Premises

Manufacturer: Alzo Nobel Powder Coatings Ltd

Manufacturers Version No:  
 APR Version No: 0

Is Undergoing Trial: No

Proposer: Derek McGovern (derek.mcgovern@tube.tfl.gov.uk)  
 Sponsor: Sam Sambasivan (sam.sambasivan@tube.tfl.gov.uk)  
 Acceptance Manager: Sam Sambasivan (sam.sambasivan@tube.tfl.gov.uk)

Date Authorised For Use: 19 Sep 2012  
 Allocated To:

Requirement ID	Requirement Description	Status	Is Trailing	Allocated To
No records to display.				

ConditionID	ReqID	Condition Description
No records to display.		

**Evidence**

No records to display.

Available Files

EvidenceItemID	RequirementID	EvidenceType	EvidenceText	Evidence Type	Evidence Text	IsPublic
<a href="#">Download</a>	6071	User Guide	Technical Data Sheet - Gloss	InterponD1036GLOSS.pdf		<input checked="" type="checkbox"/>
<a href="#">Download</a>	6072	User Guide	Technical Data Sheet - Stain	InterponD1036SATM.pdf	application/pdf	<input checked="" type="checkbox"/>
<a href="#">Download</a>	6073	User Guide	Technical Data Sheet - Matt	InterponD1036Matt_30_Issue4Aug2011.pdf	application/pdf	<input checked="" type="checkbox"/>
<a href="#">Download</a>	6080	Specification	British Board of Agreement Certification	BSAInterponD1036Dec07.pdf	application/pdf	<input checked="" type="checkbox"/>

**Event Log**

Date/Time	Person	Status	Type	Data
19/09/2012 10:20:13	Terry Price (terry.price@tube.tfl.gov.uk)	Authorised For Use	Authorise New Product	
19/09/2012 10:16:30	Sam Sambasivan (sam.sambasivan@tube.tfl.gov.uk)	Accepted	Accept Product	
19/09/2012 10:15:05	Terry Price (terry.price@tube.tfl.gov.uk)	Waiting Acceptance Outcome	Start Acceptance Project	
18/09/2012 16:56:49	Sam Sambasivan (sam.sambasivan@tube.tfl.gov.uk)	With Admin Manager	Support Proposal	
04/09/2012 13:42:09	Derek McGovern (derek.mcgovern@tube.tfl.gov.uk)	With Sponsor	Submit Proposal	
04/09/2012 13:25:46	Derek McGovern (derek.mcgovern@tube.tfl.gov.uk)	Updated EvidenceItem	Updated EvidenceItem	EvidenceItemID=6082 (File Contents Unchanged)
04/09/2012 13:24:54	Derek McGovern (derek.mcgovern@tube.tfl.gov.uk)	Updated EvidenceItem	Updated EvidenceItem	EvidenceItemID=6081 (File Contents Unchanged)