test report

Bodycote

IMO Resolution A.653 (16) Amended By Resolution MSC 61 (67): Annex 1, Part 5

Fire Test Procedures For Surface Flammability Of Materials

WF Report Number:

157167

Date:

20th September 2006

Test Sponsor:

International Paint Limited

UKAS TESTING
0249

warringtonfire
global safety

Warringtonfire Test Report No. 157167

International Maritime Organisation Resolution A653 (16) Fire Test Procedures For Surface Flammability Of Bulkhead, Ceiling And Deck Finish Materials As Amended By Resolution MSC 61 (67): Annex 1, Part 5

Sponsored By

International Paint Limited
Stoneygate Lane
Felling
Gateshead
NE10 0JY

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Test Details

Summary

A test has been conducted in accordance with IMO Resolution A.653(16) as amended by Resolution MSC 61 (67): Annex 1, Part 5 on the specimens detailed in this report. The following calculated results were obtained:

Heat for sustained burning (Qsb)	=	11.82	MJ/m^2
Critical flux at extinguishment (CFE)	=	35.70	kW/m^2
Peak heat release rate (Qp)	=	0.88	kW
Total heat release (Qt)	=	0.11	MJ

The specimens meet all the criteria given in the IMO document and can therefore be considered to have low flame spread in compliance with the International Convention for the Safety of Life at Sea, 1974.

The Total Heat Release (Q_t) is not more than 0.2MJ and the Peak Heat Release Rate (Q_p) is not more than 1.0kW. Therefore, in accordance with Paragraph 2.2 of Annex 2 to IMO Resolution MSC 61(67), it is considered that the specimens covered by this report comply with the requirements of Part 2 of Annex 1 'Smoke and Toxicity Test' to IMO Resolution MSC 61(67).

Scope of test

International Maritime Organisation Resolution A653 (16) as amended by Resolution MSC 61 (67): Annex 1, Part 5 "Recommendation on Improved Fire Test Procedures for Surface Flammability of Bulkhead, Ceiling and Deck-Finish Materials", specifies a procedure for measuring fire characteristics of bulkhead, ceiling and deck finish materials as a basis for characterising their flammability and thus their suitability for use in maritime construction.

The Resolution 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 together with a method for determining the heat released by the specimen during exposure to a defined gradient of irradiance. It also details a classification system based on critical flux at extinguishment, heat for sustained burning, peak heat release rate and total heat release.

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.

Test procedure

The tests were performed in accordance with the procedure specified in IMO Resolution A653 (16) as amended by Resolution MSC 61 (67): Annex 1, Part 5, utilising an Acetylene/air pilot flame and it is advised that this report is read in conjunction with that document.

The test method involved mounting each conditioned specimen in a defined gradient of radiant flux (see Appendix I) and measuring the time to ignition, spread of flame, its final extinguishment distance together with a stack thermocouple signal as an indication of heat release by the specimen during burning.

Instruction to test

The test was conducted on the 16th August 2006 at the request of International Paint 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 11th August 2006. Prior to the tests, the specimens were conditioned to constant mass at a temperature of 23 ± 2°C and a relative humidity of 50 ± 10%.

Exposed face

The coated face of the specimens was exposed to the radiant heat of the furnace when the specimens were mounted in the test 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 two-coat coating system (product reference "Interior Primer 860" / "Interior Finish 750"), applied to one face of a 3mm thick steel sheet substrate
Product reference of coating system		"Interior Primer 860" / "Interior Finish 750"
Overall coating system thickness		165 microns
Final coating product (Test face)	Generic type	A two-pack polyurethane finish coating
	Product reference	"Interior Finish 750"
	Name of manufacturer	International Paints Limited
	Colour	White
	Number of coats	One
	Application rate	The coating was applied to a thickness of 40 microns dry film thickness
	Application method	Conventional Spray
	Specific gravity	1.27
	Flame retardant details	**See 'Note 1' below**
	Curing process per coat	No specific curing process
First coating product	Generic type	An epoxy / amine based primer
	Product reference	"Interior Primer 860"
	Name of manufacturer	International Paints Limited
	Colour	White
	Number of coats	One
	Application rate	The coating was applied to a thickness of 125 microns dry film thickness
	Application method	Airless Spray
	Specific gravity	1.45
	Flame retardant details	**See 'Note 1' below**
	Curing process per coat	No specific curing process
Substrate	Trade name / product reference	"Steel (Marine grade)"
	Generic type	Steel (Marine grade)
	Name of manufacturer	**See 'Note 2' below**
	Thickness	3mm
	Density / weight per unit area	**See 'Note 2' below**
	Flame retardant details	The substrate is inherently flame retardant
	Preparation details	Grit blasted to SA 2.5 prior to the application of the coating
Brief description of manufacturing process of coatings		Factory manufactured by High Speed Disperser

Note 1 – The sponsor stated that no flame retardant additives were utilised in the production of the coating.

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

Test Results

Duration of test

The test is terminated when any one of the following is applicable;

I. The specimen fails to ignite after a 10 minute exposure.

II. Three minutes have passed since all flaming from the specimen ceased.

III. Flaming reaches the end of the specimen or self extinguishes and thus ceases to progress along the specimen. This criterion is only used when heat release measurements are not being made.

IV. In the case of floorcoverings, the test shall be terminated after 40 minutes.

For each of the specimens, the test was terminated three minutes after all flaming had ceased.

Test results

The test results relate only to the behaviour of the specimens of the product under the particular conditions of the 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 manufactured product in the form in which they are 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.

The test results relating to the spread of flame parameters 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. The heat release data generated during each of the tests is given in Appendix II.

Classification

Materials giving values for all the surface flammability criteria not exceeding those listed below are considered to meet the requirement for low flame spread in compliance with the regulations II - 2/3.8, II-2/34 and II-2/49 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended.

BULKHEAD, WALL AND CEILING LININGS				FLOOR COVERINGS			
CFE kw/m^2	Qsb MJ/m^2	Qt MJ	Qp kW	CFE kW/m^2	Qsb MJ/m^2	Qt MJ	Qp kW
≥ 20	≥ 1.5	≤ 0.7	≤ 4.0	≥ 7.0	≥ 0.25	≤ 2.0	≤ 10.0

Where CFE = Critical flux at extinguishment
Qsb = Heat for sustained burning
Qt = Total heat release
Qp = Peak heat release rate

Note

In accordance with the provisions of SOLAS, 1974 and subsequent amendments, primary deck coverings, if applied within accommodation and service spaces and control stations, should be of approved materials which will not readily ignite, or give rise to toxic or explosive hazards at elevated temperatures. IMO Resolution A.687 (17) "Recommendation on Fire Test Procedures for Ignitability of Primary Deck Coverings" specifies a procedure for evaluating the ignitability of the primary deck coverings. Toxic and explosive hazards of the primary deck coverings should be verified to the satisfaction of the appropriate Administration.

The values calculated from the data in Table 1 and Appendix II for each specimen for each of the parameters above are as follows:

PARAMETER	SPECIMEN NUMBER			AVERAGE
	1	2	3	
Heat for Ignition (Qi) (MJm^{-2})	11.30	11.68	11.40	11.46
Heat for Sustained Burning (Qsb) (MJm^{-2})	11.84	11.92	11.71	11.82
Critical flux at Extinguishment (CFE) (kW/m^2)	35.70	35.70	35.70	35.70
Peak Heat Release Rate (Qp) (kW)	0.80	1.16	0.67	0.88
Total Heat Release (Qt) (MJ)	0.06	0.19	0.09	0.11

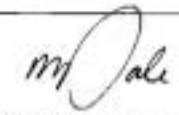
Comparison with the required criteria shows that the specimens described in this report meet all the requirements for low flame spread in compliance with the International Convention for the Safety of Life at Sea (SOLAS), 1974.

The Total Heat Release (Q_t) is not more than 0.2MJ and the Peak Heat Release Rate (Q_p) is not more than 1.0kW. Therefore, in accordance with Paragraph 2.2 of Annex 2 to IMO Resolution MSC 61(67), it is considered that the specimens covered by this report comply with the requirements of Part 2 of Annex 1 'Smoke and Toxicity Test' to IMO Resolution MSC 61(67).

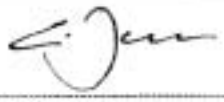
Validity

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.

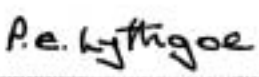
Signatories



Responsible Officer
M Dale *



Approved
C Dean *
Senior Laboratory Supervisor



Head Of Department
P E Lythgoe *

* For and on behalf of warringtonfire.

Report Issued: 20th September 2006

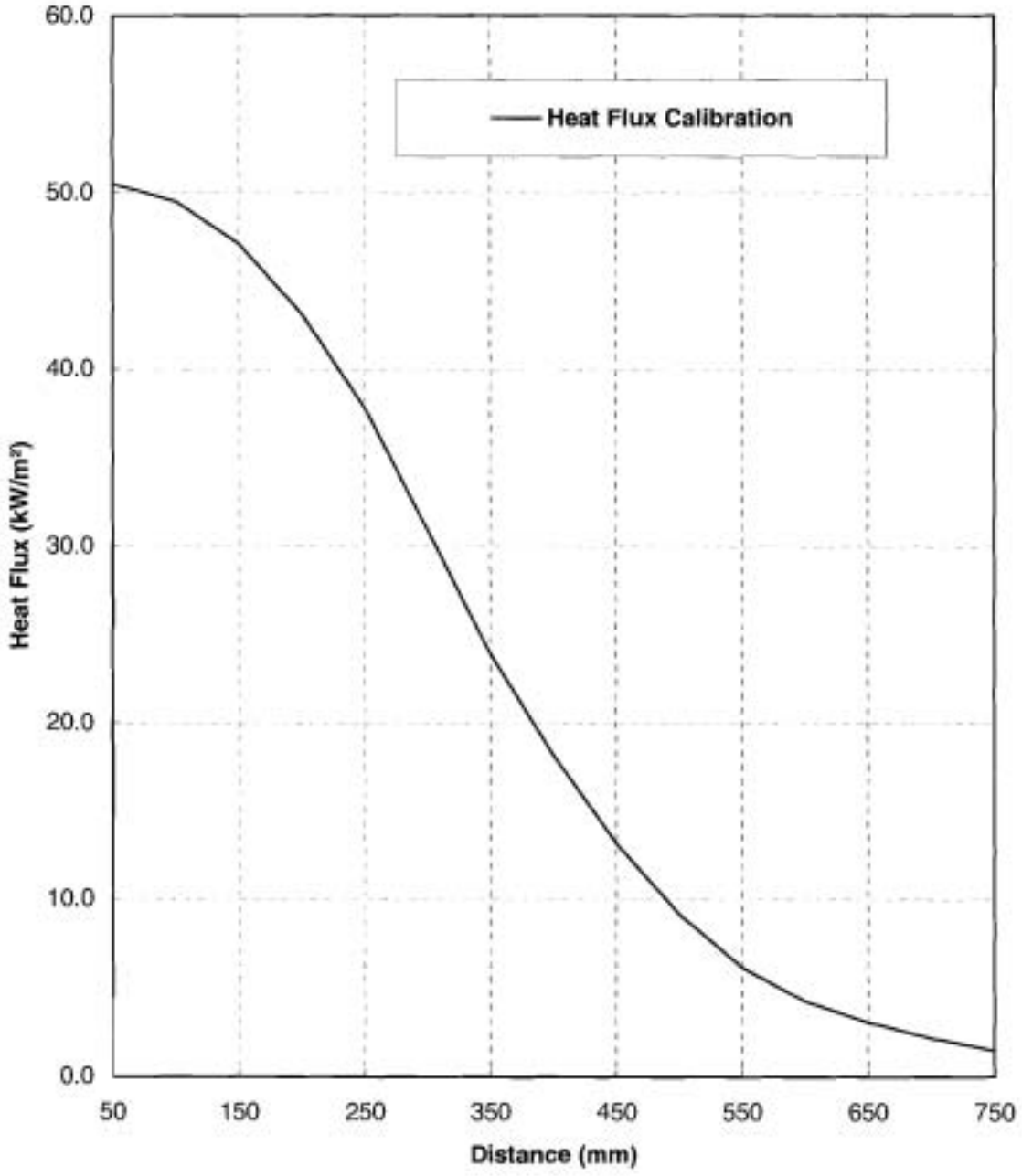
Table 1

Specimen No:	1		Heat for Sustained Burning (MJ/m^2)	2		Heat for Sustained Burning (MJ/m^2)	3		Heat for Sustained Burning (MJ/m^2)
Time to Ignition: (min:sec)	04:00			03:53			03:59		
Time to Travel	min	sec		min	sec		min	sec	
50mm	04	00	12.12	04	08	12.52	04	02	12.22
100mm	04	00	11.88	04	08	12.28	04	02	11.98
150mm	04	00	11.30	04	08	11.68	04	02	11.40
200mm	04	47	12.37	04	42	12.15	04	39	12.02
250mm	06	06	13.83	05	49	13.19	06	08	13.91
300mm									
350mm									
400mm									
450 mm									
500mm									
550mm									
600mm									
650mm									
700mm									
750mm									
800mm									
Duration of Test (min:sec)	13:23			13:30			11:39		
Final Travel (mm)	260			260			260		
C.F.E. (kw/m^2)	35.70			35.70			35.70		

OBSERVATIONS:

The Total Heat Release (Q_t) is not more than 0.2MJ and the Peak Heat Release Rate (Q_p) is not more than 1.0kW. Therefore, in accordance with Paragraph 2.2 of Annex 2 to IMO Resolution MSC 61(67), it is considered that the specimens covered by this report comply with the requirements of Part 2 of Annex 1 'Smoke and Toxicity Test' to IMO Resolution MSC 61(67).

Appendix 1


Heat Flux Calibration
Heat Flux (kW/m²)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
50
150
250
350
450
550
650
750
Distance (mm)

Appendix 2

Heat Release from Specimen