

BS EN 13823: 2002

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

WF Report Number (Issue 2)

180118

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Test Sponsor:

RCS Manufacturing



**Bodycote warringtonfire Test Report No. 180118
(Issue 2)**

**BS EN 13823: 2002
Reaction-To-Fire Tests for Building Products -
Building Products Excluding Floorings
Exposed to the Thermal Attack by a Single
Burning Item**

Sponsored By

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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. The test was performed in accordance with the procedure specified in BS EN 13823: 2002 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: 2002. There were no deviations from the defined procedures.
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 26 th of February 2009 at the request of RCS Manufacturing, 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 were received on the 23 rd of January 2009 and were conditioned to constant mass at a temperature of $23 \pm 2^{\circ}\text{C}$ and a relative humidity of $50 \pm 5\%$ prior to testing.
Intended use	Thermal insulation
Test facility	The SBI test facility at Bodycote warringtonfire is constructed in accordance with the specifications detailed in BS EN 13823: 2002.
Exposed face	The test face with the steel mesh was exposed to the heating conditions of the test when the specimens were mounted in the test position.
Deviation from the standard	During the course of calculation of the different fire parameters, the contribution of the fire source utilised during the test is subtracted by taking baseline readings from an auxiliary burner prior to the commencement of the test, such that the heat release and smoke production from the specimen alone can be determined. For the purpose of this test and in the case of the baseline smoke production value only, rather than using the baseline readings from the auxiliary burner, the baseline smoke values subtracted were determined by taking baseline readings from the main burner prior to commencement of the test. Further information relating to this procedure is held on the confidential file relating to this investigation.

Continued on next page.

**Deviation from
the standard
continued**

Two tests were initially performed on specimens of the insulation material. During these tests, excessive debris from the specimen accumulated on the burner and impeded the fire source flame and prevented valid test results being obtained.

To obtain valid test results, at the specific request of the sponsor of the test and in association with the Classification Body, the sponsor applied a 1mm thick steel mesh with 3mm perforations to the face of the product in the region of the fire source. The mesh was fixed into place to help maintain structural integrity under test conditions in an attempt to prevent debris falling onto and blocking the burner, thus allowing valid test results to be obtained.

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:

Trade name / product reference		"Pyro-Foam"
General description		A glass tissue faced phenolic foam encased in a metal frame.
Overall thickness (without metal frame)		100mm (Stated by sponsor) 101.16 (Determined by Bodycote warringtonfire)
Overall density (without metal frame)		80Kg/m ³ (stated by sponsor) 77.66Kg/m ³ (Determined by Bodycote warringtonfire)
Facing	Trade name / product reference	"C4 Tissue"
	Generic type	Glass tissue
	Name of manufacturer	Polyfibre
	Density / weight per unit area	See Note 1
	Thickness	0.5mm
	Colour	White
	Flame retardant details	See Note 2
Insulation	Generic type	Phenolic Foam
	Trade name / product reference	"Pyro-Foam"
	Name of manufacturer	RCS Manufacturing
	Thickness	100mm
	Colour	Pink
	Density	80Kg/m ³
	Flame retardant details	See Note 1
Facing	Trade name / product reference	"C4 Tissue"
	Generic type	Glass tissue
	Name of manufacturer	Polyfibre
	Density / weight per unit area	See Note 2
	Thickness	0.5mm
	Colour	White
	Flame retardant details	See Note 2

Continued on next page

Frame	Trade name / product reference	"Stelvetite"
	Generic type	Polyvinyl chloride coated steel
	Name of manufacturer	Corus
	Density / weight per unit area	See Note 2
	Thickness	0.55mm
	Colour	White
	Flame retardant details	See Note 2
Mesh * See note 3 below	Trade name / product reference	"Spark Guard"
	Generic type	Extended steel mesh
	Name of manufacturer	Expomet
	Density / weight per unit area	See Note 1
	Thickness	1mm
	Colour	Silver
	Size of perforation (cell size)	3mm
	Flame retardant details	See Note 2
Brief description of manufacturing process		Foam is injected into a cavity in liquid form, the foam then expands to give auto adherence to the skins located on the press faces.

Note 1: The sponsor was unwilling to provide this information.

Note 2: The sponsor of the test has confirmed that no flame retardant additives were utilised in the production of the product / component.

Note 3: It is important to note that the phenolic foam was tested with a steel mesh placed in front of it, in the region of the burner to help maintain structural integrity whilst under test conditions.

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 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. A plan view of the SBI apparatus is shown in Figure 1. A schematic illustration of the specimen housing and the exhaust system is shown in Figure 2.

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.

Observations made during the test and comments on any difficulties encountered during the test are given in Table 1.

A total of three specimens were tested. The following data, relevant to Euroclassification of Building Products was obtained:

Parameter	Results *			
	Specimen 1	Specimen 2	Specimen 3	Mean
FIGRA (W/s) (<i>THR(t) threshold of 0.2MJ</i>)	10.02	10.92	12.94	11.29
FIGRA (W/S) (<i>THR(t) threshold of 0.4MJ</i>)	10.02	10.92	12.94	11.29
THR 600s (MJ)	1.35	1.29	1.45	1.36
SMOGRA (m ² /s ²)	0.00	0.00	0.00	0.00
TSP 600s (m ²)	18.95	26.88	26.19	24.01
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	-

*** Please note the deviation from test standard detailed on page 5 of this test report and the test results should be treated with caution.**

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 3 to 5. Curves of time averaged rate of smoke production (SPRav(t)), cumulative smoke production (TSP(t)) and smoke growth rate (SMOGRA) are appended as figures 6 to 8.

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.

Table 1

Time		Observation
min	Sec	
05	09	In the case of all three specimens, discolouration of the surface of the product occurred.
07	09	In the case of all three specimens, flaming behind the mesh in the region of the burner began to occur.
26	00	End of test conditions. In the case of all three specimens, all flaming ceased.


Note: Impingement of the burner flame onto the specimen commenced at 5 minutes.

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.

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Signatories


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Approved M. Dale * Deputy Operations Manager


Authorised C. Dean * Operations Manager

* For and on behalf of **Bodycote warringtonfire**.

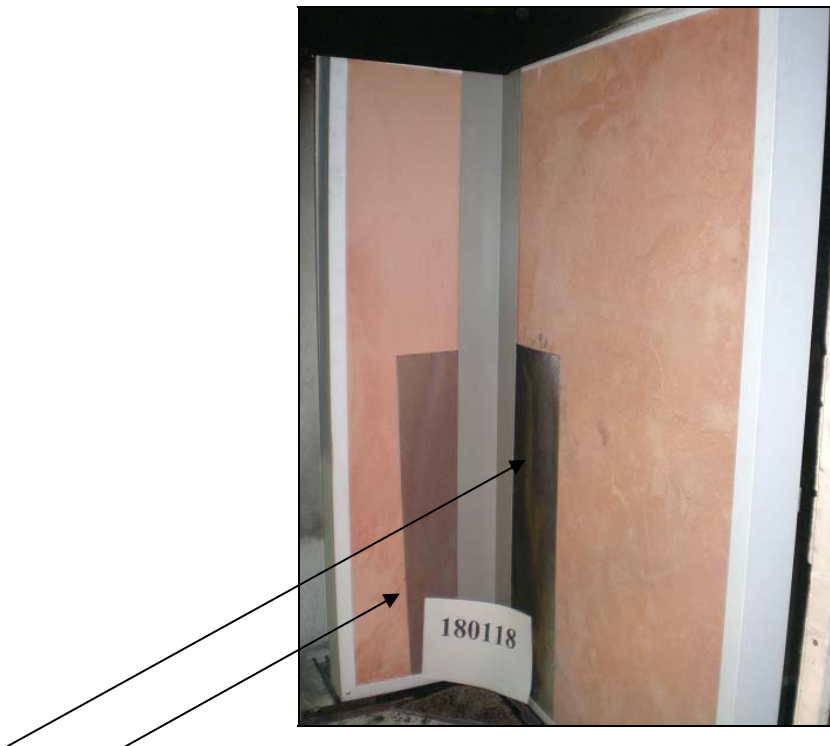
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Annex 1:
Test apparatus and installation Figures and Plates



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



Position of the steel mesh. The mesh measured approximately 900mm in height and 300mm in width.

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

Figure 1 - Plan View of SBI Apparatus

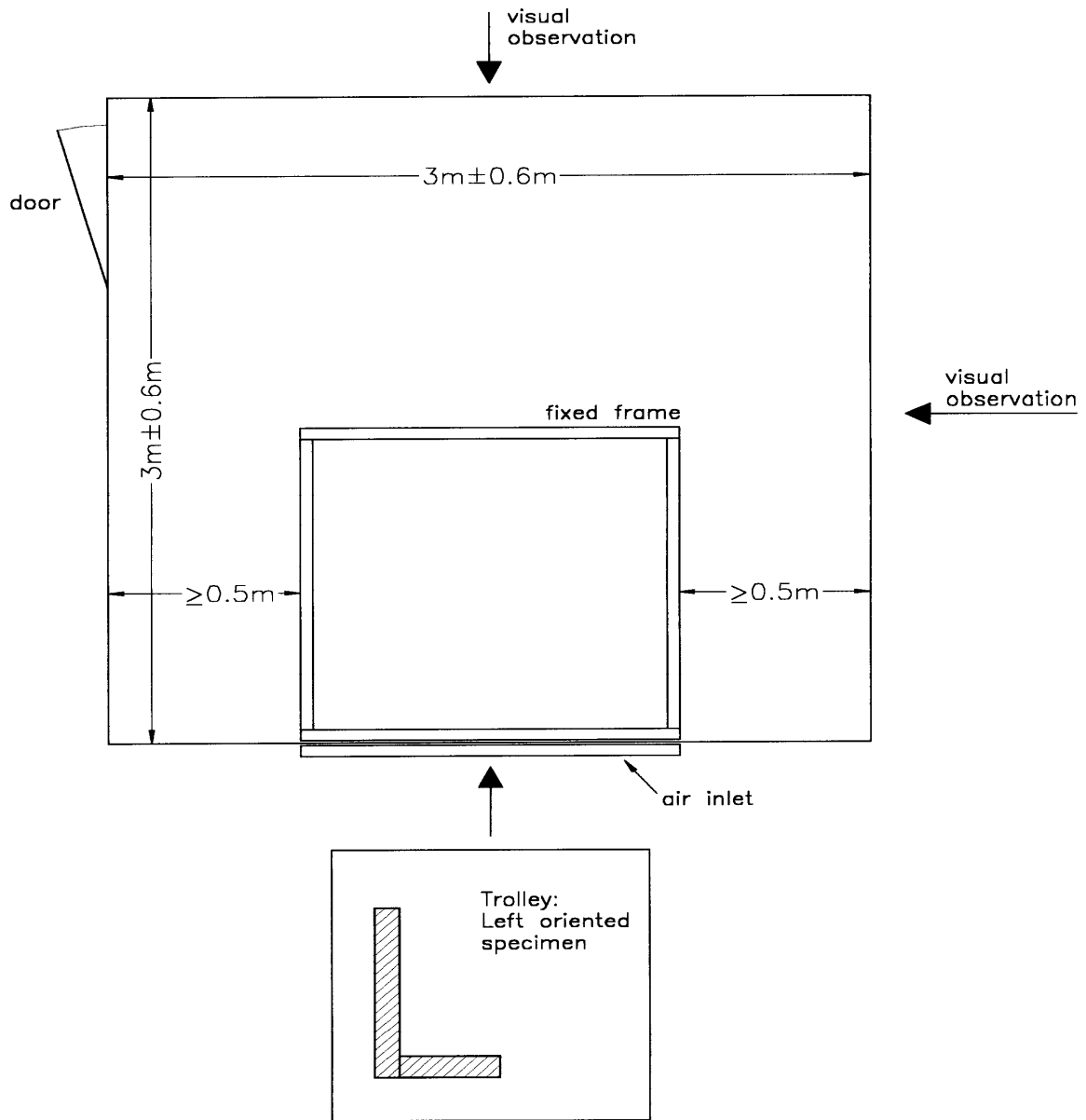
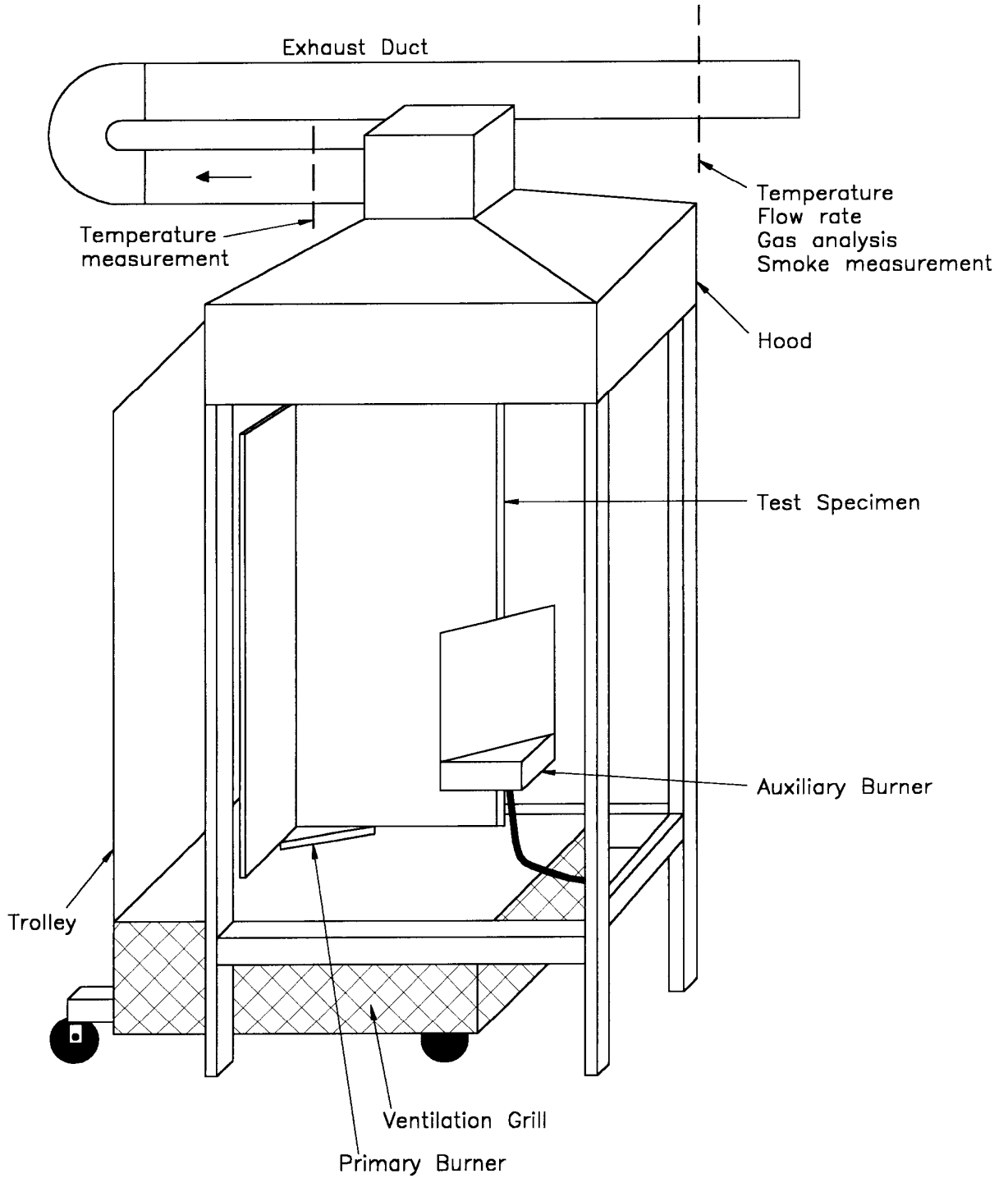


Figure 2 - Test Apparatus (Schematic)



Annex 2: Graphs

Figure 3. $HRR_{av}(t)$ (kW)

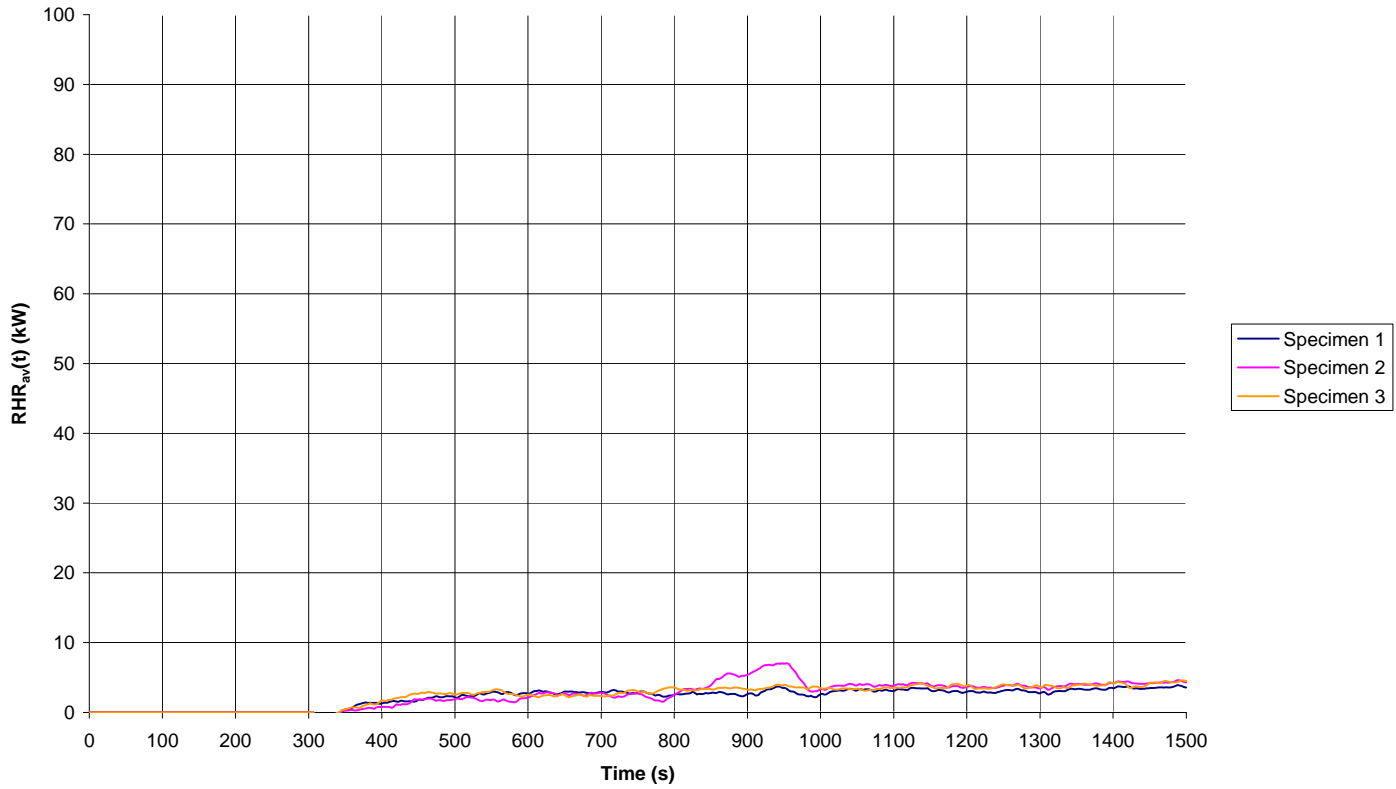


Figure 4. $THR(t)$ (MJ)

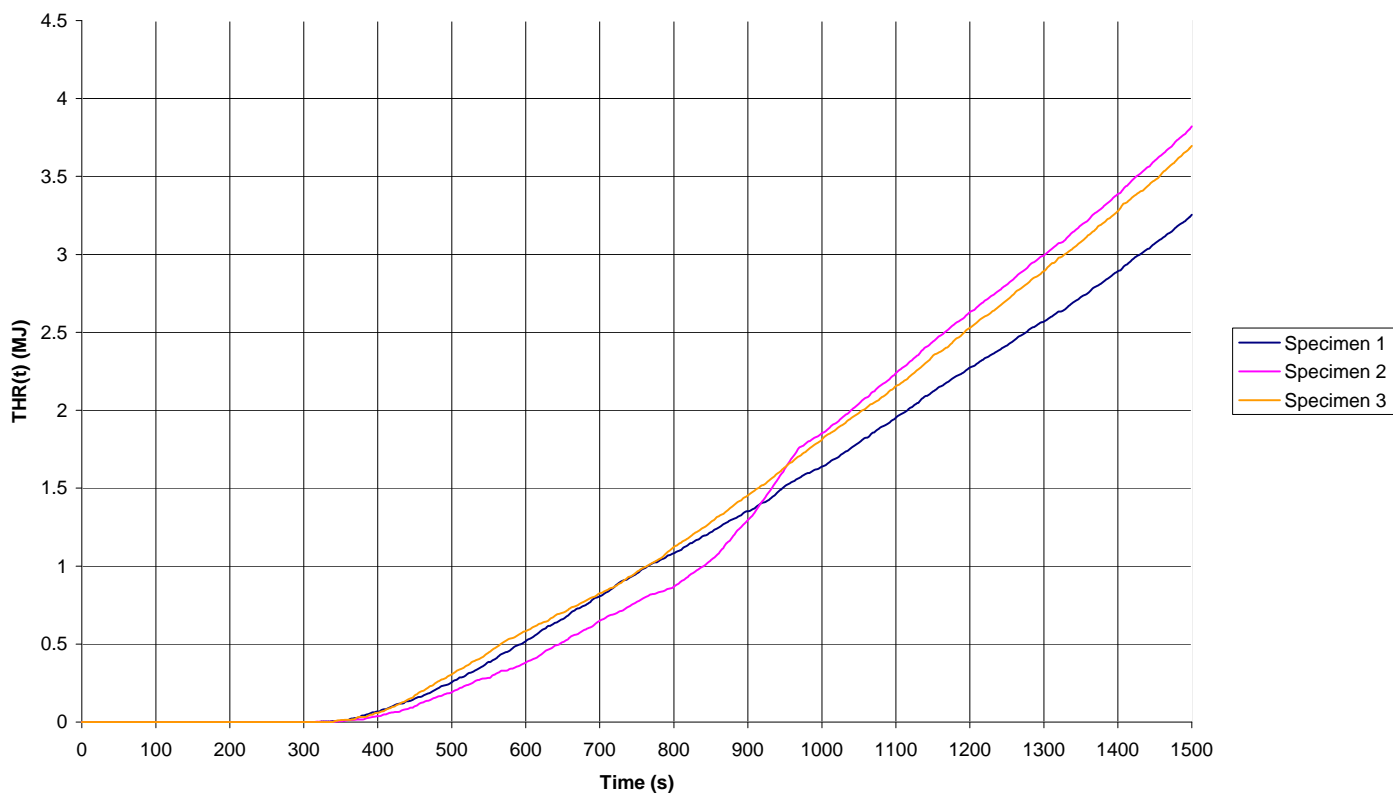


Figure 5. FIGRA

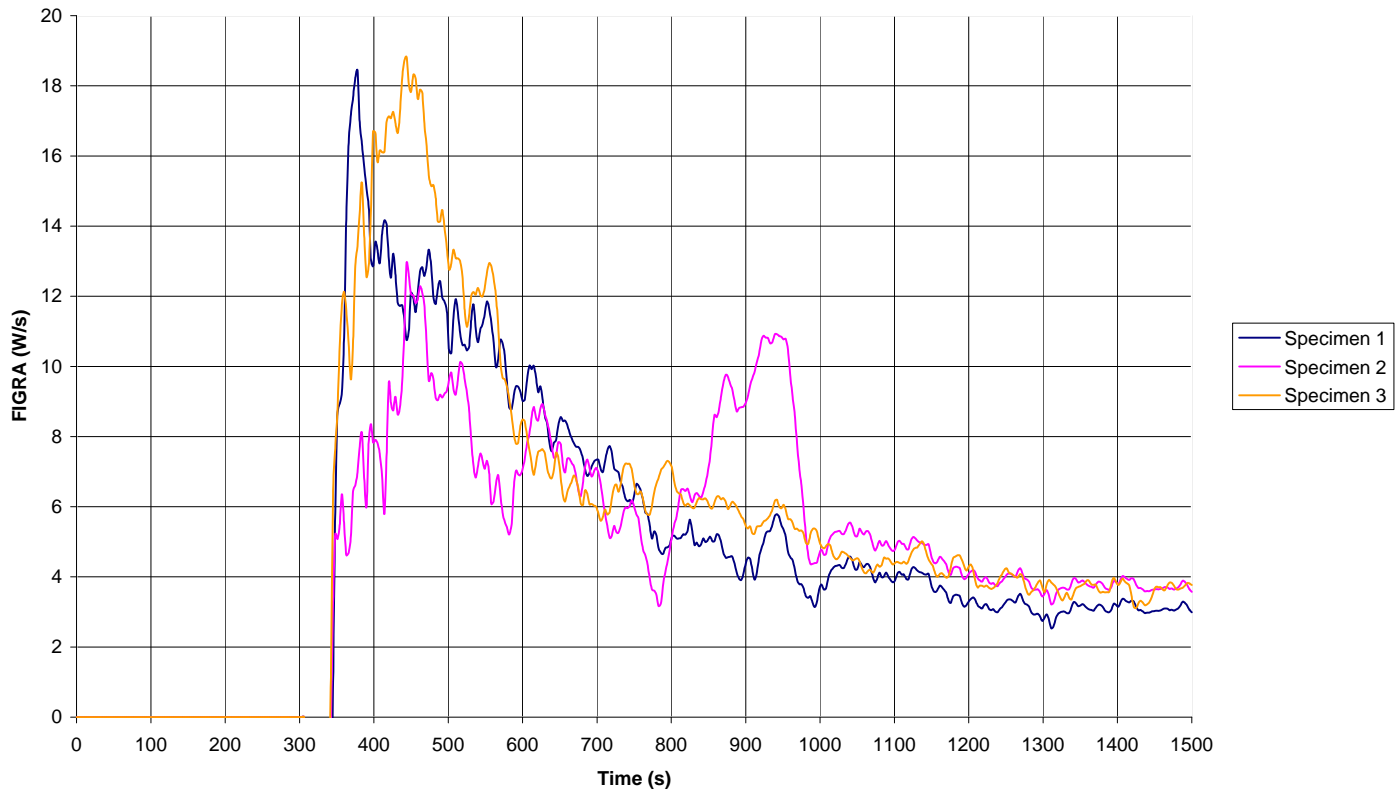


Figure 6. $SPR_{av}(t)$ (m^2/s)

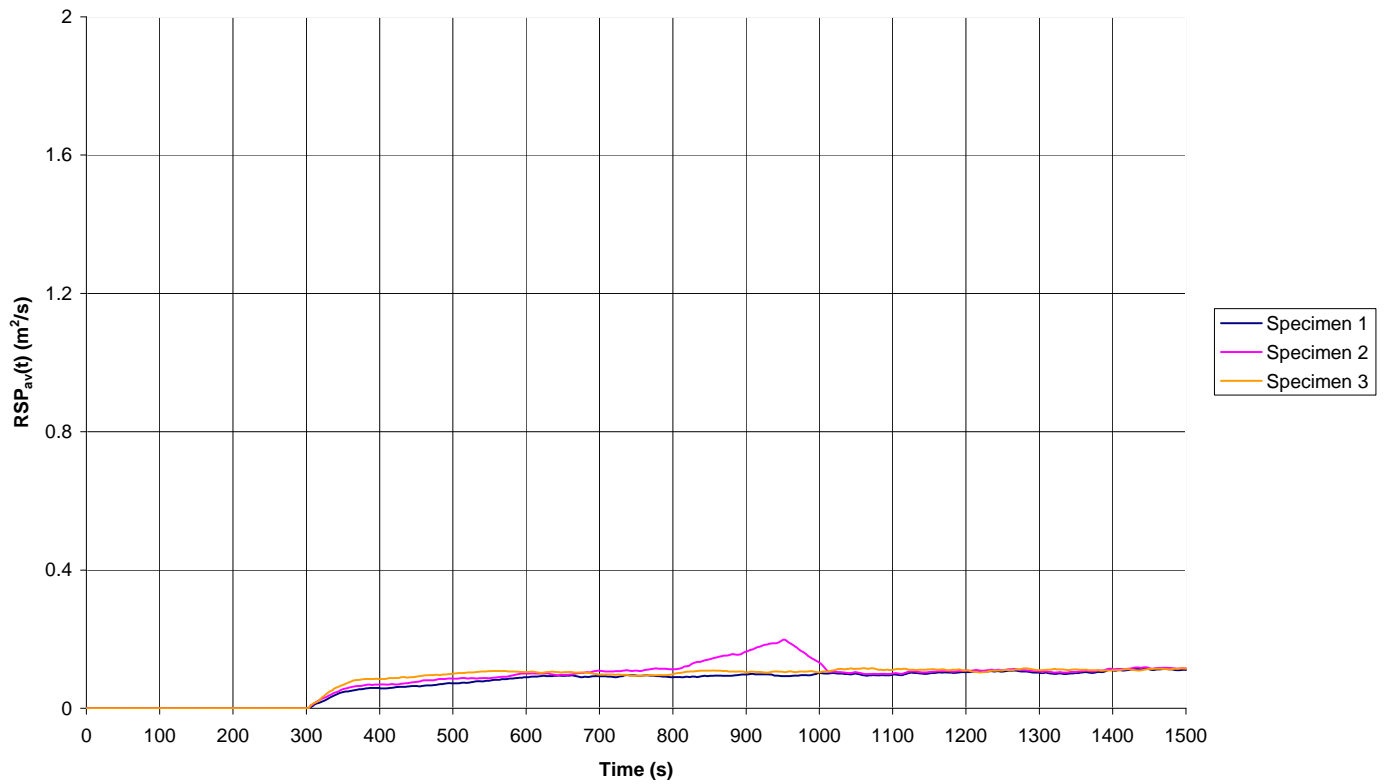


Figure 7. TSP(t) (m²)

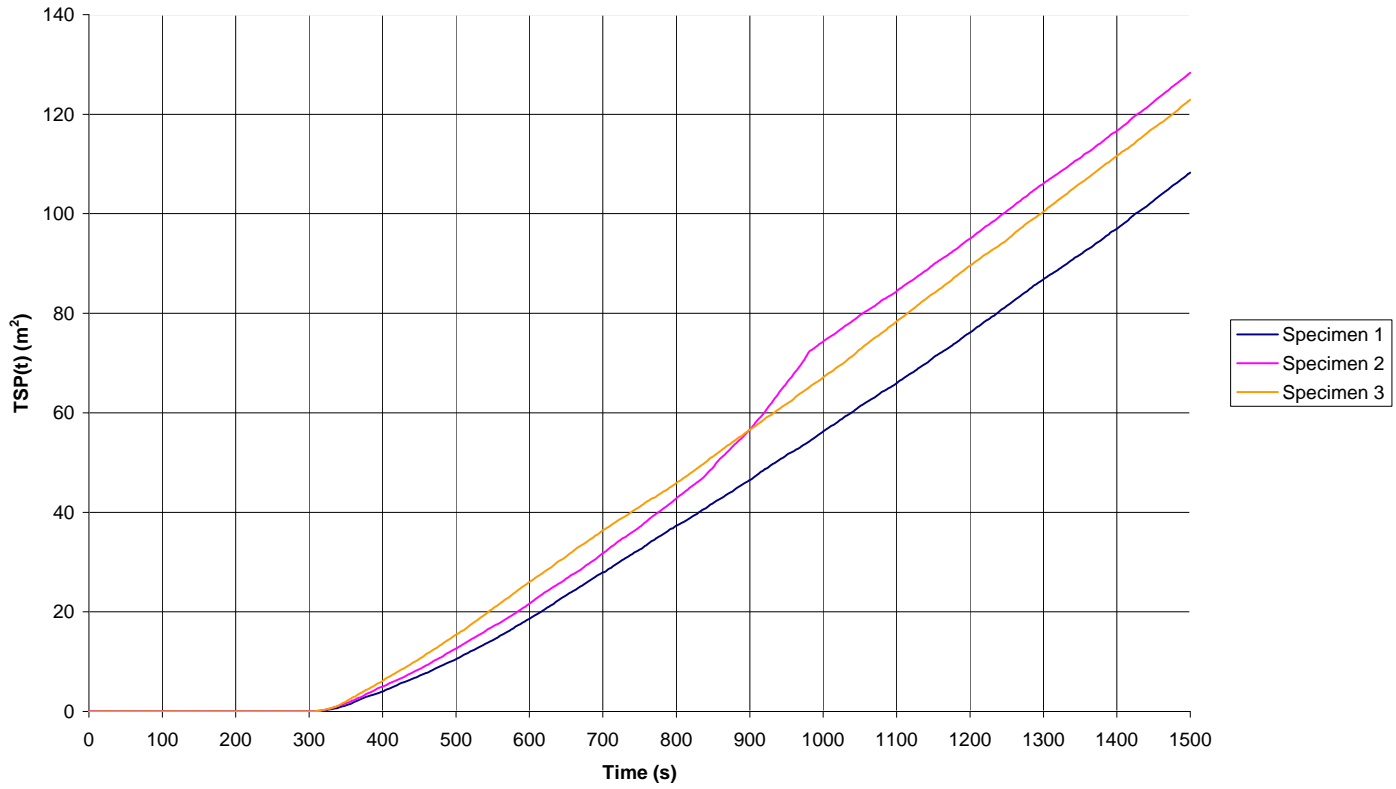
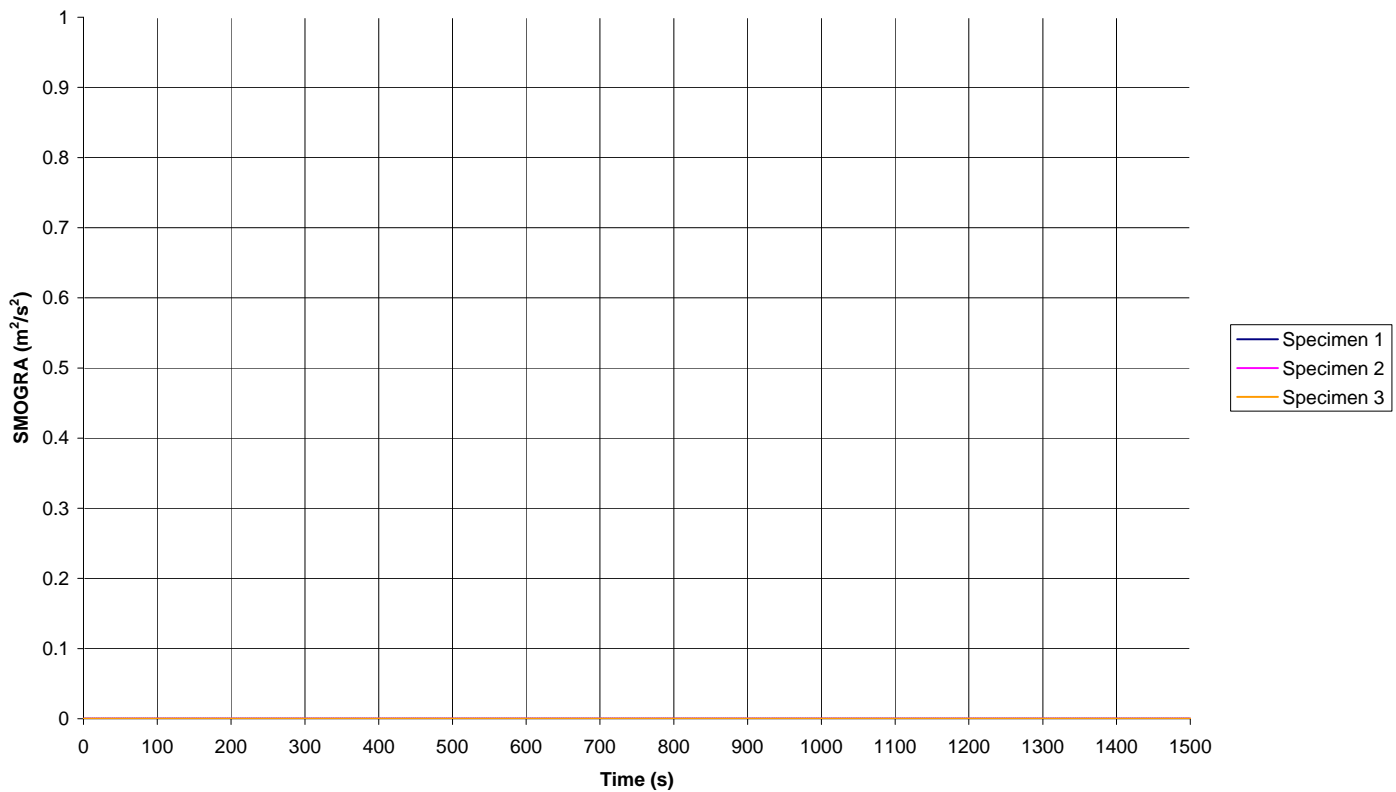


Figure 8. SMOGRA Graph.





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