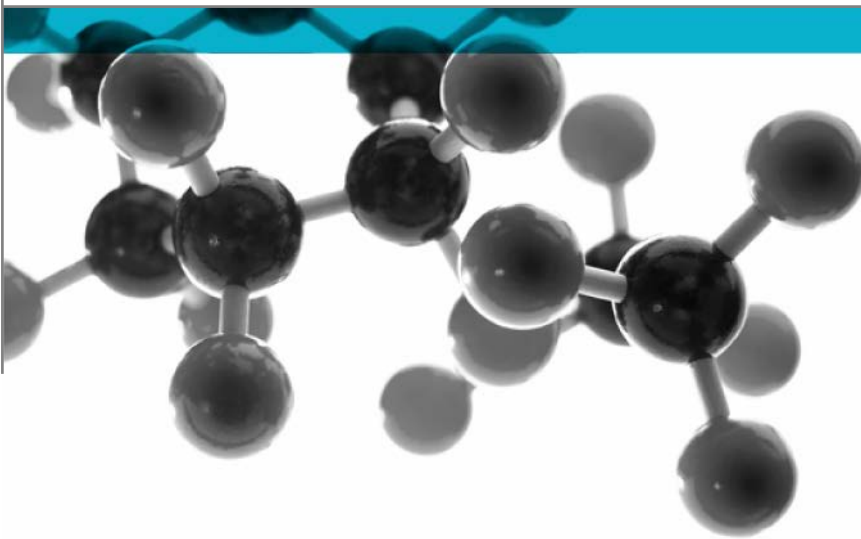


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# BS 476: Part 7: 1997



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

A Report To: AFS Boru Sanayi A.S.

Document Reference: 403636

Date: 28<sup>th</sup> August 2018

Issue No.: 1

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Testing  
Advising  
Assuring



## 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 application rate
Flexible ducting product	"COMBIAFS"	150 microns	300g/m <sup>2</sup> ± 10%
<b>Individual components used to manufacture composite:</b>			
Aluminium foil (test face)	"Aluminium"	9 microns	2.72g/cm <sup>3</sup>
Adhesive	Confidential	Not applicable	Unwilling to provide
Polyester film	"Polyester"	12 microns	1.40g/m <sup>3</sup>
PVC (reverse face)	"PVC"	Confidential	Confidential
<b>Please see page 5 of this test report for the full description of the product tested</b>			


**Test Sponsor** AFS Boru Sanayi A.S., Ivedik Organize Sanayi Bolgesi, No. 1468, Cadde No:153, Ostim, Ankara 06370, Turkey

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


An uncertainty of measurement estimation has been conducted in relation to the distance travelled by the flame front and the findings are as detailed in Appendix 2.

**Date of Test** 21<sup>st</sup> August 2018

## Signatories



Responsible Officer  
T. Mort \*  
Senior Technical Officer



Authorised  
S. Deeming \*  
Business Unit Head

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

Report Issued: 28<sup>th</sup> August 2018

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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> August 2018 at the request of AFS Boru Sanayi A.S., 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>	<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 1<sup>st</sup> February 2018.</p> <p>Prior to the tests, all of the specimens 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>. One specimen from the total sample submitted for test was selected for constant mass verification.</p>
<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 aluminium foil 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. This information has not been independently verified by **Exova Warringtonfire**. All values quoted are nominal, unless tolerances are given.

General description		Flexible ducting product. The sponsor has stated that in practice the product tested is used to form a cylindrical duct that incorporates a reinforcing steel wire helix
Product reference		"COMBIAFS"
Name of manufacturer		AFS BORU SANAYI A.S.
Overall weight per unit area		300 g/m <sup>2</sup> ± 10% (stated by sponsor) 297.09g/m <sup>2</sup> (determined by <b>Exova Warringtonfire</b> )
Overall thickness		150 micron (stated by sponsor) 0.76mm (determined by <b>Exova Warringtonfire</b> )
Product configuration		<ul style="list-style-type: none"> <li>• Aluminium foil</li> <li>• Adhesive</li> <li>• Polyester film</li> <li>• Adhesive</li> <li>• Aluminium foil</li> <li>• Adhesive</li> <li>• Polyester film</li> <li>• Adhesive</li> <li>• Aluminium foil</li> <li>• PVC</li> </ul>
Aluminium foil (test face)	Product reference	"Aluminium"
	Generic type	Aluminium
	Name of manufacturer	<b>See Note 1 below</b>
	Density	2.72g/cm <sup>3</sup>
	Thickness	9 microns
	Flame retardant details	<b>See Note 2 below</b>
Adhesive	Product reference	<b>See Note 3 below</b>
	Generic type	<b>See Note 3 below</b>
	Name of manufacturer	<b>See Note 1 below</b>
	Thickness	<b>See Note 4 below</b>
	Application rate	<b>See Note 1 below</b>
	Flame retardant details	<b>See Note 2 below</b>
Polyester film	Product reference	"Polyester"
	Generic type	Polyester
	Name of manufacturer	<b>See Note 1 below</b>
	Density	1.40g/m <sup>3</sup>
	Thickness	12 microns
	Flame retardant details	<b>See Note 4 below</b>

Continued on next page

PVC film (reverse face)	Product reference	"PVC"
	Generic type	Polyvinyl chloride (PVC) film
	Name of manufacturer	<b>See Note 1 below</b>
	Weight per unit area	<b>See Note 3 below</b>
	Thickness	<b>See Note 3 below</b>
	Flame retardant details	<b>See Note 4 below</b>
Brief description of manufacturing process		<b>See Note 1 below</b>

**Note 1.** The sponsor of the test 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 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 was unable to provide this information.

## Test Results

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### 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.**

**An uncertainty of measurement estimation has been conducted in relation to the distance travelled by the flame front and the findings are as detailed in Appendix 2.**

### 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 3, 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	60	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)	50	50	50	60	50	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 – Uncertainty of measurement

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Specimen No.	1	2	3	4	5	6
Maximum distance travelled at 1.5 minutes (mm)	±3	±3	±3	±4	±3	±3
Maximum distance travelled in 10 minutes (mm)	±3	±3	±3	±4	±3	±3

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.

## Appendix 3 – Classification criteria

### Classification of spread of flame

Classification	Spread of Flame at 1.5 min		Final Spread of Flame	
	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:	

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