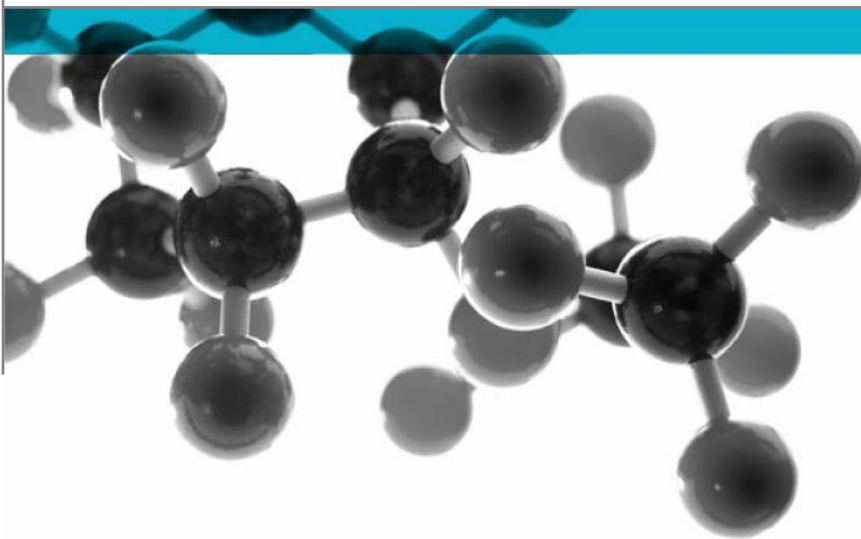


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# BS 476 Part 3: 2004



## External Fire Exposure Roof Test

A Report To: Light Weight Tiles Limited

Document Reference: 348107

Date: 16<sup>th</sup> March 2015

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
Polypropylene tiles screwed to wooden battens and fixed onto a magnesium oxide board	"Re-cycled"	35-55mm*	12.70kg/m <sup>2*</sup>
<b>Individual components used to manufacture composite:</b>			
Tiles	"Roofing Sheets"	3mm	4.72kg/m <sup>2*</sup>
Battens	"Batten"	2 x 1 inch	1 kg/m <sup>2</sup>
Substrate	"Multi-pro XS"	6mm	1203.87kg/m <sup>3</sup>
<b>Please see page 5 and 6 of this test report for the full description of the product tested</b>			

**Test Sponsor** Light Weight Tiles Limited, Unit 138 Lydney Harbour Estate, Lydney ,Gloucester GL15 4EJ


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

**Date of Test:** 25<sup>th</sup> February 2015

## Signatories



Responsible Officer  
K. Hughes \*  
Technical Officer



Authorised  
S. Deeming\*  
Business Unit Head

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

Report Issued: 16<sup>th</sup> March 2015

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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>6</b>
<b>TABLE 1 .....</b>	<b>7</b>
<b>REVISION HISTORY .....</b>	<b>9</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 25<sup>th</sup> February 2015 at the request of Light Weight Tiles Limited, 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 7<sup>th</sup> January 2015. 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 sloping 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		Polypropylene tiles screwed to wooden battens and fixed onto a magnesium oxide board
Product reference of overall composite		"Re-cycled"
Name of manufacturer of overall composite		Light Weight Tiles Limited
Thickness of overall composite		35-55mm (determined by <b>Exova Warringtonfire</b> )
Weight per unit area of overall composite		12.70kg/m <sup>2</sup> (determined by <b>Exova Warringtonfire</b> )
Tiles	Generic type	Polypropylene
	Product reference	"Roofing Sheets"
	Detailed description	Polypropylene roofing sheets with coloured crushed rock granules sprayed with paint
	Name of manufacturer	Light Weight Tiles Limited
	Thickness	3mm (stated by sponsor) 4.8mm (determined by <b>Exova Warringtonfire</b> )
	Weight per unit area	4.72kg/m <sup>2</sup> (determined by <b>Exova Warringtonfire</b> )
	Colour reference	"Brown"
Flame retardant details		<b>See Note 1 below</b>
Fixing details tiles to battens		45mm countersunk screw
Battens	Generic type	Wooden Battens
	Product reference	"Batten"
	Name of supplier	Lydney pallets
	Dimensions	2 x 1 inch
	Weight per unit area	1 kg/m <sup>2</sup>
	Colour reference	"Natural"
	Flame retardant details	
Fixing details battens to substrate		45mm countersunk screw
Substrate	Generic type	Magnesium oxide
	Product reference	"Multi-pro XS"
	Detailed description	Medium density magnesium oxide panel with fibre glass mesh layers
	Name of manufacturer	Resistant Building Products
	Thickness	6mm (stated by sponsor) 6.3mm (determined by <b>Exova Warringtonfire</b> )
	Density	1203.87kg/m <sup>3</sup> (determined by <b>Exova Warringtonfire</b> )
	Colour reference	"White" as observed by <b>Exova Warringtonfire</b> )
	Flame retardant details	
Brief description of manufacturing process		<b>See Note 2 below</b>

**Note 1: The sponsor of the test has confirmed that no flame retardant additives were utilised in the production of the component.**

**Note 2: The sponsor was unwilling to provide this information.**

## Test Results

### 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. S.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)	26		
Time to fire penetration (if applicable) (min:sec)	Did not penetrate		
Duration of flaming after withdrawal of the test flame (if applicable) (min:sec)	3:25		
Maximum flame spread distance (if applicable) (mm)	90mm		

<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	27	27
Duration of flaming after withdrawal of the test flame (if applicable) (min:sec)	67:00	60:00	74:00
Maximum flame spread distance (if applicable) (mm)	840	840	840
Additional observations:			
In the case of all three specimens ignition occurred in the first 2 minutes of the test			

<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)	27	28	28
Time to fire penetration (if applicable) (min:sec)	Did not penetrate	Did not penetrate	Did not penetrate
Additional observations:			
In the case of three specimens 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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