

BS 476: Part 3: 2004

**External Fire Exposure Roof
Test**

WF Report Number:

158117

Date:

13th October 2006

Test Sponsor:

Tapco Europe Limited



Warringtonfire Test Report No 158117

**BS 476: Part 3: 2004
External Fire Exposure Roof Test**

Sponsored By

**Tapco Europe Limited
Unit 32, Tokenspire Business Park, Hull
Road
Woodmansey
East Yorkshire
HU17 OTB**



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Test Details

Purpose of test	<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>
Scope of test	<p>The tests are designed to enable measurement of:</p> <ul style="list-style-type: none">a) capacity of a representative section of a roof to resist penetration by fire when the external surface is exposed to radiation and flame; andb) distance of the spread of flame on the outer surface of the roof covering under certain conditions. <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>
Fire test study group	<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 12th October 2006 at the request of Tapco Europe Limited, the sponsor of the test.</p>
Provision of test specimens	<p>The specimens were supplied by the sponsor of the test. Warringtonfire was not involved in any selection or sampling procedure.</p>
Conditioning of specimens	<p>The specimens were received on the 21st September 2006. 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>
Orientation of specimens	<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		Plastic based roofing tile with an underlay mechanically fixed to a batten and rafter system.
Plastic Tiles (Test Face)	Product reference	"Inspire Slate"
	Composition details	Polypropylene, Limestone, Pigment Blend, UV Absorber and Additives. The sponsor was unable to provide any further information in relation to the composition of the roofing tiles
	Name of manufacturer	Inspire Slate
	Tile size	288mm x 438mm
	Weight per unit area	4.76kg/m ²
	Thickness	Tapers from a thickness of 7mm at the top of the tile to 3.5mm at the bottom edge.
	Colour	"Grey"
	Flame retardant details	See Note 1 Below
Underlay	General description	Roofing Underlayment
	Product reference	"Layfast SBS TU-35"
	Composition details	Asphalt, Fiberglass, Rubber, Sand, Granules. The sponsor was unable to provide any further information in relation to the composition of the underlay.
	Name of manufacturer	MB Technology
	Weight per unit area	1.81kg/m ²
	Thickness	1.1mm
	Colour	Black
	Flame retardant details	See Note 2 Below
Brief description of manufacturing process	See Note 2 Below	
Mounting and fixing details	The specimens were fixed to a 50mm x 50mm wooden frame with 30mm x 30mm wooden battens with ¾" clout nails.	

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

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

Test Results

Results of test

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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Signatories


Responsible Officer A Myler*


Approved I Moore * Laboratory Supervisor


Head of Department P E Lythgoe *

* For and on behalf of warringtonfire.

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Table 1

PRELIMINARY IGNITION TEST WITH BURNING BRANDS (STAGE 1)	Specimen No:
Room Temperature at Start of Test (°C)	16
Time to Fire Penetration (if applicable) (min:sec)	N/A
Duration of Flaming after Withdrawal of the Test Flame (if applicable) (min:sec)	1:11
Maximum Flame Spread Distance (if applicable) (mm)	N/A

SPREAD OF FLAME TEST WITH BURNING BRANDS AND SUPPLEMENTARY RADIANT HEAT (STAGE 2)	Specimen No:		
	2	3	4
Room Temperature at Start of Test (°C)	29	28	29
Duration of Flaming after Withdrawal of the Test Flame (if applicable) (min:sec)	79:08	88:12	78:26
Maximum Flame Spread Distance (if applicable) (mm)	580	630	590
Other observations:			
<p>In the case of each specimen, ignition occurred upon application of the pilot flame during the third minute of the test.</p> <p>In the case of each specimen, flaming remained upon removal of the pilot flame during the fourth minute of the test and began to spread down over the specimen surface from the fifth minute of the test.</p>			

PENETRATION TEST WITH BURNING BRANDS, WIND AND SUPPLEMENTARY RADIANT HEAT (STAGE 3)	Specimen No:		
	5	6	7
Room Temperature at Start of Test (°C)	30	30	30
Time to Fire Penetration (if applicable) (min:sec)	N/A	N/A	N/A
Other observations:			
<p>In the case of each specimen, ignition occurred upon application of the pilot flame during the sixth minute of the test.</p> <p>In the case of each specimen, flaming remained upon removal of the pilot flame at six minutes and continued to the end of the test duration.</p> <p>In the case of each specimen fire penetration did not occur.</p>			

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 there is not more than 533mm spread of flame
- C. Those specimens on which there is more than 533mm spread of flame
- 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.



Bodycote warringtonfire Testing • Holmesfield Road • Warrington • Cheshire • WA1 2DS • United Kingdom
Tel: +44 (0) 1925 655 116 • Fax: +44 (0) 1925 655 419 • Email: Info@warringtonfire.net • Website: www.warringtonfire.net

