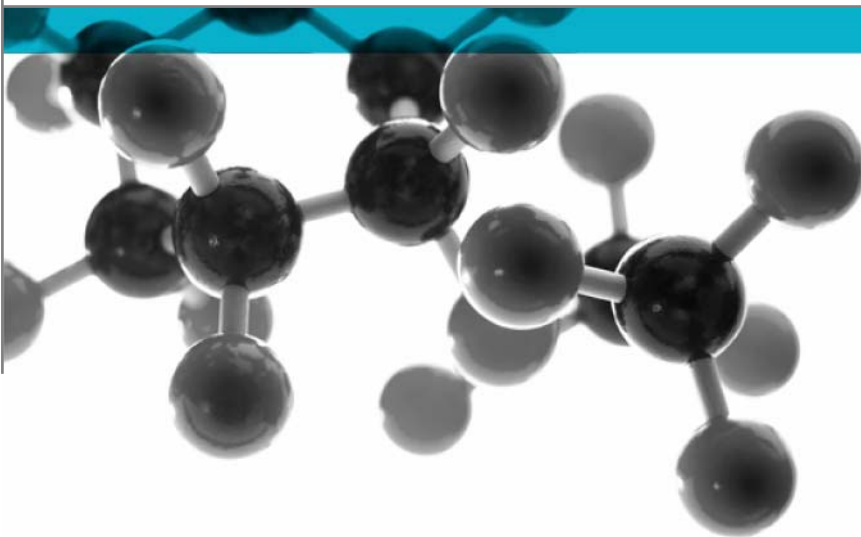


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BS 476: Part 6: 1989+A1:2009



Method Of Test For Fire Propagation For Products

A Report To: AFS Boru Sanayi A.S.

Document Reference: 323725

Date: 22nd February 2013

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 or density
Flexible air duct comprising PVC coated polyester mesh.	"PVCAFS.M1"	0.22 – 0.25mm	325 - 360g/m ²
Individual components used to manufacture composite:			
Coating (test face)	Confidential	Not stated	Confidential
Polyester mesh	Confidential	Unable to provide	Confidential
Please see page 5 of this test report for the full description of the product tested			

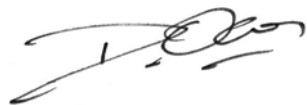

Test Sponsor AFS Boru Sanayi A.S., Kuskondu Sk. 1, Çankaya, Ankara, Turkey

Test Results:

Fire propagation index, I	=	3.9
Sub index, i₁	=	2.6
Sub index, i₂	=	1.0
Sub index, i₃	=	0.3

Date of Test 27th November & 11th December 2012

Signatories

	
Responsible Officer D J Owen* Technical Officer	Authorised M Dale* Acting Operations Manager

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

Report Issued: 22nd February 2013

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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 27th November & 11th December 2012 at the request of AFS Boru Sanayi A.S., 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 were received on the 7th November 2012 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.</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>One of two identical faces 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		Flexible air duct comprising polyvinyl chloride (PVC) coated polyester mesh.
Product reference of composite including substrate		"PVCAFS.M1"
Name of manufacturer of composite including substrate		AFS BORU SANAYI A.S.
Thickness of composite including substrate		0.22 – 0.25mm (stated by sponsor) 0.25mm (determined by Exova Warringtonfire)
Weight per unit area of composite including substrate		325 - 360g/m ² (stated by sponsor) 367.6 g/m ² (determined by Exova Warringtonfire)
Product reference of coating		"PVC coating"
Name of manufacturer of coating		See Note 1 below
Overall thickness of coating		See Note 2 below
Overall density/weight per unit area of coating		See Note 2 below
Coating (test face)	Generic type	PVC
	Product reference	See Note 3 below
	Name of manufacturer	See Note 1 below
	Colour reference	"Grey"
	Number of coats	2 layers
	Application rate / thickness per coat	See Note 2 below
	Weight per unit area	See Note 3 below
	Application method	See Note 3 below
	Trade name of flame retardant	See Note 3 below
	Generic type of flame retardant	See Note 3 below
	Amount of flame retardant	See Note 3 below
Curing process per coat	See Note 2 below	
Polyester mesh	Generic type	Polyester
	Product reference	See Note 3 below
	Name of manufacturer	See Note 1 below
	Colour reference	"White"
	Thickness	See Note 1 below
	Density / weight per unit area	See Note 3 below
	Type of weave / cell dimensions	See Note 1 below
	Flame retardant details	See Note 4 below

Continued on next page

Specimen construction details	'PVCAFS.M1' ducting in practice would encapsulate a high tensile steel wire helix to form the wall of the air ducting. It is not practicable to include the wire helix within the specimens and for this reason; the laminate only was tested. It is considered that the inclusion of the wire helix would not have any detrimental effect on the flame-spread characteristics of the actual product.
Brief description of manufacturing process	See Note 1 below

Continued on next page

Note 1 - The sponsor was unwilling to provide this information.

Note 2 - The sponsor was unable to provide this information.

Note 3 - The sponsor of the test has provided this information but at the specific request of the sponsor, these details have been omitted from the report and are instead held on the confidential file relating to this investigation.

Note 4 - 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	=	3.9
Sub index, i_1	=	2.6
Sub index, i_2	=	1.0
Sub index, i_3	=	0.3

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 - BS 476:PART 6:1989+A1:2009

Specimen No. : 1

Date : 27-Nov-12

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	17	12	1.00	
1.00	23	17	0.60	
1.50	28	23	0.33	
2.00	31	27	0.20	
2.50	36	31	0.20	
3.00	39	35	0.13	2.47
4.00	70	65	0.13	
5.00	120	102	0.36	
6.00	136	129	0.12	
7.00	156	153	0.04	
8.00	172	171	0.01	
9.00	182	184	0.00	
10.00	192	197	0.00	0.66
12.00	207	209	0.00	
14.00	219	223	0.00	
16.00	227	233	0.00	
18.00	234	237	0.00	
20.00	237	244	0.00	0.00
Total Index of Performance S			=	3.12

SubIndex s1 2.47

SubIndex s2 0.66

SubIndex s3 0.00

Index of Performance S 3.12

Table 2

Laboratory Record Sheet
FIRE PROPAGATION TEST - BS 476:PART 6:1989+A1:2009

Specimen No. : 2

Date : 11-Dec-12

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	18	12	1.20	
1.00	22	17	0.50	
1.50	26	22	0.27	
2.00	30	26	0.20	
2.50	33	30	0.12	
3.00	39	34	0.17	2.45
4.00	73	65	0.20	
5.00	114	102	0.24	
6.00	144	128	0.27	
7.00	165	151	0.20	
8.00	178	168	0.13	
9.00	193	182	0.12	
10.00	205	192	0.13	1.28
12.00	221	208	0.11	
14.00	230	216	0.10	
16.00	236	224	0.08	
18.00	242	232	0.06	
20.00	246	236	0.05	0.39
Total Index of Performance S			=	4.13

SubIndex s1 2.45

SubIndex s2 1.28

SubIndex s3 0.39

Index of Performance S 4.13

Table 3

Laboratory Record Sheet
FIRE PROPAGATION TEST - BS 476:PART 6:1989+A1:2009

Specimen No. : 3

Date : 11-Dec-12

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	18	12	1.20	
1.00	23	17	0.60	
1.50	29	22	0.47	
2.00	32	26	0.30	
2.50	35	30	0.20	
3.00	39	34	0.17	2.93
4.00	72	65	0.18	
5.00	111	102	0.18	
6.00	139	128	0.18	
7.00	165	151	0.20	
8.00	179	168	0.14	
9.00	188	182	0.07	
10.00	202	192	0.10	1.04
12.00	219	208	0.09	
14.00	229	216	0.09	
16.00	240	224	0.10	
18.00	247	232	0.08	
20.00	251	236	0.08	0.44
Total Index of Performance S			=	4.42

SubIndex s1 2.93

SubIndex s2 1.04

SubIndex s3 0.44

Index of Performance S 4.42

Revision History

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

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