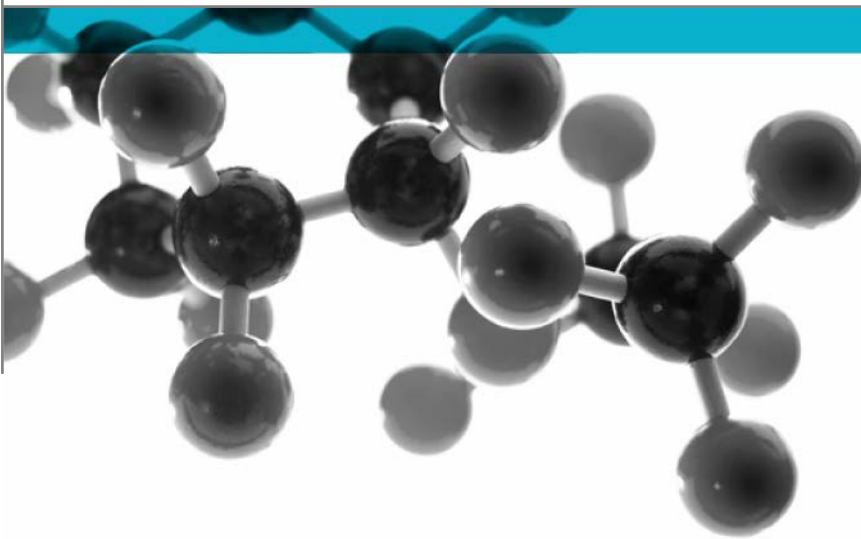


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BS 476: Part 6: 1989+A1:2009



Method Of Test For Fire Propagation For Products

A Report To: AFS Boru Sanayi A.S.

Document Reference: 382367

Date: 16th June 2017

Issue No.: 2

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 ducting product	"ALUAFS.70"	74 microns	120±5% g/m ²
Individual components used to manufacture composite:			
Aluminium foil	Unwilling to provide	9 microns	2.72 g/cm ³
Adhesive	Unwilling to provide	6 microns	Unwilling to provide
Polyester film	Unwilling to provide	12 microns	1.40 g/cm ³
Please see pages 5 & 6 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	=	4.9
Sub index, i₁	=	4.0
Sub index, i₂	=	0.9
Sub index, i₃	=	0.0

Date of Test 26th & 28th April 2017

Reason for revision This document replaces issue 1 (dated 31st May 2017) of the same number which has been withdrawn. The product reference was incorrect and has been corrected in this issue 2 report.

Signatories


Responsible Officer C. Meachin * Technical Officer


Authorised B. Dean * Technical Leader

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

Report Issued: 16 th June 2017

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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 26th & 28th April 2017 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 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 7th April 2017.</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>Assembly - Fabrication of materials and/or composites that can contain air gaps. An air space was provided at the back of the product by testing over spacers of non-combustible insulation board 20 mm wide and 12.5mm thick.</p>
Exposed face	<p>The external aluminium foil 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		Flexible ducting product comprising: <ul style="list-style-type: none"> • Aluminium Foil • Adhesive • Polyester Film • Adhesive • Aluminium Foil • Adhesive • Polyester Film • Adhesive • Aluminium Foil <p>In practice, the product tested is used to form a cylindrical duct that incorporates a reinforcing steel wire helix</p>
Product reference		"ALUAFS.70"
Name of manufacturer		AFS
Weight per unit area		120±5% g/m ² (stated by sponsor) 115.6g/m ² (determined by Exova Warringtonfire)
Thickness		74 microns (stated by sponsor) 0.05mm (determined by Exova Warringtonfire)
Component 1, 5 & 9 (Aluminium foil)	Product Reference	See Note 1 below
	Generic type	Aluminium
	Name of manufacturer	See Note 1 below
	Density	2.72g/cm ³
	Thickness	9 microns
	Flame retardant details	See Note 1 below
Component 2, 4, 6 & 8 (Adhesive)	Product Reference	See Note 1 below
	Generic type	See Note 1 below
	Name of manufacturer	See Note 1 below
	Thickness	6 microns
	Application rate	See Note 1 below
	Flame retardant details	See Note 1 below
Component 3 & 7 (Polyester film)	Product Reference	See Note 1 below
	Generic type	Polyester film
	Name of manufacturer	See Note 1 below
	Density	1.40g/cm ³
	Thickness	12 microns
	Flame retardant details	See Note 1 below

Specimen construction details	'ALUAFS.70' 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 with a 12.5mm airspace at the back of the product. It is considered that the inclusion of the wire helix would not have any detrimental effect on the fire propagation characteristics of the actual product.)
Brief description of manufacturing process	See Note 1 below

Note 1: The sponsor of the test 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	=	4.9
Sub index, i_1	=	4.0
Sub index, i_2	=	0.9
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.

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Table 1
Laboratory Record Sheet
FIRE PROPAGATION TEST - BS476:PART 6:1989+A1:2009
Specimen No. : 1
Date : 26-Apr-17

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	18	11	1.40	3.89
1.00	23	15	0.80	
1.50	29	20	0.60	
2.00	33	25	0.40	
2.50	38	29	0.36	
3.00	43	33	0.33	
4.00	72	63	0.23	0.47
5.00	107	99	0.16	
6.00	134	130	0.07	
7.00	153	152	0.01	
8.00	168	169	0.00	
9.00	181	182	0.00	
10.00	190	191	0.00	0.00
12.00	205	207	0.00	
14.00	214	220	0.00	
16.00	221	227	0.00	
18.00	227	236	0.00	0.00
20.00	230	239	0.00	
Total Index of Performance S			=	4.36

SubIndex s1 3.89
SubIndex s2 0.47
SubIndex s3 0.00
Index of Performance S 4.36

Table 2
Laboratory Record Sheet
FIRE PROPAGATION TEST - BS476:PART 6:1989+A1:2009
Specimen No. : 2
Date : 28-Apr-17

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	18	11	1.40	4.37
1.00	25	15	1.00	
1.50	30	20	0.67	
2.00	35	25	0.50	
2.50	39	29	0.40	
3.00	45	33	0.40	
4.00	78	63	0.38	1.23
5.00	114	99	0.30	
6.00	140	130	0.17	
7.00	161	152	0.13	
8.00	178	169	0.11	
9.00	189	182	0.08	
10.00	198	191	0.07	1.23
12.00	211	207	0.03	0.07
14.00	225	220	0.04	
16.00	225	227	0.00	
18.00	227	236	0.00	
20.00	232	239	0.00	
Total Index of Performance S			=	5.67

SubIndex s1 4.37
SubIndex s2 1.23
SubIndex s3 0.07
Index of Performance S 5.67

Table 3
Laboratory Record Sheet
FIRE PROPAGATION TEST - BS476:PART 6:1989+A1:2009
Specimen No. : 3
Date : 28-Apr-17

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	17	11	1.20	3.88
1.00	23	15	0.80	
1.50	30	20	0.67	
2.00	34	25	0.45	
2.50	39	29	0.40	
3.00	44	33	0.37	
4.00	75	63	0.30	0.76
5.00	110	99	0.22	
6.00	137	130	0.12	
7.00	155	152	0.04	
8.00	172	169	0.04	
9.00	185	182	0.03	
10.00	192	191	0.01	0.76
12.00	207	207	0.00	0.01
14.00	221	220	0.01	
16.00	225	227	0.00	
18.00	233	236	0.00	
20.00	237	239	0.00	
Total Index of Performance S			=	4.65

SubIndex s1 3.88
SubIndex s2 0.76
SubIndex s3 0.01
Index of Performance S 4.65

Revision History

Issue No : 2	Re-issue Date: 16 th June 2107
Revised By: C. Meachin	Approved By: B. Dean
Reason for Revision: This document replaces issue 1 (dated 31 st May 2017) of the same number which has been withdrawn. The product reference was incorrect and has been corrected in this issue 2 report.	

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