

test report

BS 476: Part 3: 2004

**External Fire Exposure
Roof Test**

WF Report Number:

151008

Date:

19th December 2005

Test Sponsor:

**Phoenix
Dichtungstechnik
GmbH**

Warringtonfire Test Report No 151008

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

Sponsored By

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CONTENTS	PAGE NO.
TEST DETAILS	4
DESCRIPTION OF TEST SPECIMENS	5
TEST RESULTS	8
SIGNATORIES	9
Table 1	10



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>
Scope of test	<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> <p>The tests are designed to enable measurement of:</p> <ol 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; and b) distance of the spread of flame on the outer surface of the roof covering under certain conditions.
Fire test study group	<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> <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 30th November and 1st December 2005 at the request of Phoenix Dichtungstechnik GmbH 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 16th November 2005. 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 position 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 mechanically fixed insulated roof construction applied to a plywood deck	
Product reference		"Resitrix MB" mechanical fixing system	
Specimen configuration		Cap sheet / Insulation / Vapour control layer / Plywood deck	
Overall thickness		Approximately 102.1 mm	
Overall weight per unit area		16.92kg/m ² (as determined by warringtonfire)	
Cap Sheet (Test Face)	Generic type	Heat-weldable synthetic rubber (EPDM) waterproofing membrane	
	Product reference	"Resitrix MB"	
	Colour reference	"Black"	
	Weight per unit area	3.5 kg/m ²	
	Thickness	3.1 mm	
	Flame retardant details	See Note 1 Below	
Fixing details		Mechanically fixed utilising fixing agents "SFS IRD 40x82 ISO FAST" through the cap sheet, insulation, vapour control layer and deck to fix the whole specimen together.	
Foil Faced Insulation	Facing	Product reference	"Kingspan TR 26"
		Generic type	Aluminium foil
		Name of manufacturer	Kingspan Insulation B.V.
		Density / weight per unit area	See Note 2 Below
		Thickness	See Note 2 Below
		Colour	"Silver"
		Flame retardant details	See Note 1 Below
	Bonding Details (Facing to insulation)		Auto adhesively bonded during the manufacturing process
	Insulation	Product reference	"Kingspan TR 26"
		Generic type	Polyisocyanurate
		Name of manufacturer	Kingspan Insulation B.V.
		Density	32 kg/m ³
Thickness		80 mm	
Flame retardant details		See Note 1 Below	



Vapour Control Layer	General description	General description of vapour control layer	Glass reinforced self adhesive aluminium vapour barrier
		Product reference	"ALUTRIX"
		Colour reference of vapour control layer	"Silver"
		Overall weight per unit area of vapour control layer	Approximately 0.9 kg/m ²
		Overall thickness of vapour control layer	1.0 mm
	Layer 1 (Aluminium vapour barrier)	Product reference	See Note 2 Below
		Generic type	Aluminium layer
		Name of manufacturer	See Note 2 Below
		Thickness	31 microns
		Weight per unit area	Approximately 55g/m ²
		Colour reference	"Silver"
		Flame retardant details	See Note 1 Below
	Layer 2 (reinforcement)	Product reference	See Note 2 Below
		Generic type	Glass reinforcement
		Name of manufacturer	See Note 2 Below
		Thickness	0.30 mm
		Weight per unit area	Approximately 60g/m ²
		Flame retardant details	See Note 1 Below
	Layer 3 (self-adhesive layer)	Product reference	See Note 2 Below
		Generic type	Self-adhesive-bitumen
		Name of manufacturer	Phoenix-Dichtungstechnik GmbH
		Thickness	Approximately 0.60 mm
		Weight per unit area	Approximately 600 g/m ²
		Colour reference	"Black"
	Primer (Bonding vapour control layer to plywood deck)	Flame retardant details	See Note 1 Below
		Generic type	Surface primer
		Product reference	"FG 35"
		Colour reference	"Black"
Application rate		Approximately 200 g/m ²	
Application method		Brush and roller	
Thickness		See Note 2 Below	
Flame retardant details		See Note 1 Below	
Deck (Reverse Face)	Product reference	See Note 2 Below	
	Generic type	Marine plywood	
	Name of manufacturer	See Note 2 Below	
	Weight per unit area	9.3 kg/m ²	
	Thickness	18 mm	
	Flame retardant details	See Note 1 Below	
Jointing Details		100mm side lap in cap sheet on one specimen subjected to the fire penetration section of the test. 100mm end lap in cap sheet on one specimen subjected to the spread of flame section of the test.	



Brief description of manufacturing process	<ul style="list-style-type: none">▪ Priming of plywood with "FG35"▪ Vapour control layer bonded to plywood (self adhesive)▪ "Kingspan TR 26" insulation and "Resitrix MB" cap sheet mechanically fixed to plywood utilising "SFS IRD 40x82 ISO FAST" fixing agents.
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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 unwilling 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.F.AB".

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 *

* For and on behalf of warringtonfire.

Report Issued: 19th December 2005



Table 1

PRELIMINARY IGNITION TEST WITH BURNING BRANDS (STAGE 1)	Specimen No:	
		1
Room Temperature at Start of Test (°C)	22	
Time to Fire Penetration (if applicable) (min:sec)	n/a	
Duration of Flaming after Withdrawal of the Test Flame (if applicable) (min:sec)	1:17	
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)	24	25	24
Duration of Flaming after Withdrawal of the Test Flame (if applicable) (min:sec)	70:00	42:00	59:00
Maximum Flame Spread Distance (if applicable) (mm)	270	200	180
Other observations:			
In the case of each specimen ignition occurred from the first minute of application of the pilot flame, and flame spread began from the third minute of the test.			

PENETRATION TEST WITH BURNING BRANDS, WIND AND SUPPLEMENTARY RADIANT HEAT (STAGE 3)	Specimen No:		
	5	6	7
Room Temperature at Start of Test (°C)	28	29	28
Time to Fire Penetration (if applicable) (min:sec)	n/a	n/a	n/a
Other observations:			
In the case of each specimen no fire penetration occurred.			



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.

