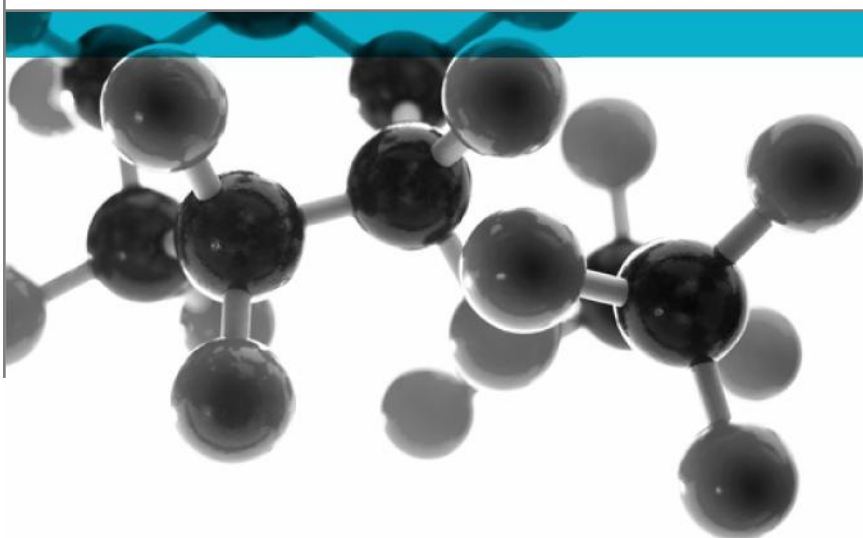


Exova Warringtonfire
Holmesfield Road
Warrington
WA1 2DS
United Kingdom

T : +44 (0) 1925 655116
F : +44 (0) 1925 655419
E : warrington@exova.com
W: www.exova.com



BS 476: Part 6: 1989+A1:2009



Method Of Test For Fire Propagation For Products

A Report To: International Aluminium Company s.r.l.

Document Reference: 338763

Date: 22nd May 2014

Issue No.: 1

Page 1

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 / density specific gravity
A coating system applied to an aluminium substrate	"D-MAX® HIGH SOLID PERFORMANCE ALUMINUM"	3.0 mm	2.71 g/cm ³
Individual components used to manufacture composite:			
Final coating product (test face)	"WHITE RAL 9016 VL 403"	20±2 microns	Unwilling to provide
First coating product	"WHITE VL75"	5±2 microns	Unwilling to provide
Substrate	"5754 ALLOY"	3 mm	2.71 g/cm ³
Coating product (reverse face)	"GREY RAL 7035 VL232"	5±2 microns	Unwilling to provide
Please see page 5 of this test report for the full description of the product tested			



Test Sponsor International Aluminium Company s.r.l., Via Pergolesi, 6 – 20124 Milano mi, Italy.

Test Results:

Fire propagation index, I	=	0.3
Sub index, i₁	=	0.3
Sub index, i₂	=	0.0
Sub index, i₃	=	0.0

Date of Test 26th & 27th March 2014

Signatories

	
Responsible Officer C. Meachin * Technical Officer	Authorised S. Deeming * Operations Manager

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

Report Issued: 22nd May 2014

This version of the report has been produced from a .pdf format electronic file that has been provided by Exova Warringtonfire to the sponsor of the report and must only be reproduced in full. Extracts or abridgements of reports must not be published without permission of Exova Warringtonfire.

CONTENTS	PAGE NO.
EXECUTIVE SUMMARY	2
SIGNATORIES.....	2
TEST DETAILS.....	4
DESCRIPTION OF TEST SPECIMENS.....	5
TEST RESULTS	7
Table 1	8
Table 2	9
Table 3	9
REVISION HISTORY	11



Test Details

Purpose of test	<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>
Scope of test	<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>
Fire test study group/EGOLF	<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>
Instruction to test	<p>The test was conducted on the 26th & 27th March 2014 at the request of International Aluminium Company s.r.l., the sponsor of the test.</p>
Provision of test specimens	<p>The specimens were supplied by the sponsor of the test. Exova Warringtonfire was not involved in any selection or sampling procedure.</p>
Conditioning of specimens	<p>The specimens for testing to BS 476: Part 6: 1989+A1: 2009 together with the specimens for testing to BS 476: Part 7: 1997 were received on the 10th March 2014.</p> <p>Prior to the tests, all of the specimens were conditioned to constant mass at a temperature of $23 \pm 2^{\circ}\text{C}$ and a relative humidity of $50 \pm 5\%$. One specimen from the total sample submitted for test was selected for constant mass verification.</p>
Form in which the specimens were tested	<p>Composite - Combination of materials which are generally recognised in building constructions as discrete entities e.g. coated or laminated materials.</p>
Exposed face	<p>The PVDF 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		A coating system applied to an aluminium substrate
Product reference of composite		"D-MAX® HIGH PERFORMANCE SOLID ALUMINIUM"
Name of manufacturer of composite		INTERNATIONAL ALLUMINIUM COMPANY SRL
Thickness of composite		3.0 mm (stated by sponsor) 3.0 mm (determined by Exova Warringtonfire)
Density of composite		2.71 g/cm ³ (stated by sponsor) 2.62 g/cm ³ (determined by Exova Warringtonfire)
Final coating product (Test face)	Generic type	Polyvinylidene difluoride (PVDF) liquid paint
	Product reference	"WHITE RAL 9016 VL 403"
	Name of manufacturer	See Note 1 below
	Colour reference	See Note 1 below
		"White" (observed by Exova Warringtonfire)
	Number of coats	1
	Application thickness per coat	20±2 microns
	Density / specific gravity	See Note 1 below
	Application method	Coil coating
Flame retardant details	See Note 2 below	
Curing process per coat	Infra-red system	
First coating product	Generic type	Polyester liquid paint
	Product reference	"WHITE VL75"
	Name of manufacturer	See Note 1 below
	Colour reference	See Note 1 below
	Number of coats	1
	Application thickness per coat	5±2 microns
	Density / specific gravity	See Note 1 below
	Application method	Coil coating
	Flame retardant details	See Note 2 below
Curing process per coat	Infra-red system	
Substrate	Generic type	Aluminium alloy
	Product reference	"5754 ALLOY"
	Detailed description / composition details	EN AW 5754 / EN AW-AI Mg3
	Name of manufacturer	See Note 1 below
	Thickness	3 mm
	Density	2.71 g/cm ³
	Flame retardant details	This component is inherently flame retardant

Continued on next page

Coating product (Reverse face)	Generic type	Epoxide liquid paint
	Product reference	"GREY RAL 7035 VL232"
	Name of manufacturer	See Note 1 below
	Colour reference	See Note 1 below
	Number of coats	1
	Application thickness per coat	5±2 microns
	Density / specific gravity	See Note 1 below
	Application method	Coil coating
	Flame retardant details	See Note 2 below
	Curing process per coat	Infra-red system
Brief description of manufacturing process		Unwinding coil Jointing with preceding coil Chemical pre-treatment Painting (primer on face a & back on face b) Paint polymerization Painting (finish on face a) Paint polymerization Cooling Application of protective film Rewinding coil

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.

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.

Fire propagation index, I	=	0.3
Sub index, i_1	=	0.3
Sub index, i_2	=	0.0
Sub index, i_3	=	0.0

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.

This report may only be reproduced in full. Extracts or abridgements shall not be published without permission of **Exova Warringtonfire**.

Table 1

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

Specimen No. : 1

Date : 26-Mar-14

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	12	11	0.20	
1.00	17	16	0.10	
1.50	22	22	0.00	
2.00	26	26	0.00	
2.50	29	30	0.00	
3.00	32	35	0.00	0.30
4.00	63	66	0.00	
5.00	100	105	0.00	
6.00	125	136	0.00	
7.00	146	154	0.00	
8.00	162	172	0.00	
9.00	176	184	0.00	
10.00	185	196	0.00	0.00
12.00	200	210	0.00	
14.00	213	219	0.00	
16.00	219	226	0.00	
18.00	224	232	0.00	
20.00	231	239	0.00	0.00
Total Index of Performance S			=	0.30

SubIndex s1 0.30

SubIndex s2 0.00

SubIndex s3 0.00

Index of Performance S 0.30

Table 2

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

Specimen No. : 2

Date : 26-Mar-14

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	12	11	0.20	
1.00	16	16	0.00	
1.50	21	22	0.00	
2.00	26	26	0.00	
2.50	29	30	0.00	
3.00	32	35	0.00	0.20
4.00	63	66	0.00	
5.00	95	105	0.00	
6.00	122	136	0.00	
7.00	142	154	0.00	
8.00	158	172	0.00	
9.00	171	184	0.00	
10.00	182	196	0.00	0.00
12.00	196	210	0.00	
14.00	206	219	0.00	
16.00	217	226	0.00	
18.00	222	232	0.00	
20.00	227	239	0.00	0.00
Total Index of Performance S			=	0.20

SubIndex s1 0.20

SubIndex s2 0.00

SubIndex s3 0.00

Index of Performance S 0.20

Table 3

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

Specimen No. : 3

Date : 27-Mar-14

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	12	11	0.20	
1.00	17	16	0.10	
1.50	21	22	0.00	
2.00	24	26	0.00	
2.50	28	30	0.00	
3.00	30	35	0.00	0.30
4.00	62	66	0.00	
5.00	96	105	0.00	
6.00	121	136	0.00	
7.00	143	154	0.00	
8.00	158	172	0.00	
9.00	171	184	0.00	
10.00	181	196	0.00	0.00
12.00	192	210	0.00	
14.00	202	219	0.00	
16.00	209	226	0.00	
18.00	214	232	0.00	
20.00	220	239	0.00	0.00
Total Index of Performance S			=	0.30

SubIndex s1 0.30

SubIndex s2 0.00

SubIndex s3 0.00

Index of Performance S 0.30

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:	

Document No.: 338763

Author: C. Meachin

Client: International Aluminium
Company s.r.l.

Page No.: 11 of 11

Issue Date: 22nd May 2014

Issue No.: 1



0249