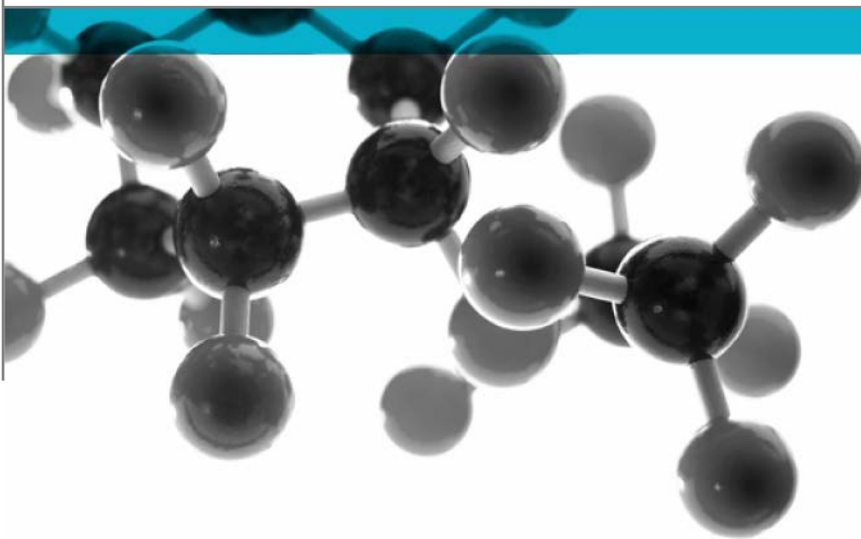


Exova Warringtonfire
Holmesfield Road
Warrington
WA1 2DS
United Kingdom

T : +44 (0) 1925 655116
F : +44 (0) 1925 655419
E : warrington@exova.com
W : www.exova.com



IMO Resolution MSC 307(88): Annex 1: Part 5



Test for Surface Flammability

A Report To: Ball & Young Limited

Document Reference: 358192

Issue Date: 17th November 2015

Issue No.: 1

Expiry Date: 12th November 2030

Page 1

Testing
Advising
Assuring



Executive Summary

Objective To determine the performance of the following product when tested in accordance with IMO Resolution MSC 307(88): Annex 1: Part 5.



Generic Description	Product reference	Thickness or application rate	Weight per unit area / density / specific gravity	
A carpet underlay adhered to a 3mm thick steel substrate	"Contract 6mm FR"	7.97mm*	24.25kg/m ² *	
Individual components used to manufacture composite:				
Underlay	Printed test face	"40g FR PP"	40 microns	40g/m ²
	Foam core	"140 CM BY"	6mm	140kg/m ³
	Printed reverse face	"MC00002"	Between 20 and 30 microns	Between 20 and 30g/m ²
Adhesive	"Styccobond F40"	4m ² per litre	1.0	
Substrate	None assigned	3mm	23.56kg/m ²	
*Determined by Exova Warringtonfire				
Please see pages 5 & 6 of this test report for the full description of the product tested				

Test Sponsor Ball & Young Limited, 53 Causeway Road, Earlstrees Industrial Estate, Corby, Northants., NN17 4DU

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

Date of Test 13th November 2015

Signatories

	
Responsible Officer T. Kinder * Technical Officer	Authorised T. Mort * Senior Technical Officer

* For and on behalf of **Exova Warringtonfire**.

Report Issued: 17th November 2015

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Test Details

Purpose of test	<p>This test method, adopted by the International Maritime Organisation, specifies a procedure for qualifying the surface flammability of products and thus their suitability for use in maritime construction.</p> <p>The tests were performed in accordance with the procedure specified in IMO Resolution MSC 307(88): Annex 1, Part 5 and it is advised that this report is read in conjunction with these documents.</p>
Scope of test	<p>International Maritime Organisation Resolution MSC 307(88): Annex 1, Part 5 "Test for Surface Flammability (Test for Surface Materials and Primary Deck Coverings)", specifies a procedure for measuring fire characteristics of bulkhead, ceiling, floor coverings and primary deck covering materials as a basis for characterising their flammability and thus their suitability for use in maritime construction.</p> <p>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.</p>
Instruction to test	<p>The test was conducted on the 13th November 2015 at the request of Ball & Young Limited, the sponsor of the test.</p>
Conditioning of specimens	<p>The specimens were received on the 26th October 2015.</p> <p>Prior to test the specimens were conditioned to constant mass at a temperature of $23 \pm 2^{\circ}\text{C}$ and a relative humidity of $50 \pm 5\%$.</p>
Exposed face	<p>The non-woven face of the specimens was exposed to the radiant heat of the test when the specimens were mounted in the test position.</p>
Substrate	<p>The specimens were adhered to a 3mm thick steel substrate.</p>
Provision of test specimens	<p>The specimens were supplied by the sponsor of the test. Exova Warringtonfire was not involved in any selection or sampling procedure.</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 carpet underlay adhered to a 3mm thick steel substrate	
Product reference		"Contract 6mm FR"	
Name of manufacturer		Ball & Young Ltd	
Thickness of composite		7.97mm (determined by Exova Warringtonfire)	
Weight per unit area of composite		24.25kg/m ² (determined by Exova Warringtonfire)	
Underlay	Printed test face	Generic type	Polypropylene
		Product reference	"40g FR PP"
		Name of manufacturer	See Note 1 below
		Colour reference	"White"
		Thickness	40 microns
		Weight per unit area	40g/m ²
		Type of weave	Non – woven
		Flame retardant details	See Note 2 below
	Foam core	Generic type	Polyurethane
		Product reference	"140 CM BY"
		Detailed description	Reconstituted polyurethane chip foam
		Name of manufacturer	Ball & Young Ltd
		Thickness	6mm
		Density	140kg/m ³
		Colour reference	"Various"
	Flame retardant details	See Note 3 below	
	Printed reverse face	Generic type	Polyethylene
		Product reference	"MC00002"
		Name of manufacturer	See Note 1 below
		Thickness	Between 20 and 30 microns
		Weight per unit area	Between 15 and 25g/m ²
Colour reference		"Grey"	
Flame retardant details	See Note 2 below		
Adhesive	General description	Synthetic polymer emulsion flooring adhesive	
	Trade name	"Styccobond F40"	
	Name of manufacturer	F. Ball and Co. Ltd.	
	Colour	"White"	
	Specific gravity	1.0	
	Application rate	4m ² per litre	
	Application method	1.5mm by 5mm V notched trowel	
	Flame retardant details	The manufacturer stated that no flame retardant additives were utilised in the construction of the adhesive	

Continued on next page

Substrate	Generic type	Steel
	Name of supplier	S & A Joinery
	Thickness	3mm
	Weight per unit area	23.56kg/m ²
	Flame retardant details	The substrate is inherently flame retardant
Brief description of manufacturing process		Flame bonding

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

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

Note 3. The sponsor of the test has confirmed that no flame retardant additives were utilised in the production of the component.

Test Results

Test procedure

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

Test results

Parameter	Units	Specimen Number			Average
		1	2	3	
Heat for Ignition (Q_i)	MJm ⁻²	0.28	0.24	0.24	0.25
Heat for Sustained Burning (Q_{sb})	MJm ⁻²	0.31	0.27	0.35	0.31
Critical flux at Extinguishment (CFE)	kW/m ²	15.70	20.00	20.00	18.6
Peak Heat Release Rate (q_p)	kW	9.21	7.15	8.09	8.2
Total Heat Release (Q_t)	MJ	1.35	1.22	1.34	1.3
Burning drops	N/A	None	None	None	N/A

Other test observations required by standard

Number of specimens tested	3
Type of pilot flame	Propane / air

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 Appendix 1. The heat release data generated during each of the tests is given in Appendix 2.

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 - 2/3.29 and II-2/5.3.2.4 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, and related Articles of Protocol 1998, as amended and consolidated in the 2004 publication of SOLAS.

Parameter	Requirement for bulkhead, wall & ceiling linings	Requirement for floor coverings	Requirements for primary deck coverings
Heat for Sustained Burning	≥1.5 MJm ⁻²	≥0.25 MJm ⁻²	≥0.25 MJm ⁻²
Critical flux at Extinguishment	≥20 kW/m ²	≥7.0 kW/m ²	≥7.0 kW/m ²
Peak Heat Release Rate	≤4.0 kW	≤10.0 kW	≤10.0 kW
Total Heat Release	≤0.7 MJ	≤2.0 MJ	≤2.0 MJ
Burning drops	Zero	≤10	Zero

Summary of Results

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

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.

Validity

This report is valid for a period for fifteen years from the date of test.

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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.

Appendix 1 – Observations during test

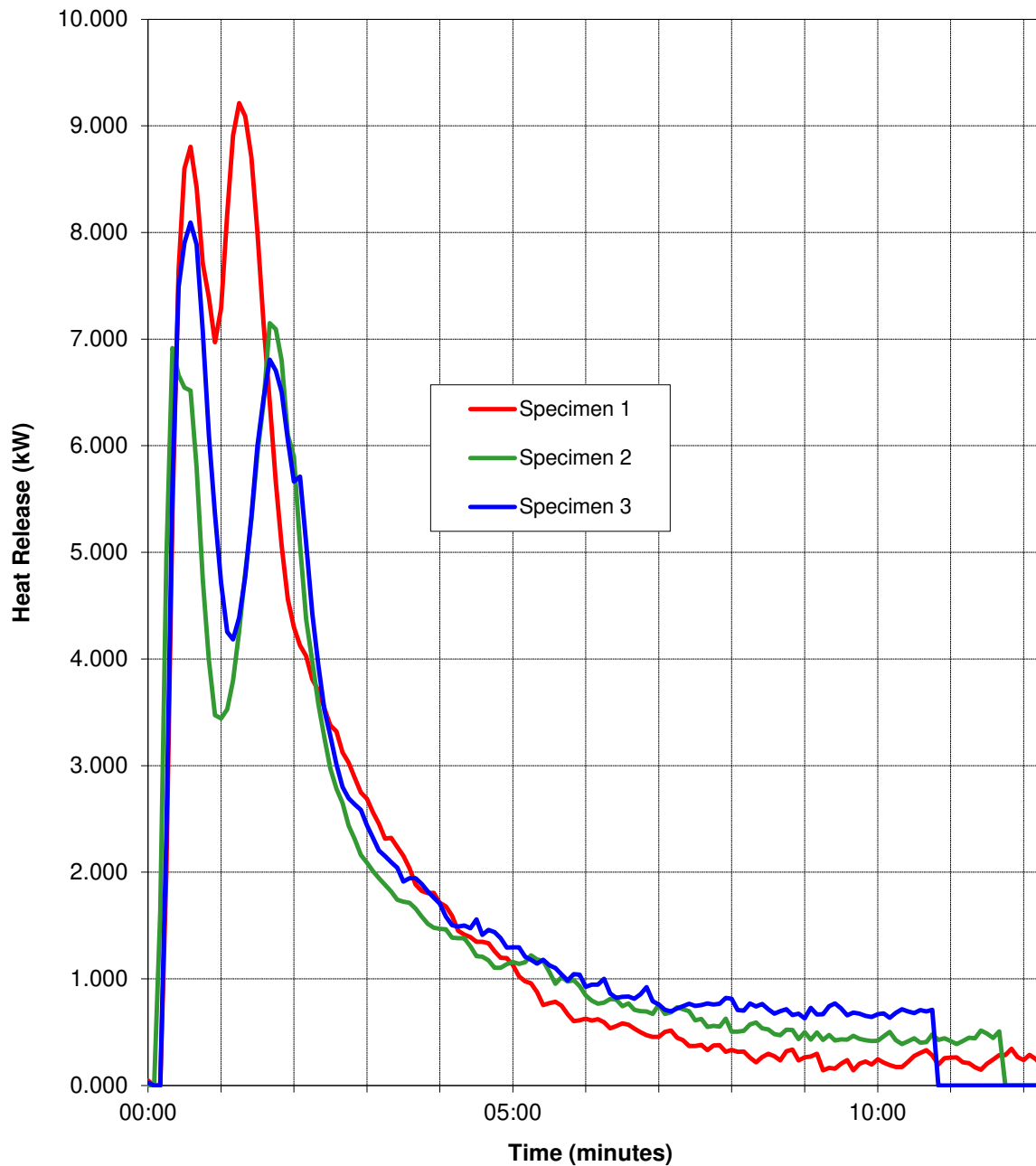
Specimen No:	1		Heat for Sustained Burning (MJ/m ²)	2		Heat for Sustained Burning (MJ/m ²)	3		Heat for Sustained Burning (MJ/m ²)
Time to Ignition: (min:sec)	00:01			00:01			00:01		
Time to Travel	min	sec		min	sec		min	sec	
50mm	00	02	0.10	00	03	0.15	00	02	0.10
100mm	00	04	0.20	00	04	0.20	00	04	0.20
150mm	00	06	0.28	00	05	0.24	00	05	0.24
200mm	00	07	0.30	00	06	0.26	00	07	0.30
250mm	00	08	0.30	00	07	0.26	00	09	0.34
300mm	00	09	0.28	00	09	0.28	00	15	0.46
350mm	00	17	0.41	00	13	0.31	00	17	0.41
400mm	02	54	3.17						
450 mm									
500mm									
550mm									
600mm									
650mm									
700mm									
750mm									
800mm									
Duration of Test (min:sec)	12:16			11:40			10:43		
Final Travel (mm)	420			380			380		
C.F.E. (kw/m ²)	15.70			20.00			20.00		

OBSERVATIONS:

None.

Appendix 2 – Heat release from test specimens

Heat Release from Specimen



Revision History

Issue No :	Re - Issue Date :
Revised By:	Approved By:
Reason for Revision:	

Issue No :	Re - Issue Date :
Revised By:	Approved By:
Reason for Revision:	