

BS 476: Part 3: 2004

**External Fire Exposure
Roof Test**

WF Report Number:

171512

Date:

7th May 2008

Test Sponsor:

Cray Valley Limited



0249

Bodycote warringtonfire
Test Report No 171512

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

Sponsored By

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Test Details

Purpose of test	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".
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	The test was conducted on the 4 th April 2008 at the request of Cray Valley Limited, the sponsor of the test.
Provision of test specimens	The specimens were supplied by the sponsor of the test. Bodycote warringtonfire was not involved in any selection or sampling procedure.
Conditioning of specimens	The specimens were received on the 4 th March 2008. 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%.
Orientation of specimens	The specimens were tested in the flat position.

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 flame retardant grade coated, glass fibre reinforced composite based on an unsaturated polyester resin	
Product reference / trade name		"Glass Fibre Composite Flat Panel With Fire Retardant Top Coat"	
Name of manufacturer		Cray Valley Ltd	
Colour reference		Neutral (Grey)	
Overall thickness		3-4 mm (stated by sponsor) 2.5mm (determined by Bodycote warringtonfire)	
Overall weight per unit area / density		3.5 kg/m ² (stated by sponsor) 2.8kg/m ² (determined by Bodycote warringtonfire)	
Final coating product (Test face)	Generic type	Polyester based top coat	
	Product reference / trade name	"Polycor Iso Brush Fire Retardant Top Coat"	
	Name of manufacturer	Cray Valley Ltd	
	Colour	Neutral (Grey)	
	Number of coats	One	
	Application rate per coat	800g/m ²	
	Application method	Brush	
	Specific gravity	1.5	
	Flame retardant details	See Note 1 Below	
Curing process per coat	Ambient cure on addition of 1.5-2.5% MEKP b/w		
Moulded Sheet	General description		A glass fibre reinforced composite based on an unsaturated polyester resin
	Product reference / trade name		The sponsor of the test has stated the component does not have a product reference or trade name.
	Resin	Generic type	Unsaturated polyester
		Product reference / trade name	"Norsodyne E9268 resin"
		Name of manufacturer	Cray Valley Ltd
		Flame retardant details	See Note 1 Below
	Glass reinforcement	Type	Glass fibre mat
		Product reference / trade name	"PPG Emulsion Bound Chopped Strand Mat"
		Number of layers	Two
		Weight per unit area of each layer	450g/m ²
		Configuration of glass reinforcement	Emulsion Bound Chopped Strand
	Name of manufacturer	PPG	
	Resin to glass ratio (by weight)		2:1
Brief description of manufacturing process		Ambient cured using MEKP 50 catalyst.	

Note 1 : 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



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* For and on behalf of **Bodycote warringtonfire**

Report Issued: 7th May 2008

Table 1

PRELIMINARY IGNITION TEST WITH BURNING BRANDS (STAGE 1)	Specimen No:		
	1		
Room Temperature at Start of Test (°C)	20		
Time to Fire Penetration (if applicable) (min:sec)	N/A		
Duration of Flaming after Withdrawal of the Test Flame (if applicable) (min:sec)	N/A		
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	24	25
Duration of Flaming after Withdrawal of the Test Flame (if applicable) (min:sec)	3:15	4:58	27:00
Maximum Flame Spread Distance (if applicable) (mm)	40	20	20
Other observations:			
In the case of each specimen ignition occurred upon application of the pilot flame during the first 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	29
Time to Fire Penetration (if applicable) (min:sec)	N/A	N/A	N/A
Other observations:			
In the case of specimen No.6 ignition occurred upon application of the pilot flame during the sixth minute of the test, and all flames ceased during the twenty-fifth minute of the test.			
In the case of specimen No.s 6 and 7, ignition did not occur.			
In the case of each specimen fire 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 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.