test report

Bodycote

BS 476: Part 6: 1989

Method Of Test For
Fire Propagation For Products

WF Report Number

182136 (Issue 2)

Date:

13th May 2009

Test Sponsor:

Eurobond Insustries Pvt. Ltd.

warringtonfire
global safety
TESTING

UKAS TESTING

0249

Bodycote warringtonfire Test Report No. 182136
(Issue 2)

BS 476: Part 6: 1989
Method Of Test For
Fire Propagation For Products

Sponsored By

Eurobond Industries Pvt. Ltd.
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India

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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 6: 1989, "Fire tests on building materials and structures, method for fire propagation for products".

The test was performed in accordance with the procedure specified in BS 476: Part 6: 1989, and this report should be read in conjunction with that British Standard.

Scope of test

BS 476: Part 6: 1989 specifies a method of test, the result being expressed as a fire propagation index, that provides a comparative measure of the contribution to the growth of fire made by an essentially flat material, composite or assembly. It is primarily intended for the assessment of the performance of internal wall and ceiling linings.

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 has 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 8th & 9th April 2009 at the request of Eurobond Industries Pvt. Ltd., 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 for testing to BS 476: Part 6: 1989 together with the specimens for testing to BS 476: Part 7: 1997 were received on the 6th May 2009.

Prior to the tests, all of the specimens were conditioned to constant mass at a temperature of 23 ± 2°C and a relative humidity of 50 ± 5%. One specimen from the total sample submitted for test was selected for constant mass verification

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 face coated with the PVDF coating 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		A composite panel comprising coated aluminium facings adhered to an LDPE core
Product reference of composite		"EUROBOND-FR"
Name of manufacturer of composite		Eurobond Industries Pvt. Ltd.
Thickness of composite		4mm (stated by sponsor) 4.13mm (determined by **Bodycote warringtonfire**)
Weight per unit area of composite		6.5 kg/m^2 (stated by sponsor) 6.76kg/m^2 (determined by **Bodycote warringtonfire**)
Coating (test face)	Product reference	"Kynar 500"
	Generic type	PVDF (Polyvinylidene Difluoride)
	Name of manufacturer	Becker Industrial Coating
	Colour	"Bright Silver"
	Application rate	**See Note 1 below**
	Application thickness	Between 28 and 32 microns
	Application method	Hot roller coating
	Specific gravity	**See Note 2 below**
	Flame retardant details	**See Note 2 below**
Facing	Product reference	"Front Aluminium Foil"
	Generic type	Aluminium alloy 1100-H18
	Name of manufacturer	Lite Source Hong Kong Ltd.
	Weight per unit area	1.36kg/m^2
	Thickness	0.50mm
	Flame retardant details	The aluminium is inherently flame retardant
Adhesive	Product reference	"DUPONT"
	Generic type	Polymer based film The sponsor was unable to provide further information relating to the generic type of the component
	Name of manufacturer	DuPont
	Application thickness	0.07mm
	Application method	Bonding between core and aluminium is through heating
	Flame retardant details	**See Note 2 below**
Core	Product reference	"Lite Source Hong Kong Ltd."
	Generic type	Flame retardant grade LDPE (Low Density Polyethylene)
	Colour	"White"
	Name of manufacturer	Lite Source Hong Kong Ltd.
	Weight per unit area	3.79kg/m^2
	Thickness	3mm
	Flame retardant details	**See Note 2 below**

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Adhesive	Product reference	"DUPONT"
	Generic type	Polymer based film The sponsor was unable to provide further information relating to the generic type of the component
	Name of manufacturer	DuPont
	Application thickness	0.07mm
	Application method	Bonding between core and aluminium is through heating
	Trade name of flame retardant	**See Note 2 below**
Backing	Product reference	"Back Aluminium Foil"
	Generic type	Aluminium alloy 1100-H18
	Name of manufacturer	Lite Source Hong Kong Ltd.
	Weight per unit area	1.36kg/m^2
	Thickness	0.50mm
	Flame retardant details	The aluminium is inherently flame retardant
Coating (reverse face)	Product reference	"Back Coating"
	Generic type	Anti corrosive coating / service coating The sponsor was unable to provide further information relating to the generic type of the component
	Name of manufacturer	Becker Industrial Coating
	Colour	"Grey / White"
	Application rate	**See Note 1 below**
	Application thickness	Between 6 and 10 microns
	Application method	Hot roller coating
	Specific gravity	**See Note 1 below**
	Flame retardant details	**See Note 2 below**
Brief description of manufacturing process		The FR LDPE granules are blended together and then auto loaded into another chamber. The moisture is removed from the blended mixture before it is extruded. After extruding the dried mixture, is it then formed into a sheet of the desired thickness with the help of calendaring. The coated aluminium is then adhered to the LDPE sheet with the help of the adhesive film. In the cooling stage the composite sheets are cooled and levelled and a protective film is applied. The aluminium composite panel is than marked as per operations for traceability. This includes marking the manufacturing date, batch number etc. The aluminium composite panel is then taken off after trimming and cutting into desired sizes.

Note 1. The sponsor of the test was unwilling to provide this information.

Note 2. The sponsor of the test was unable to provide this information.

Test Results

Results

A total of three specimens were tested. The laboratory record sheet relating to each of the test specimens is appended to this report (refer to Tables 1, 2 and 3).

Throughout the test on each specimen careful observation was made of the product's behaviour within the apparatus and special note was taken of any of the phenomena listed in clause 9.2 of the Standard. None of the listed phenomena was observed and the test results on all three specimens tested were valid.

The following test results were obtained for the product.

Fire propagation index, I	**=**	**2.5**
Sub index, i_1	**=**	**1.8**
Sub index, i_2	**=**	**0.6**
Sub index, i_3	**=**	**0.1**

NOTE: If a suffix 'R' is included in the above fire propagation index, I, then this indicates that the results should be treated with caution.

Applicability of test results

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.

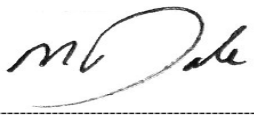
Attention is drawn to Appendix 1, entitled 'Effect of thermal characteristics on the performance of assemblies'.

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
S. Deeming *



Approved
M. Dale *
Deputy Operations Manager

Authorised
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Operations Manager

* For and on behalf of **Bodycote warrington**fire.

Report Issued: 13th May 2009

Table 1

Laboratory Record Sheet

FIRE PROPAGATION TEST - BS 476 : PART 6 : 1989

Specimen No. : 1 **Date : 8-Apr-09**

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts-Tc/10t	Sub Index Of Performance
0.50	17	12	1.00	
1.00	23	19	0.40	
1.50	27	25	0.13	
2.00	32	29	0.15	
2.50	35	31	0.16	
3.00	40	36	0.13	1.98
4.00	62	61	0.03	
5.00	96	99	0.00	
6.00	127	129	0.00	
7.00	153	147	0.09	
8.00	179	168	0.14	
9.00	189	184	0.06	
10.00	201	198	0.03	0.33
12.00	220	214	0.05	
14.00	236	227	0.06	
16.00	242	238	0.03	
18.00	250	247	0.02	
20.00	253	251	0.01	0.17
Total Index of Performance S			**=**	**2.48**

SubIndex s1 **1.98**

SubIndex s2 **0.33**

SubIndex s3 **0.17**

Index of Performance S **2.48**

Table 2

Laboratory Record Sheet

FIRE PROPAGATION TEST - BS 476 : PART 6 : 1989

Specimen No. : 2 **Date : 8-Apr-09**

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	17	12	1.00	
1.00	21	19	0.20	
1.50	26	25	0.07	
2.00	31	29	0.10	
2.50	38	31	0.28	
3.00	42	36	0.20	1.85
4.00	64	61	0.08	
5.00	94	99	0.00	
6.00	123	129	0.00	
7.00	145	147	0.00	
8.00	162	168	0.00	
9.00	178	184	0.00	
10.00	202	198	0.04	0.12
12.00	223	214	0.08	
14.00	234	227	0.05	
16.00	246	238	0.05	
18.00	248	247	0.01	
20.00	253	251	0.01	0.19
Total Index of Performance S			**=**	**2.15**

SubIndex s1 **1.85**

SubIndex s2 **0.12**

SubIndex s3 **0.19**

Index of Performance S **2.15**

Table 3

Laboratory Record Sheet

FIRE PROPAGATION TEST - BS 476 : PART 6 : 1989

Specimen No. : 3 **Date : 9-Apr-09**

Time mins t	Specimen Temperature Deg C Ts	Calibration Temperature Deg C Tc	Ts- Tc/10t	Sub Index Of Performance
0.50	15	12	0.60	
1.00	22	19	0.30	
1.50	28	25	0.20	
2.00	32	29	0.15	
2.50	35	31	0.16	
3.00	41	36	0.17	1.58
4.00	68	61	0.18	
5.00	114	99	0.30	
6.00	142	129	0.22	
7.00	164	147	0.24	
8.00	180	168	0.15	
9.00	197	184	0.14	
10.00	202	198	0.04	1.27
12.00	216	214	0.02	
14.00	235	227	0.06	
16.00	245	238	0.04	
18.00	248	247	0.01	
20.00	254	251	0.02	0.14
Total Index of Performance S			**=**	**2.98**

SubIndex s1 **1.58**

SubIndex s2 **1.27**

SubIndex s3 **0.14**

Index of Performance S **2.98**

Appendix 1

Effect of thermal characteristics on the performance of specimens

The result of a test in accordance with BS 476: Part 6: 1989 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 6: 1989:

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 packing pieces, 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/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 specimen holder.

(b) Where the product is normally used as a free-standing sheet and the characteristics noted in (a) do not apply, then an airspace should be provided at the back of the product by testing over asbestos cement perimeter battens 20 mm wide and 12.5 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.

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