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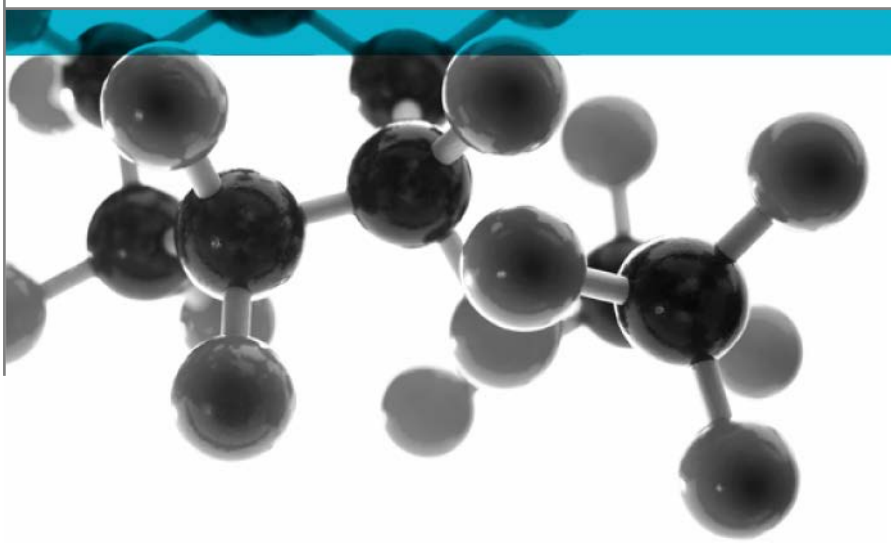
BS 476: Part 6: 1989+A1:2009



Method Of Test For
Fire Propagation For Products

A Report To: Infinity Innovative Coatings

Document Reference: 534235

Date: 11th August 2023

Issue No.: 1

0249

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 specific gravity
A five coat coating system applied to a magnesium oxide board	"ArmourGuard WB Spray Granite Build Up"	12.30mm*	12.03kg/m^2*
Individual components used to manufacture composite:			
Final coating product (test face)	"ArmourGuard WB"	2 x 25 microns	1.1kg/litre
Second coating product	"Water-Based Spray Granite 41"	1.2mm	1.18kg/litre
First coating product	"ArmourGuard WB"	2 x 25 microns	1.1kg/litre
Magnesium oxide board	"Infinity Effects MGO Board"	12mm	20.8kg/m^2
*determined by Warringtonfire			
Please see page 7 of this test report for the full description of the product tested			

Test Sponsor Infinity Innovative Coatings, 42 Drumalig Roan, Carryduff, Belfast, BT8 8EQ

Test Results:

Fire propagation index, I = 1.4

Sub index, i_1 = 0.9

Sub index, i_2 = 0.3

Sub index, i_3 = 0.2

An uncertainty of measurement estimation has been conducted in relation to the fire propagation index, I and the sub index, i_1. The findings are as detailed in Annex A of this report.

Date of Test 4th August 2023

Signatories

Responsible Officer D. Roberts * Testing Officer	Authorised T. Deluce * Technical Lead

* For and on behalf of Warringtonfire.

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Test Details

Purpose of test

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".

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.

Scope of test

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.

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 4th August 2023 at the request of Infinity Innovative Coatings, the sponsor of the test.

Provision of test specimens

The specimens were supplied by the sponsor of the test. Warringtonfire was not involved in any selection or sampling procedure. The results stated in this report apply to the sample as received.

Conditioning of specimens

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 27th June 2023.

Prior to the tests, all of the specimens were conditioned to constant mass at a temperature of 23 ± 2°C and a relative humidity of 50 ± 5%. One specimen from the total sample submitted for test was selected for constant mass verification.

Form in which the specimens were tested

Composite - Combination of materials which are generally recognised in building constructions as discrete entities e.g. coated or laminated materials.

Exposed face

The coated face of the specimens was exposed to the heating conditions of the test.

Photographs of specimens before and after test

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		A five coat coating system applied to a magnesium oxide board
Product reference of coating system		"ArmourGuard WB Spray Granite Build Up"
Name of manufacturer		Infinity Innovative Coatings
Overall thickness		12.30mm (determined by Warringtonfire)
Overall weight per unit area		12.03kg/m^2 (determined by Warringtonfire)
Final coating product (Test face)	Generic type	Water-based urethane acrylic coating
	Product reference	"ArmourGuard WB"
	Name of manufacturer	Infinity Innovative Coatings
	Colour	Clear
	Number of coats	2
	Application thickness per coat	25 microns
	Specific gravity	1.1kg/litre
	Application method	Spray on
	Flame retardant details	**See Note 1 below**
	Curing process	Air drying
Second coating product	Generic type	Water-based spray granite
	Product reference	"Water-Based Spray Granite 41"
	Name of manufacturer	Infinity Innovative Coatings
	Colour	Grey, White, Black
	Number of coats	1
	Application thickness	1.2mm
	Specific gravity	1.18kg/litre
	Application method	Spray on
	Flame retardant details	**See Note 1 below**
	Curing process	Air drying
First coating product	Generic type	Water-based urethane acrylic coating
	Product reference	"Pigmentable ArmourGuard WB"
	Name of manufacturer	Infinity Innovative Coating
	Colour	Grey
	Number of coats	2
	Application thickness per coat	25 microns
	Specific gravity	1.1kg/litre
	Application method	Spray on
	Flame retardant details	**See Note 1 below**
	Curing process	Air drying

Continued on next page.

Substrate	Generic type	Magnesium oxide board
	Product reference	“Infinity Effects MGO Board”
	Name of manufacturer	Infinity Effects
	Thickness	12mm
	Weight per unit area	20.8kg/m^2
	Flame retardant details	**See Note 1 below**
Brief description of manufacturing process of coatings		The manufacturing process of 4 mesh magnesium oxide (MgO) board involves the following steps: raw material preparation, mixing, forming with embedded mesh, curing, trimming and cutting, surface treatment, quality control, and packaging. It includes mixing raw materials, forming the board with a mesh layer, curing with heat and pressure, trimming, surface treatment, quality checks, and packaging.

Note 1: The sponsor was unwilling 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.

Fire propagation index, I	**=**	**1.4**
Sub index, i_1	**=**	**0.9**
Sub index, i_2	**=**	**0.3**
Sub index, i_3	**=**	**0.2**

An uncertainty of measurement estimation has been conducted in relation to the fire propagation index, I and the sub index, i_1. The findings are as detailed in Annex A of this report.

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.

Table 1

Laboratory Record Sheet

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

Specimen No. : 1 **Date : 4-Aug-23**

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	**13**	**12**	**0.20**	
1.00	**20**	**19**	**0.10**	
1.50	**26**	**24**	**0.13**	
2.00	**31**	**28**	**0.15**	
2.50	**36**	**32**	**0.16**	
3.00	**38**	**34**	**0.13**	**0.88**
4.00	**69**	**63**	**0.15**	
5.00	**104**	**97**	**0.14**	
6.00	**130**	**122**	**0.13**	
7.00	**151**	**142**	**0.13**	
8.00	**164**	**159**	**0.06**	
9.00	**181**	**172**	**0.10**	
10.00	**190**	**180**	**0.10**	**0.81**
12.00	**204**	**194**	**0.08**	
14.00	**211**	**205**	**0.04**	
16.00	**221**	**215**	**0.04**	
18.00	**227**	**222**	**0.03**	
20.00	**234**	**225**	**0.05**	**0.24**
Total Index of Performance S			**=**	**1.93**

SubIndex s1 **0.88**

SubIndex s2 **0.81**

SubIndex s3 **0.24**

Index of Performance S **1.93**

Table 2

Laboratory Record Sheet

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

Specimen No. : 2 **Date : 4-Aug-23**

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	**13**	**12**	**0.20**	
1.00	**19**	**17**	**0.20**	
1.50	**25**	**23**	**0.13**	
2.00	**29**	**27**	**0.10**	
2.50	**32**	**32**	**0.00**	
3.00	**35**	**35**	**0.00**	**0.63**
4.00	**62**	**64**	**0.00**	
5.00	**96**	**102**	**0.00**	
6.00	**122**	**132**	**0.00**	
7.00	**140**	**152**	**0.00**	
8.00	**153**	**168**	**0.00**	
9.00	**164**	**182**	**0.00**	
10.00	**172**	**193**	**0.00**	**0.00**
12.00	**185**	**208**	**0.00**	
14.00	**195**	**219**	**0.00**	
16.00	**197**	**228**	**0.00**	
18.00	**202**	**237**	**0.00**	
20.00	**209**	**242**	**0.00**	**0.00**
Total Index of Performance S			**=**	**0.63**

SubIndex s1	**0.63**
SubIndex s2	**0.00**
SubIndex s3	**0.00**
Index of Performance S	**0.63**

Table 3

Laboratory Record Sheet

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

Specimen No. : 3 **Date : 4-Aug-23**

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	**14**	**12**	**0.40**	
1.00	**20**	**17**	**0.30**	
1.50	**25**	**23**	**0.13**	
2.00	**30**	**26**	**0.20**	
2.50	**33**	**29**	**0.16**	
3.00	**36**	**34**	**0.07**	**1.26**
4.00	**61**	**61**	**0.00**	
5.00	**97**	**95**	**0.04**	
6.00	**123**	**124**	**0.00**	
7.00	**145**	**144**	**0.01**	
8.00	**163**	**158**	**0.06**	
9.00	**177**	**177**	**0.00**	
10.00	**186**	**184**	**0.02**	**0.14**
12.00	**203**	**195**	**0.07**	
14.00	**216**	**204**	**0.09**	
16.00	**232**	**213**	**0.12**	
18.00	**236**	**221**	**0.08**	
20.00	**240**	**229**	**0.06**	**0.41**
Total Index of Performance S			**=**	**1.81**

SubIndex s1 **1.26**

SubIndex s2 **0.14**

SubIndex s3 **0.41**

Index of Performance S **1.81**

Annex A

Uncertainty of measurement

Specimen No.	1	2	3	Average
Fire propagation index, I	+0.77 -0.37	+0.76 -0.33	+0.77 -0.56	+0.77 -0.42
Sub index i_1	+0.76 -0.34	+0.76 -0.33	+0.76 -0.56	+0.76 -0.41

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Revision History

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

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Revised By:	Approved By:
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