test report

BS 476: Part 7: 1997

Method For Classification Of The Surface Spread Of Flame Of Products

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Test Sponsor:

Filon Products Limited

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Warringtonfire Test Report No. 153324 (Issue 2)

BS 476: Part 7: 1997
Method For Classification Of The
Surface Spread Of Flame Of Products

Sponsored By

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CONTENTS **PAGE NO.**

Test Details

Purpose of test	To determine the performance of a product when it is subjected to the conditions of the test specified in BS 476: Part 7: 1997, "Fire tests on building materials and structures, method for classification of the surface spread of flame of products". This test was therefore performed in accordance with the procedure specified in BS 476: Part 7: 1997, and this report should be read in conjunction with that British Standard.
Scope of test	BS 476: Part 7: 1997 specifies a method of test for measuring the lateral spread of flame along the surface of a specimen of a product orientated in the vertical position, and a classification system based on the rate and extent of flame spread. It provides data suitable for comparing the performances of essentially flat materials, composites, or assemblies, which are used primarily as the exposed surfaces of walls or ceilings.
Fire test study group/EGOLF	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.
Instruction to test	The test was conducted on the 21st March 2006 at the request of Filon Products Limited, the sponsor of the test.
Provision of test specimens	The specimens were supplied by the sponsor of the test. Warringtonfire was not involved in any selection or sampling procedure.
Conditioning of specimens	The specimens were received on the 13th March 2006 and were conditioned to constant mass at a temperature of 23 ± 2°C and a relative humidity of 50 ± 5% prior to testing.
Form in which the specimens were tested	Assembly
Specimen mounting	Each specimen was placed over 25mm thick by 20mm wide calcium silicate based spacers positioned around its perimeter and mounted onto a backing board so that a 25mm enclosed air gap was provided between the unexposed face of the specimen and the backing board.
Exposed face	The film face of the specimens was exposed to the heating conditions of the test

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			UV protected GRP resin sheet
Product reference			"Filon Grade G300"
Name of manufacturer			Filon Products Limited
Overall thickness			1.2mm
Overall weight per unit area			1.83kg/m²
Film		Generic type	UV resistant polyester film
		Product reference	**See Note 1 below**
		Name of manufacturer	**See Note 1 below**
		Colour	"Transparent"
		Thickness	20 microns
		Weight per unit area	36m²/kg
		Flame retardant details	**See Note 2 below**
		Bonding	The film was applied to the GRP during the manufacturing process
Moulded Sheet	General description		Glass fibre reinforced polyester resin laminate sheet
	Product reference		"Filon Roofing Sheet"
	Thickness		1.2mm
	Weight per unit area		1.83kg/m²
	Resin	Generic type	Flame retardant grade polyester resin
		Product reference	**See Note 1 below**
		Name of manufacturer	**See Note 1 below**
		Flame retardant details	**See Note 3 below**
	Glass reinforcement	Type	Chopped glass roving fibres
		Product reference	**See Note 1 below**
		Number of layers	**See Note 3 below**
		Weight per unit area of each layer	**See Note 3 below**
		Configuration of glass reinforcement	**See Note 3 below**
		Name of manufacturer	**See Note 1 below**
	Resin to glass ratio (by weight)		33% typical
	Percentage glass reinforcement (by weight)		2:1
Brief description of manufacturing process			**See Note 1 below**

Note 1. The sponsor of the test has provided this information but, at the request of the sponsor, these details have been omitted from the report and are held in the confidential file relating to this investigation

Note 2. The sponsor of the test has confirmed that no flame retardant additives were utilised in the production of the component

Note 3. The sponsor of the test was unable to provide this information

Test Results

Results and observations

The test results for the individual specimens, together with observations made during the test and comments on any difficulties encountered during the test are given in Table 1.

Classification

In accordance with the class definitions given in BS 476: Part 7: 1997, the specimens tested are classified as class 3.

Criteria for classification

If the prefix 'D' or suffix 'R' or 'Y' is included in the classification, this indicates that the results should be treated with caution. An explanation of the reason for the prefix and suffixes is given in Appendix 1, together with the irradiance along the horizontal reference line of the specimen position during the test and the classification limits specified in the Standard.

Applicability of test result

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

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

Attention is drawn to Appendix 2 entitled "Effect of thermal characteristics on the performance of assemblies".

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.

Signatories

Responsible Officer
T. Mort*

Approved
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Laboratory Supervisor

* For and on behalf of warringtonfire.

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Table 1

SPECIMEN No.	1	2	3	4	5	6
Maximum distance travelled at 1.5 minutes (mm)	210	210	205	215	180	225
Distance (mm)	Time to travel to indicated distance (minutes : seconds)					
75	0:26	0:32	0:30	0:31	0:39	0:28
165	1:09	1:20	1:17	1:04	1:24	1:10
190	1:21	1:28	1:23	1:19	1:32	1:14
215	1:38	1:49	1:36	1:29	1:49	1:23
240	1:49	1:51	1:50	1:48	2:15	1:43
265	2:01	2:07	1:58	2:08	2:25	2:01
290	2:19	2:34	2:28	2:31	2:40	2:15
375	3:58	4:21	4:07	4:16	3:57	4:12
455	7:29	7:45	7:44	7:39	7:06	7:31
500	9:54			9:57	9:39	
525						
600						
675						
710						
750						
785						
825						
Time to reach maximum distance travelled	10:00	10:00	10:00	10:00	10:00	10:00
Maximum distance travelled in 10 minutes (mm)	500	490	490	500	510	490

Note: Six specimens are usually tested. If the test on any specimen is deemed to be invalid, as defined in the Standard, it is permissible for up to a maximum of nine specimens to be tested in order to obtain the six valid test results.

Observations made during test and comments on any difficulties encountered during the test:

NONE

Appendix 1

Irradiance along the horizontal reference line of the specimen position during the test

Distance along reference line from the hotter end of the specimen position (mm)	75	225	375	525	675	825
Irradiance at points specified above (kW/m^2)	32.5	21.0	14.5	10.0	7.0	5.0

Note: A tolerance of ± 0.5 kW/m^2 is specified on the irradiance measurement

Classification of spread of flame

Classification	Spread of Flame at 1.5 min		Final Spread of Flame	
	Limit (mm)	Limit for one specimen (mm)	Limit (mm)	Limit for one specimen (mm)
Class 1	165	165 + 25	165	165 + 25
Class 2	215	215 + 25	455	455 + 25
Class 3	265	265 + 25	710	710 + 25
Class 4	Exceeding the limits for class 3			

Explanation of prefix and suffixes which may be added to the classification

1. A suffix R is added to the classification if more than six specimens are required in order to obtain six valid test results (e.g. class 2R).
2. A prefix D is added to the classification of any product which does not comply with the surface characteristics specified in the Standard and has therefore been tested in a modified form (e.g. class D3).
3. A suffix Y is added to the classification if any softening and/or other behaviour that may affect the flame spread occurs (e.g. class 3Y).

For example, a classification of D3RY could be achieved indicating (a) a modified surface has been used; (b) a class 3 result has been obtained; (c) additional specimens have been used to obtain 6 valid results and; (d) softening and/or other behaviour has occurred which is considered to have affected the test result.

Appendix 2

Effect of thermal characteristics on the performance of specimens

The result of the test in accordance with BS 476: Part 7: 1997 is applicable only to the specimens in the form in which they were tested. Small differences in the composition or thickness of the product may significantly affect the performance during the test and may therefore invalidate the test result. It is important that the specimens which are tested fully represent the product which is supplied and the manner in which it will be used. This may require a product to be tested in a number of different ways to determine the classification which will be achieved in its different methods of use.

A surface coating, for example, may be applied to a selected substrate using a particular method and application rate. The test classification which is achieved for that set of specimens will be applicable only to that situation. If the substrate or method and rate of application in a particular practical situation are different from that which was tested, then it will be necessary to determine the classification which will be achieved for that situation. Similarly, specimens incorporating a wallcovering must be fully representative of the situation which occurs in practice and will normally consist of the wallcovering bonded to a chosen substrate with a chosen adhesive; the test result will only apply to that composite system. The same principle applies to any composite or assembly which is being investigated.

It is sometimes possible to assume a `worst case' situation which will enable a chosen set, or sets, of specimens to be constructed and tested to provide a foundation for the assessment of the probable performance of variations within the system. Similarly, it is sometimes possible to formulate a series of exploratory tests to investigate the effect of variations within a product or system, usually culminating in a series of formal tests to provide the basis for a composite assessment of pre-determined variables. In such cases, however, it is essential that careful planning of the programmes is undertaken by suitably qualified fire safety practitioners.

The following is re-produced from Appendix B of BS 476: Part 7: 1997;

With thin materials or composites, particularly those with a high thermal conductivity, the presence of an air gap and the nature of any underlying construction may significantly affect the ignition performance of the exposed surface. Increasing the thermal capacity of the underlying construction increases the "heat sink" effect and may delay ignition of the exposed surface. Any backing provided to the test specimen and in intimate contact with it, such as the non-combustible spacers, may alter this "heat sink" effect and may be fundamental to the test result itself. The influence of the underlying layers on the performance of the assembly should be understood and care should be taken to ensure that the result obtained on any assembly is relevant to its use in practice.

The following advice is offered on the construction and preparation of test specimens;

(a) Where the thermal properties of the product are such that no significant heat loss to the underlying layers can occur, e.g. a material or composite greater than approximately 6 mm thick of high thermal capacity and/or low thermal conductivity, then the product should be tested backed only by the backing board.

(b) Where the product is normally used as a free-standing sheet and the characteristics noted in (a) do not apply, then an air space should be provided at the back of the product by testing over spacers of non-combustible insulation board 20 mm wide and (25 ± 1)mm thick.

(c) Where the product is to be used over a low density non-combustible substrate and the characteristics noted in (a) do not apply, then the product should be tested in conjunction with that substrate.

(d) Where the product is to be used over a combustible substrate and the characteristics noted in (a) do not apply, then the product should be tested in conjunction with that substrate.

NOTE: Discussions are taking place in ISO/TC92/SC1 concerning the possible use of a restricted range of reference substrates (mainly non-combustible) where it is not apparent or possible to test materials or products in the representative end-use substrate.