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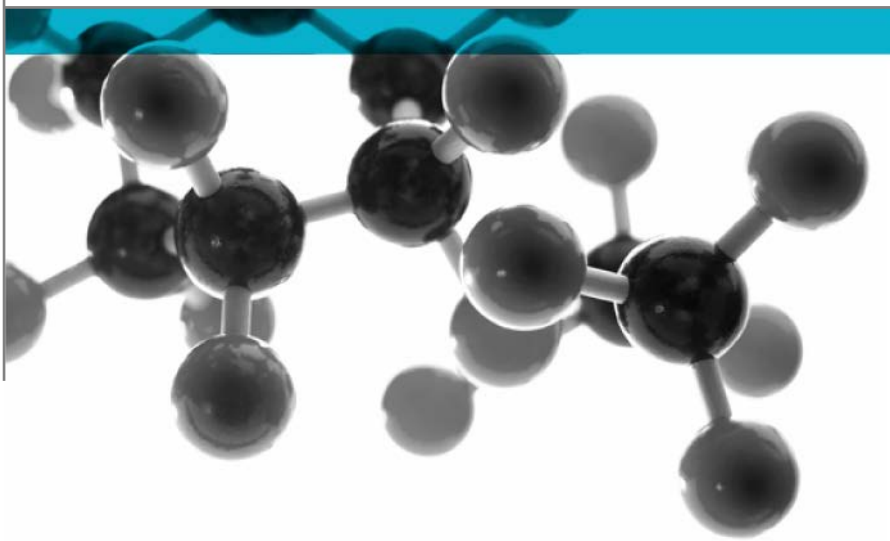
IMO Resolution MSC 307(88) (2010 FTP Code): Annex 1: Part 5



Test for Surface Flammability

A Report To: Active Composite Technologies

Document Reference: 412943

Issue Date: 23rd May 2019

Issue No.: 1

Expiry Date: 9th April 2034

Executive Summary

Objective To determine the performance of the following product when tested in accordance with IMO Resolution MSC 307(88) (2010 FTP Code): Annex 1: Part 5.

Generic Description	Product reference	Thickness	Weight per unit area or specific gravity
Gel-coated glass reinforced product	"A1 IMO"	4mm	7.5kg/m²
Individual components used to manufacture composite:			
Gel-coat	"A1"	1mm	1.75kg/ltr
Resin	"A1"	Not applicable	1.75kg/ltr
Glass reinforcement	"A1 triaxial fiber"	Not applicable	4 x 160g/m²
Please see page 5 of this test report for the full description of the product tested			

Test Sponsor Active Composite Technologies, Nijverheidsweg 15a, 3251LP Stellendam, Netherlands

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

Date of Test 10th and 30th April 2019

Signatories

Responsible Officer
T. Kinder *
Senior Technical Officer

Authorised
T. Mort *
Senior Technical Officer

* For and on behalf of Warringtonfire.

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Test Details

Purpose of test

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.

The tests were performed in accordance with the procedure specified in IMO Resolution MSC 307(88) (2010 FTP Code): Annex 1, Part 5 and it is advised that this report is read in conjunction with these documents.

Scope of test

International Maritime Organisation Resolution MSC 307(88) (2010 FTP Code): 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.

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.

Instruction to test

The test was conducted on the 10th and 30th April 2019 at the request of Active Composite Technologies, the sponsor of the test.

Conditioning of specimens

The specimens were received on the 8th April 2019.

Prior to test the specimens were conditioned to constant mass at a temperature of 23 ± 2°C and a relative humidity of 50 ± 5%.

Exposed face

The gel-coated face of the specimens was exposed to the radiant heat of the test when the specimens were mounted in the test position.

Substrate

The specimens were tested with a 12mm thick calcium silicate based backing board present.

Provision of test specimens

The specimens were supplied by the sponsor of the test. Warringtonfire was not involved in any selection or sampling procedure.

Description of Test Specimens

The description of the specimens given below has been prepared from information provided by the sponsor of the test. This information has not been independently verified by Warringtonfire**.** All values quoted are nominal, unless tolerances are given.

General description		Gel-coated glass reinforced product
Product reference		"A1 IMO"
Name of manufacturer		Acrylic Composites BV
Colour reference		"Off White"
Overall thickness		4mm (stated by sponsor) 4.77mm (determined by Warringtonfire)
Overall weight per unit area		7.5kg/m² (stated by sponsor) 6.74kg/m² (determined by Warringtonfire)
Gel-coat	Generic type	Two-component material consisting of a mineral powder and a water-borne acrylic resin
	Product reference	"A1"
	Name of manufacturer	Acrylic Composites BV
	Colour reference	"Off White"
	Number of coats	1
	Application thickness	1mm
	Specific gravity	1.75kg/ltr
	Application method	Brushing
	Trade name of flame retardant	"ATP"
	Generic type of flame retardant	ATH (aluminium trihydrate)
	Amount of flame retardant	7%
	Curing process	At room temperature
Resin	Generic type	Two-component material consisting of a mineral powder and a water-borne acrylic resin
	Product reference	"A1"
	Name of manufacturer	Acrylic Composites BV
	Trade name of flame retardant	"ATP"
	Generic type of flame retardant	ATH (aluminium tri-hydrate)
	Amount of flame retardant	7%
Glass reinforcement	Type	Glass fabric
	Product reference	"A1 triaxial fiber"
	Number of layers	4
	Weight per unit area / configuration of glass reinforcement	4 x 160g/m²
	Name of manufacturer	Acrylic Composites BV
Resin to glass ratio (by weight)		10:1
Percentage glass reinforcement (by weight)		9%
Curing process (duration and temperature)		20 minutes @ 23 °C
Brief description of manufacturing process		Laminated A1 IMO panels reinforced with A1 triaxial fiber. "gelcoat" layer and reinforced layers are the same product. To prevent print thru of the triaxial fiber in case of working in moulds, it is advised to wait with the second layers until the gelcoat layer starts to cure. Always apply the triaxial fiber between layers of A1 IMO. Application can be done by brush, roller or spray equipment.

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}	10.93	17.14	11.02	13.03
Heat for Sustained Burning (Q_{sb})	MJm^{-2}	12.43	17.98	10.86	13.76
Critical flux at Extinguishment (CFE)	kW/m^2	28.00	24.10	37.80	30.0
Peak Heat Release Rate (q_p)	kW	0.63	0.85	0.96	0.82
Total Heat Release (Q_t)	MJ	0.28	0.35	0.30	0.31
Burning drops	N/A	No	No	No	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 bulkhead, wall and ceiling products and can therefore 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 of fifteen years from the date of test.

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.

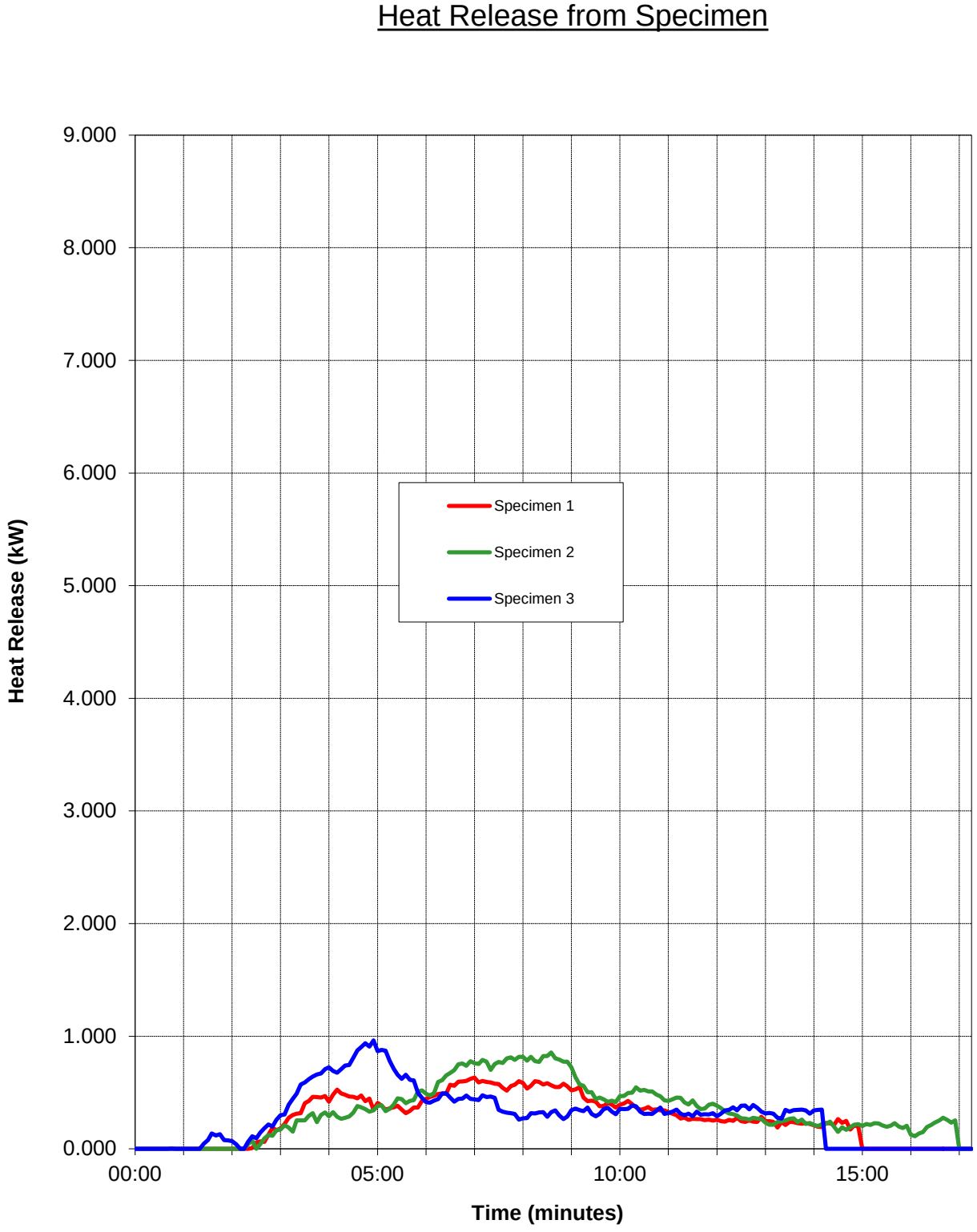
Appendix 1 – Observations during test

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)	00:33			00:50			00:36		
Time to Travel	min	sec		min	sec		min	sec	
50mm	02	11	6.62	01	13	3.69	01	08	3.43
100mm	03	50	11.39	03	55	11.63	03	15	9.65
150mm	03	52	10.93	06	04	17.14	03	54	11.02
200mm	05	05	13.15	06	44	17.41	04	08	10.69
250mm	05	50	13.23	09	01	20.45	05	08	11.64
300mm	08	12	15.20	09	08	16.93			
350mm				09	25	13.50			
400mm									
450 mm									
500mm									
550mm									
600mm									
650mm									
700mm									
750mm									
800mm									
Duration of Test (min:sec)	15:12			17:17			14:23		
Final Travel (mm)	320			350			250		
C.F.E. (kw/m^2)	28.00			24.10			37.80		

OBSERVATIONS:

In the case of specimen 1 there was popping on the surface of the specimen 15 seconds into the test.

Appendix 2 – Heat release from test specimens



Revision History

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