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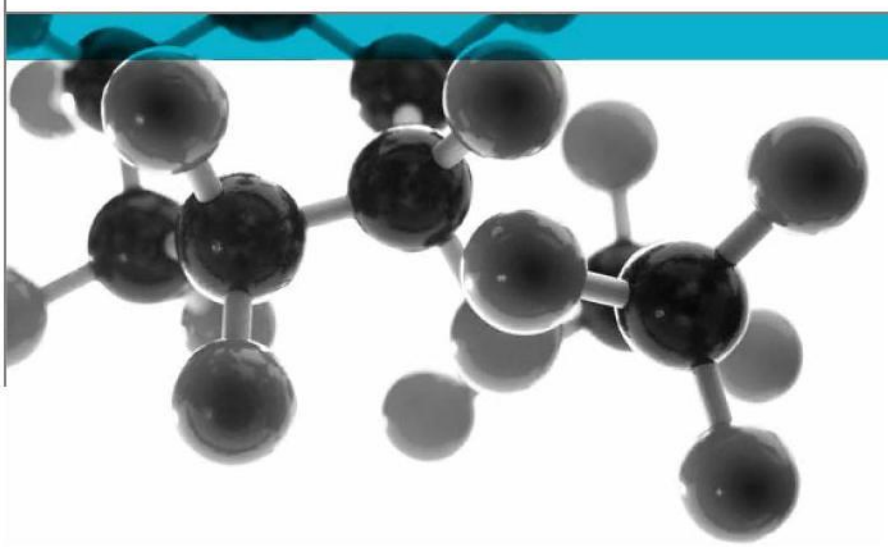
BS EN 13823: 2010



Reaction to Fire Tests for Building Products - Building Products Excluding Floorings Exposed to the Thermal Attack by a Single Burning Item

A Report To: Kingspan Insulation Ltd

Document Reference: 329582

Date: 12th February 2015

Issue No.: 1

Testing
Advising
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0249

Executive Summary

Objective To determine the fire performance of the following product when tested in accordance with BS EN 13823: 2010.

Generic Description	Product reference	Thickness	Weight per unit area or density
Foil-faced phenolic insulation board	"Kooltherm K10FM"	100mm	3.67kg/m^2
Individual components used to manufacture composite:			
Aluminium foil	Confidential	Confidential	Confidential
Foam	"K10"	100mm	Confidential
Substrate	"Promat – Brandschultzbauplatten; Promatect-H"	12mm	870kg/m^3
Please see page 5 and 6 of this test report for the full description of the product tested			

Test Sponsor Kingspan Insulation Limited, Pembridge, Leominster, Herefordshire, HR6 9LA

Test Results (average) :

FIGRA (w/s)		THR 600s (MJ)	SMOGRA (m^2/s^2)		TSP 600s (m^2)	
(0.2MJ)	(0.4MJ)		Original	Recalculated	Original	Recalculated
298.92	**167.02**	**3.74**	**1.54**	**1.35**	**67.31**	**49.45**

Lateral Flame Spread to End of Specimen? **None**
Fall of Flaming Drop/Particle? **None**
Flaming of Fallen Particle Exceeding 10s? **None**

Date of Test: 28th May 2013

Signatories

Responsible Officer K. Hughes* Technical Officer	Authorised S. Deeming* Operations Manager

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

Report Issued: 12th February 2015

CONTENTS PAGE NO.

Test Details

Purpose of test

To provide data which, in conjunction with data from other test methods, will enable building products excluding floorings, to be classified in accordance with the Classification requirements specified in BS EN 13501-1: 2007 + A1: 2009. The test was performed in accordance with the procedure specified in BS EN 13823: 2010 and this report should be read in conjunction with that standard.

Scope of test

To determine the reaction-to-fire performance of construction products, excluding floorings and excluding products which are indicated in the EC Decision 2000/147/EC, when exposed to thermal attack by a single burning item (SBI) utilising the test procedures defined in BS EN 13823: 2010.

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 28th May 2013 at the request of Kingspan Insulation Ltd, the sponsor of the test.

Provision of test specimens

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

Conditioning of specimens

The specimens were received on the 24th May 2013 and were conditioned to constant mass at a temperature of 23 ± 2°C and a relative humidity of 50 ± 5% prior to testing.

Intended application

Thermal insulation.

Test facility

The Single Burning Item (SBI) test facility at **Exova Warringtonfire** is constructed in accordance with the specifications detailed in BS EN 13823: 2010.

Deviations from the test standard

None.

Exposed face

The foil face of the specimens was exposed to the heating conditions of the test when the specimens were mounted in the test position.

Description of Test Specimens

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.

The test specimen comprised two walls (or wings) mounted into an aperture in a specimen trolley such that they formed a vertical 90° corner. The dimensions of the walls were as follows:

Short wall - 495 ± 5 mm long x 1500 ± 5 mm high
Long wall - 1000 ± 5 mm long x 1500 ± 5 mm high

Each wall (or wing) consisted of the following product:

General description		Foil-faced phenolic insulation board
Name of manufacturer		Kingspan Insulation Ltd.
Trade name		"Kooltherm K10FM"
Batch reference		"8*86918.1002"
Thickness		100mm
Weight per unit area		3.67kg/m^2
Product configuration		• Foil facer • Phenolic foam • Foil facer
Aluminium foil	Product reference	**See Note 1 below**
	Generic type	Composite foil
	Name of manufacturer	**See Note 1 below**
	Weight per unit area	**See Note 1 below**
	Thickness	**See Note 1 below**
	Colour	"Silver Foil"
	Flame retardant details	**See Note 2 below**
Foam	Product references	"K10"
	Generic type	Phenolic foam
	Name of manufacturer	Kingspan Insulation Ltd.
	Thickness	100mm
	Density	**See Note 1 below**
	Colour reference	"Pink"
	Flame retardant details	**See Note 2 below**
Substrate	Product reference	"Promat – Brandschultzbauplatten; Promatect-H"
	Generic type	Calcium Silicate based board
	Name of manufacturer	Promat
	Thickness	12mm
	Density	870kg/m^3
	Flame retardant details	The substrate is inherently flame retardant

Continued on next page

Mounting and fixing details	As per end use application: reisser countersunk screws 6x150mm with 70x70mm SFS 'Isofast' ID 70 plate washers. Edge fixings sited more than 50mm and not less than 150mm from board edges with no overlap of board joints. Fixings applied at overall rate of 9.44 per m².
Joint details	Long wing: one horizontal at 500mm of specimen height, vertical 200mm in from corner line - Short wing one horizontal joint at 500mm height. As per EN 13823 5.2.2
Brief description of manufacturing process	Facings auto adhesively bonded to phenolic foam during the manufacturing process. Foam boards are made at 70°C under pressure

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

The specimen walls (or wings) were placed in the trolley in accordance with the requirements of section 5.3 of the Standard.

Photographs of the installed product are appended as Plates 1 and 2 in Appendix 1 of this report.

Each wing was retained in the trolley using mechanical clamps which pushed the wing against a lip at the top and bottom of the aperture in the trolley.

The trolley incorporated a triangular propane sand burner of side length 250mm, which was positioned in the base of the corner formed by the two wings of the test specimen, with a horizontal separation of 40mm between the edge of the burner and the lower edges of the wings. The burner is referred to as the primary burner and has an output of 30kW. A secondary propane sand burner was attached to the fixed frame, beneath the hood but at the furthest possible distance from the specimen when the trolley was in place. The purpose of this burner is to obtain base line data without affecting the assembled specimen. The trolley incorporated a grill in its base and this was the sole source of ventilation for the test enclosure whilst the test was in progress.

Test Results

Results and observations

The test results relate to the behaviour of the test specimens of a 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 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.

A total of three specimens were tested. The results obtained, relevant to the 'Euroclassification' of Building Products are given in Table 1.

Observations made during the test and comments on any difficulties encountered during the test are given in Table 2.

Table 1

Parameter	Result			
	Specimen 1	Specimen 2	Specimen 3	Mean
FIGRA (W/s) (*THR(t) threshold of 0.2MJ*)	218.59	292.32	385.85	298.92
FIGRA (W/S) *(THR(t) threshold of 0.4MJ)*	62.48	153.21	285.36	167.02
THR 600s (MJ)	3.68	3.58	3.97	3.74
SMOGRA (m^2/s^2) (Original results)	4.61	0.00	0.00	1.54
SMOGRA (m^2/s^2) (Recalculated results)	4.04	0.00	0.00	1.35
TSP 600s (m^2) (Original results)	100.37	54.60	46.95	67.31
TSP 600s (m^2) (Recalculated results)	82.49	39.13	26.73	49.45
Lateral Flame Spread to End of Specimen?	None	None	None	-
Fall of Flaming Drop/Particle?	None	None	None	-
Flaming of Fallen Particle Exceeding 10s?	None	None	None	-

Curves of time averaged rate of heat release contribution of the specimen (HRRav(t)), cumulative heat release (THR(t)), and Fire Growth Rate (FIGRA) are appended as Figures 1 to 3. Curves of time averaged rate of smoke production (SPRav(t)), cumulative smoke production (TSP(t)) and smoke growth rate (SMOGRA) are appended as Figures 4 to 6 in appendix 2 of this report.

Interpretation of the test results given above in the context of Euroclassification of building products should be carried out using BS EN 13501–1: 2007 + A1: 2009.

Table 2

Time		Observations during test of Specimen 1
min	Sec	
00	00	Pre-checks performed on analysers
02	00	Auxiliary burner switched on to check correct burner operating conditions
05	00	Gas flow switched from auxiliary burner to main burner & test flames impinge on specimen
05	12	Charring on the surface of the product occurred in the region of the burner
05	15	Flaming on the surface of the product occurred in the region of the burner
05	20	Flaming occurred on the horizontal joint in the region of the burner
05	30	Flaming occurred on the vertical joint in the region of the burner
15	30	Flaming from the rear of the specimen occurred in the region of the burner.
26	00	End of test conditions. Flaming continued to end of test.

Time		Observations during test of Specimen 2
min	Sec	
00	00	Pre-checks performed on analysers
02	00	Auxiliary burner switched on to check correct burner operating conditions
05	00	Gas flow switched from auxiliary burner to main burner & test flames impinge on specimen
05	15	Charring on the surface of the product occurred in the region of the burner
05	21	Flaming on the surface of the product occurred in the region of the burner
05	30	Flaming occurred on the vertical joint in the region of the burner
05	33	Flaming occurred on the horizontal joint in the region of the burner
07	33	Specimen surface peeling away in the region of the burner
26	00	End of test conditions. Flaming continued to end of test.

Time		Observations during test of Specimen 3
min	Sec	
00	00	Pre-checks performed on analysers
02	00	Auxiliary burner switched on to check correct burner operating conditions
05	00	Gas flow switched from auxiliary burner to main burner & test flames impinge on specimen
05	15	Charring on the surface of the product occurred in the region of the burner
05	21	Flaming on the surface of the product occurred in the region of the burner
05	30	Flaming occurred on the horizontal joint in the region of the burner
05	33	Flaming occurred on the vertical joint in the region of the burner
07	30	Specimen surface peeling away in the region of the burner
26	00	End of test conditions. Flaming continued to end of test.

Note: Impingement of the burner flame onto all three specimens commenced at 5 minutes.

Validity

The specification and interpretation of fire test methods is 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.

Appendix 1

Photographs

Plate 1: Total View of the exposed surface of the long wing.

Plate 2: Close up view of the vertical outer edge of the long wing at a height of 500mm

Appendix 2

Graphs

Figure 1. $HRR_{av}(t)$ (kW)

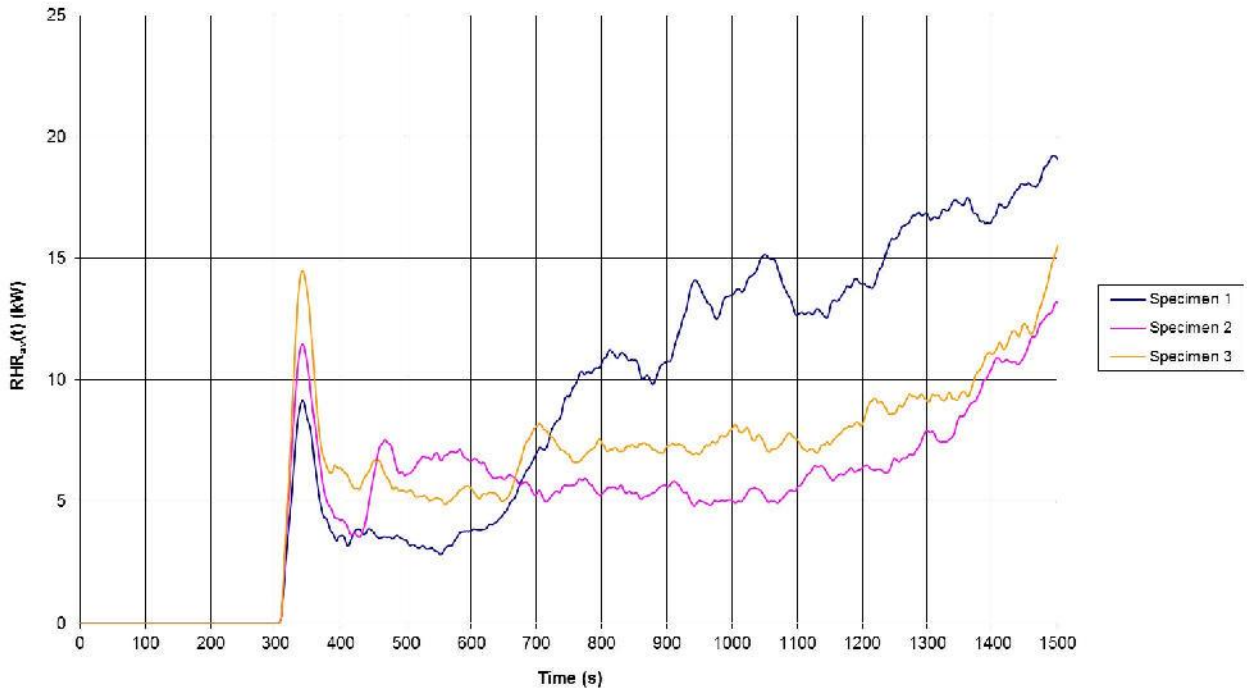


Figure 2. THR(t) (MJ)

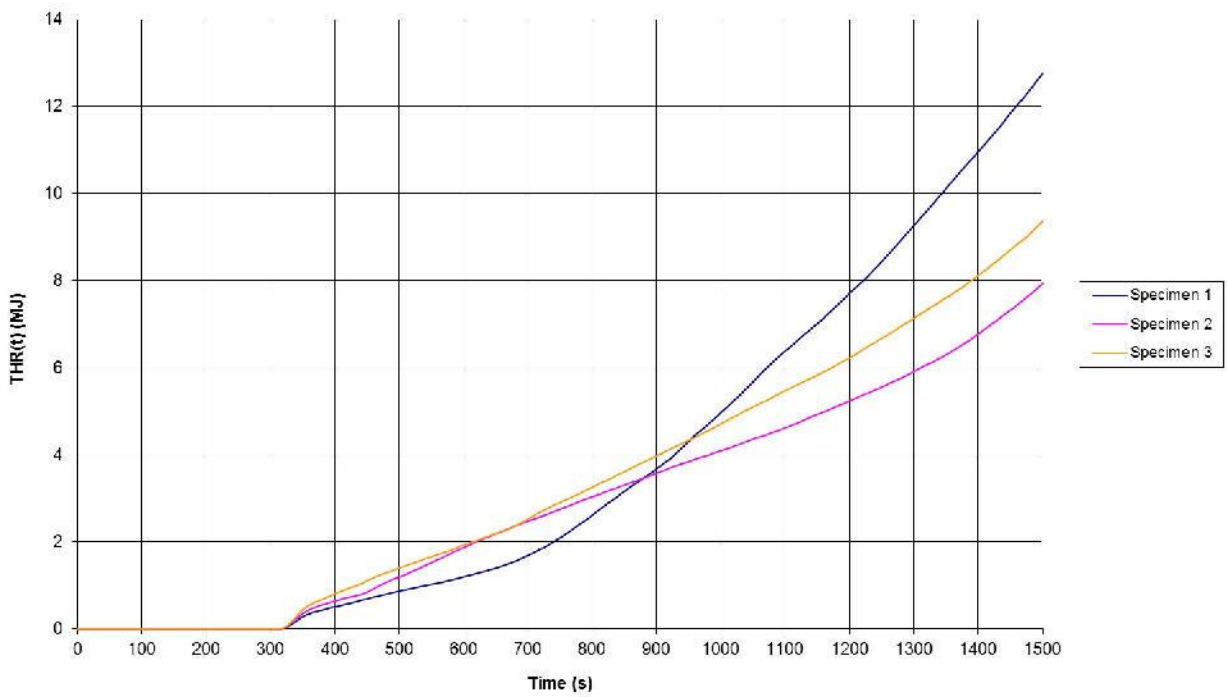


Figure 3. FIGRA

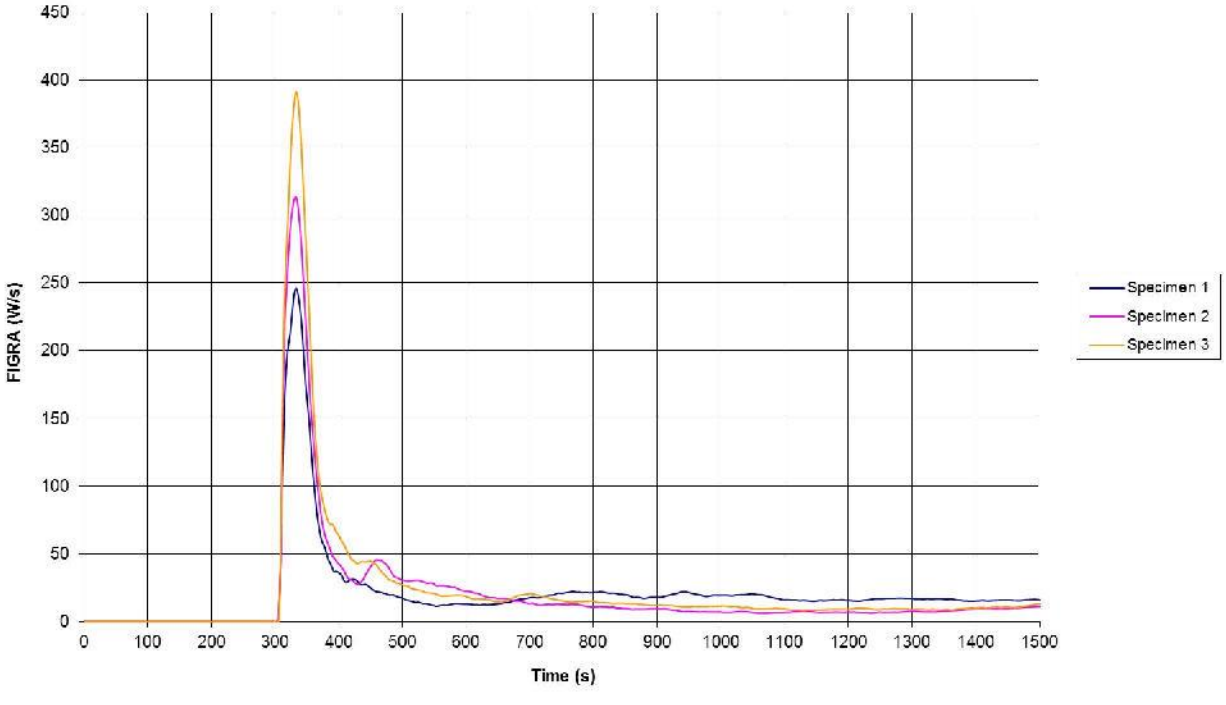


Figure 4. $SPR_{av}(t)$ (m^2/s)

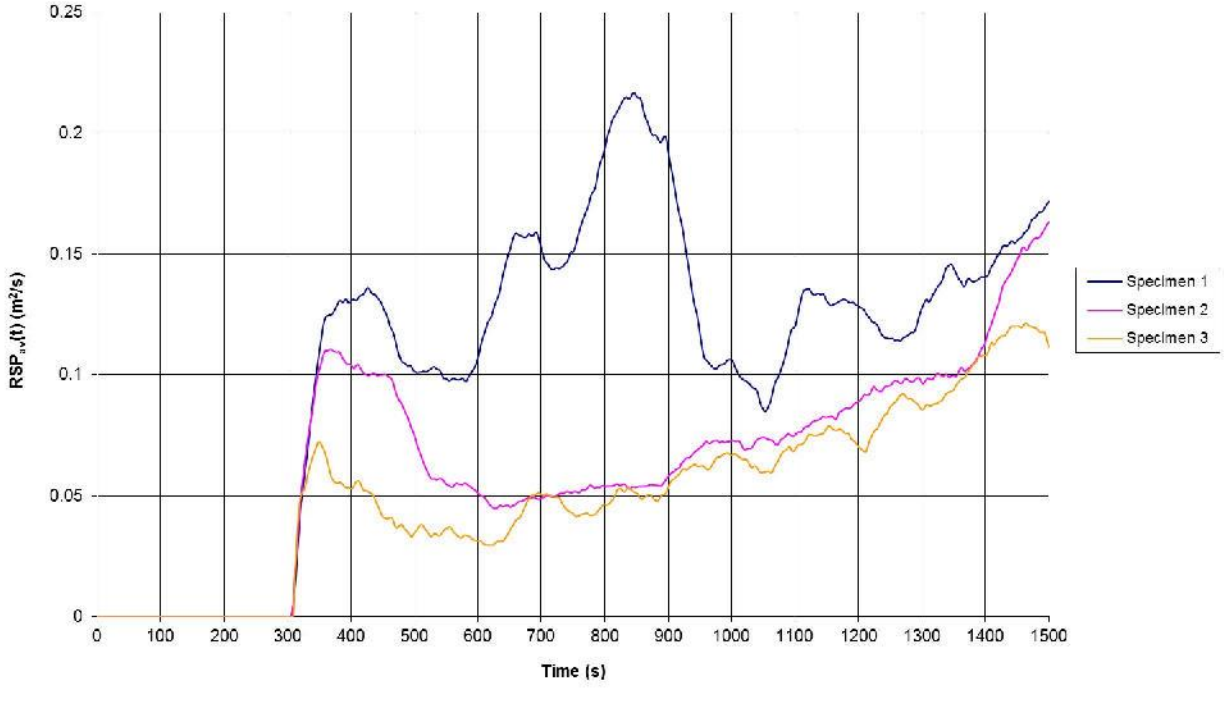


Figure 5. TSP(t) (m^2)

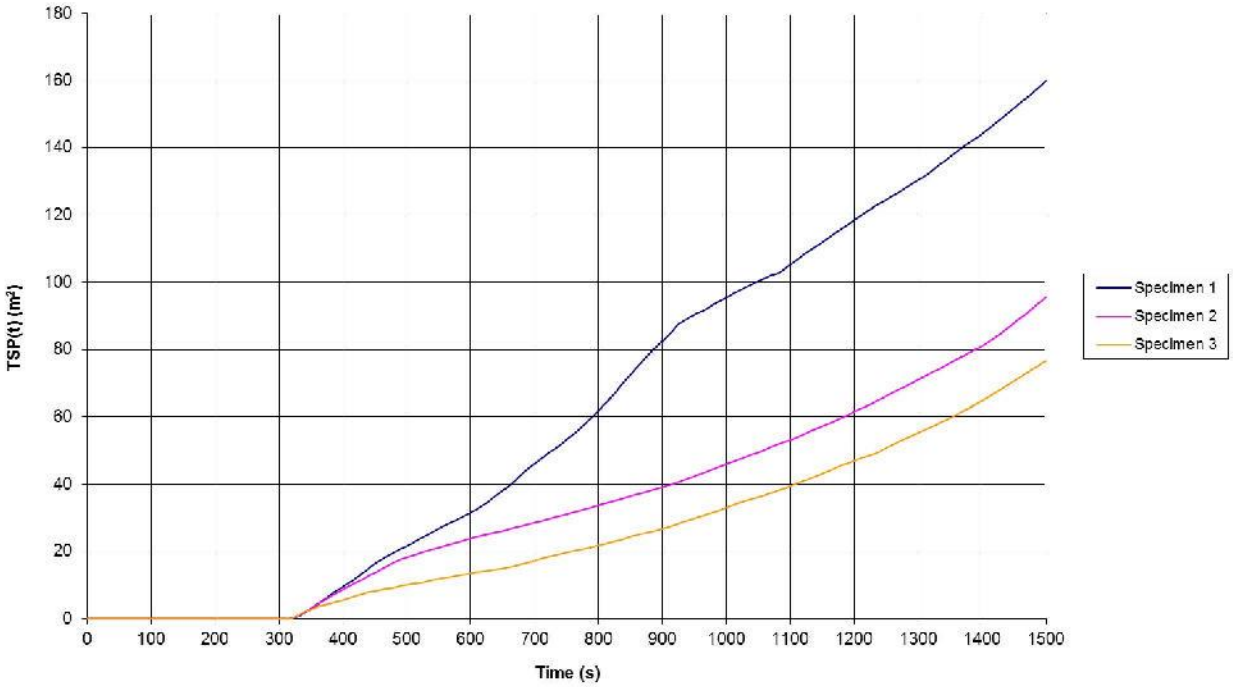
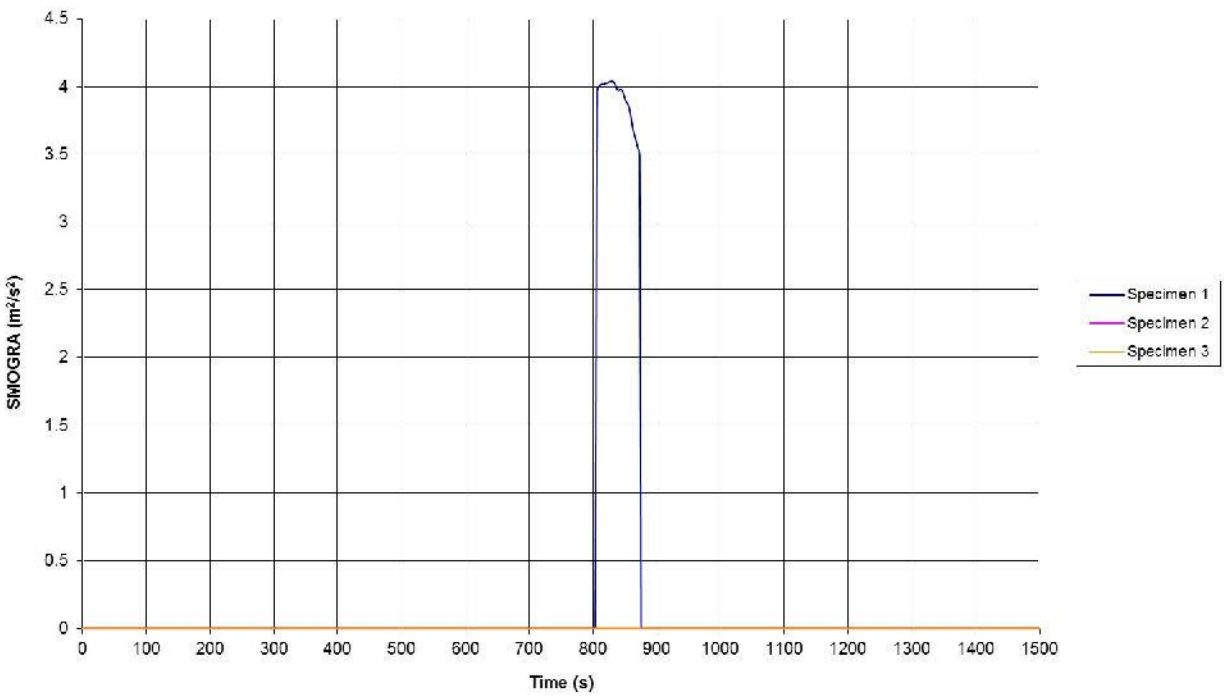


Figure 6. SMOGRA Graph.



Revision History

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