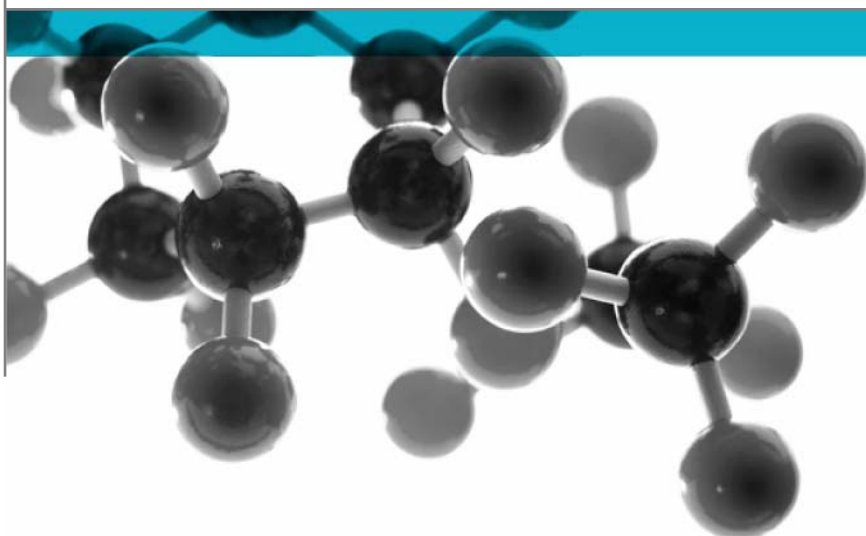


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# BS 476 Part 3: 2004



## External Fire Exposure Roof Test

A Report To: Carlisle Syntec Europe B.V.

Document Reference: 316068

Date: 14<sup>th</sup> May 2012

Issue No.: 1

Page 1

Testing  
Advising  
Assuring



## Executive Summary

**Objective** To determine the fire performance of the following product when tested in accordance with BS 476: Part 3: 2004


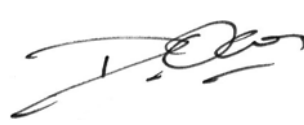

Generic Description	Product reference	Thickness	Weight per unit area or density
A composite waterproof roofing material	"PIR Glass Tissue"	142mm	18.8kg/m <sup>2</sup>
<b>Individual components used to manufacture composite:</b>			
Waterproofing membrane (test face)	"RubberBond FleeceBack EPDM"	2.54mm	2.1kg/m <sup>2</sup>
Adhesive	"WBA"	Not stated	250ml/m <sup>2</sup>
Glass tissue faced insulation	"PIR Glass Tissue"	120mm	5.6kg/m <sup>2</sup>
Mechanical fixings	"Carlisle HP Fasteners / 75mm Plate washers"	Not stated	3 per m <sup>2</sup>
Vapour control layer	"VCL"	0.25mm	0.02kg/m <sup>2</sup>
OSB deck (reverse face)	"OSB3"	18mm	11.1kg/m <sup>2</sup>
<b>Please see pages 5, 6 &amp; 7 of this test report for the full description of the product tested</b>			

**Test Sponsor** Carlisle Syntec Europe B.V., P.O. Box 110, AC Zevenaar, 6900, The Netherlands

**Test Results** In Accordance With The Designations Defined In BS 476: Part 3: 2004 The Test Specimens Are In Category "EXT.F.AC".

**Date of Test:** 16<sup>th</sup> April 2012

## Signatories

	
Responsible Officer K. Hughes * Technical Officer	Approved D. J. Owen * Senior Technical Officer
	* For and on behalf of <b>Exova Warringtonfire.</b>
Authorised S. Deeming * Operations Manager	Report Issued: 14 <sup>th</sup> May 2012

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<b>CONTENTS</b>	<b>PAGE NO.</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>2</b>
<b>SIGNATORIES.....</b>	<b>2</b>
<b>TEST DETAILS.....</b>	<b>4</b>
<b>DESCRIPTION OF TEST SPECIMENS.....</b>	<b>5</b>
<b>TEST RESULTS .....</b>	<b>8</b>
<b>TABLE 1 .....</b>	<b>9</b>
<b>REVISION HISTORY .....</b>	<b>11</b>

## Test Details

<b>Purpose of test</b>	<p>To determine the performance of specimens of a roof construction when they are subjected to the conditions of the test specified in BS 476: Part 3: 2004, "British Standard Specification for Fire Tests on Building Materials and Structures - External Fire Exposure Roof Tests".</p> <p>The test was performed in accordance with the test procedures specified in BS 476: Part 3: 2004 and this report should be read in conjunction with that British Standard.</p>
<b>Scope of test</b>	<p>The tests are designed to enable measurement of:</p> <ul style="list-style-type: none"> <li>a) capacity of a representative section of a roof to resist penetration by fire when the external surface is exposed to radiation and flame; and</li> <li>b) distance of the spread of flame on the outer surface of the roof covering under certain conditions.</li> </ul> <p>Roofs are graded according to the angle at which they are tested, the time for which they resist penetration by fire and the distance of superficial spread of flame on their external surface.</p> <p>The test specimens are tested at an angle of 45° to the horizontal (sloping position) unless the roof construction is used at an angle of less than 10° to the horizontal, in which case the specimens are tested horizontally (flat position).</p>
<b>Fire test study group/EGOLF</b>	<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>
<b>Instruction to test</b>	<p>The test was conducted on the 16<sup>th</sup> April 2012 at the request of Carlisle Syntec Europe B.V., the sponsor of the test.</p>
<b>Provision of test specimens</b>	<p>The specimens were supplied by the sponsor of the test. <b>Exova Warringtonfire</b> was not involved in any selection or sampling procedure.</p>
<b>Conditioning of specimens</b>	<p>The specimens were received on the 20<sup>th</sup> February 2012. Prior to testing the specimens were conditioned to equilibrium in an atmosphere having a temperature of 23 ±2°C and a relative humidity of 45 to 55%.</p>
<b>Orientation of specimens</b>	<p>The specimens were tested in the flat position.</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 composite waterproof roofing material		
Product reference		"PIR Glass Tissue"		
Overall thickness		142mm (stated by sponsor) 141.3mm (determined by <b>Exova Warringtonfire</b> )		
Overall weight per unit area		18.8kg/m <sup>2</sup> (stated by sponsor) 18.9kg/m <sup>2</sup> (determined by <b>Exova Warringtonfire</b> )		
Specimen configuration		<ul style="list-style-type: none"> <li>• RubberBond FleeceBack EPDM</li> <li>• Adhesive</li> <li>• PIR glass tissue</li> <li>• Mechanical fixing</li> <li>• VCL</li> <li>• Mechanical fixing</li> <li>• OSB3</li> </ul>		
Waterproof membrane	Generic type		Waterproof membrane comprising EPDM coated polyester fleece	
	Product reference		"RubberBond FleeceBack EPDM"	
	Name of manufacturer		Carlisle Syntec	
	Thickness		2.54mm	
	Weight per unit area		2.1kg/m <sup>2</sup>	
	EPDM	Generic type		EPDM
		Product reference		<b>See Note 1 below</b>
		Name of manufacturer		<b>See Note 1 below</b>
		Number of coats		One
		Thickness per coat		1.14mm
		Weight per unit area / density		<b>See Note 1 below</b>
		Colour reference		"Slate Grey"
	Flame retardant details		<b>See Note 2 below</b>	
	Polyester fleece	Generic type		Polyester fleece
		Product reference		<b>See Note 1 below</b>
		Name of manufacturer		<b>See Note 1 below</b>
		Thickness		1.4mm
		Weight per unit area / density		<b>See Note 1 below</b>
		Colour reference		<b>See Note 1 below</b>
Flame retardant details		<b>See Note 2 below</b>		
Adhesive	Product reference		"WBA"	
	Generic type		Acrylic adhesive	
	Name of manufacturer		<b>See Note 3 below</b>	
	Application rate		250ml/m <sup>2</sup>	
	Colour reference		"White"	
	Flame retardant details		<b>See Note 2 below</b>	

Continued on next page

Glass tissue faced insulation	Generic type		Glass tissue faced PIR insulation
	Product reference		"PIR Glass Tissue"
	Name of manufacturer		<b>See Note 3 below</b>
	Thickness		120mm
	Weight per unit area		5.6kg/m <sup>2</sup>
	Product configuration		<ul style="list-style-type: none"> <li>• Glass tissue</li> <li>• Insulation</li> <li>• Glass tissue</li> </ul>
	Glass tissue facing	Product reference	<b>See Note 1 below</b>
		Generic type	Glass tissue
		Name of manufacturer	<b>See Note 1 below</b>
		Thickness	<b>See Note 1 below</b>
		Density / weight per unit area	<b>See Note 1 below</b>
		Colour reference	<b>See Note 1 below</b>
	Flame retardant details		<b>See Note 1 below</b>
	Bonding details		The facing is auto-adhesively bonded to the foam during the manufacturing process
	Insulation	Product reference	<b>See Note 1 below</b>
		Generic type	PIR insulation
		Name of manufacturer	<b>See Note 1 below</b>
		Thickness	<b>See Note 1 below</b>
Density / weight per unit area		<b>See Note 1 below</b>	
Colour reference		"Yellow"	
Flame retardant details		<b>See Note 1 below</b>	
Mechanical fixings (Insulation to vapour control layer)	Product reference	"Carlisle HP Fasteners / 75mm Plate Washers"	
	Generic type	Steel fastener / plate washers	
	Name of manufacturer	Carlisle Syntec	
	Application rate	3 per m <sup>2</sup>	
	Colour reference	"Grey"	
	Flame retardant details		<b>See Note 2 below</b>
Vapour control layer	Product reference	"VCL"	
	Generic type	Polythene	
	Name of manufacturer	<b>See Note 4 below</b>	
	Weight per unit area	0.02kg/m <sup>2</sup>	
	Thickness	0.25mm	
	Colour reference	"Black"	
Flame retardant details		<b>See Note 2 below</b>	
Mechanical fixings (vapour control layer to OSB deck)	Product reference	"Carlisle HP Fasteners / 75mm Plate Washers"	
	Generic type	Steel fastener / plate washers	
	Name of manufacturer	Carlisle Syntec	
	Application rate	3 per m <sup>2</sup>	
	Colour reference	Grey	
	Flame retardant details		<b>See Note 2 below</b>

Continued on next page

Deck (reverse face)	Product reference	"OSB3"
	Generic type	OSB3
	Species	See Note 1 below
	Name of manufacturer	See Note 1 below
	Weight per unit area	11.1kg/m <sup>2</sup>
	Thickness	18mm
	Flame retardant details	See Note 2 below
Brief description of manufacturing process		See Note 1 below

**Note 1. The sponsor was unable 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 product / 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 was unwilling to provide this information.**

The description of the specimens as given above is not as detailed as would usually be the case for descriptions included in **Exova Warringtonfire** test reports and the description may not fully comply with the requirements of the test standard. In all other respects however the tests were conducted fully in accordance with the requirements of the test standard and the test results are valid.

## Test Results

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### Results

The test results relate only to the behaviour of the test specimens of the construction under the particular conditions of test, they are not intended to be the sole criterion for assessing the potential fire hazard of the construction in use.

The test results relate only to the specimens of the roof construction which were tested. Small differences in the composition or thickness of the construction may significantly affect the results of the test and may therefore invalidate the test results. Care should be taken to ensure that any construction which is supplied or used is fully represented by the specimens which were tested.

The results of the tests on each of the specimens are given in Table 1.

**In Accordance With The Designations Defined In BS 476: Part 3: 2004 The Test Specimens Are In Category “EXT.F.AC”.**

### 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**

<b>PRELIMINARY IGNITION TEST WITH BURNING BRANDS (STAGE 1)</b>	Specimen No:		
		1	
Room temperature at start of test (°C)	24		
Time to fire penetration (if applicable) (min:sec)	Did not penetrate		
Duration of flaming after withdrawal of the test flame (if applicable) (min:sec)	01:50		
Maximum flame spread distance (if applicable) (mm)	Nil		

<b>SPREAD OF FLAME TEST WITH BURNING BRANDS AND SUPPLEMENTARY RADIANT HEAT (STAGE 2)</b>	Specimen No:		
	2	3	4
Room temperature at start of test (°C)	22	25	25
Duration of flaming after withdrawal of the test flame (if applicable) (min:sec)	44:21	19:27	50:44
Maximum flame spread distance (if applicable) (mm)	840	840	840
Additional observations:			
In the case of all three specimens tested, ignition on the surface of the sample occurred within the first minute of the test.			
In the case of all three specimens tested, flaming reached the end the specimen.			

<b>PENETRATION TEST WITH BURNING BRANDS, WIND AND SUPPLEMENTARY RADIANT HEAT (STAGE 3)</b>	Specimen No:		
	5	6	7
Room temperature at start of test (°C)	28	29	29
Time to fire penetration (if applicable) (min:sec)	Did not penetrate	Did not penetrate	Did not penetrate
Additional observations:			
In the case of each specimen tested, penetration did not occur.			

## Classification Of Specimens

The following is reproduced from Clause 4 of BS 476: Part 3: 2004.

### 4 Classification

#### 4.1 Roof system

Roof systems shall be designated by the letters EXT.F or EXT.S to indicate whether the test results apply to a flat (horizontal) or an inclined roof system, respectively

#### 4.2 Fire Resistance of roof system

##### 4.2.1 Coding system

Roof systems subject to conditions of external fire shall be classified according to both the time of penetration and the distance of spread of flame along their external surface.

Each category designation shall consist of two letters, e.g. AA, AC, BB, these being determined as specified in 4.22 and 4.23

##### 4.2.2 Fire penetration (first letter)

- A. Those specimens that have not been penetrated within one hour
- B. Those specimens that are penetrated in not less than 30 min.
- C. Those specimens that are penetrated in less than 30 min.
- D. Those specimens that are penetrated in the preliminary flame test

##### 4.2.3 Spread of flame (second letter)

- A. Those specimens on which there is no spread of flame
- B. Those specimens on which the spread of flame is less than or equal to 533mm, with averaged results rounded up or down to the whole number, as normally practised
- C. Those specimens on which the spread of flame is greater than 533mm, with averaged results rounded up or down to the whole number, as normally practised
- D. Those specimens that continue to burn for five minutes after withdrawal of the test flame or spread more than 381mm across the region of burning in the preliminary test.

##### 4.2.4 Suffix "X"

Attention shall be drawn to dripping from the underside of the specimen, any mechanical failure, and any development of holes, by adding a suffix "X" to the designation to denote that one or more of these took place during the test.

#### EXAMPLE 1

EXT.F.AA is a flat roofing system with one hour fire penetration resistance on which there was no spread of flame.

#### EXAMPLE 2

EXT.S.CCX is an inclined roofing system with less than 30 min fire penetration resistance, on which the spread of flame exceeded 533mm and further deterioration took place.

## Revision History

Issue No :	Issue Date:
Revised By:	Approved By:
Reason for Revision:	

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Reason for Revision:	