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Accredited by TÜRKAK

**TSE DENEY ve KALİBRASYON MERKEZİ BAŞKANLIĞI**  
**Yapı Malzemeleri Yangın ve Akustik Laboratuvarı Müdürlüğü**

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Test  
TS EN ISO/IEC 17025  
AB-0001-T

**HEADSHIP OF TSE TEST and CALIBRATION CENTER**  
**CONSTRUCTION MATERIALS FIRE AND ACOUSTICS LABORATORY DIRECTORATE**

Address:Aydınlı Mahallesi Ulus Sokak No:7/1 34953 Tuzla/ İSTANBUL  
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**MUAYENE VE DENEY RAPORU**  
**TEST REPORT**

AB-0001-T  
502783  
12-19

**Deneyi Talep Eden/Firma** : NOTERSON ENDÜSTRİYEL ENERJİ VERİMLİLİK LTD. ŞTİ  
(Adı,Adresi,Şehir vb.) (NOTERSON ENDÜSTRİYEL ENERJİ VERİMLİLİK LTD. ŞTİ: OĞUZLAR MAH.  
**Requesting/Customer** 1388.SOK. NO:30/3 BALGAT ÇANKAYA Çankaya-ANKARA)  
(Name,Address, City etc.)  
**Deney Talep Tarihi/No** : 19.11.2019 / 355773  
**Order Date / No**  
**Numunenin Tanımı** : 551817,SU BAZLI AKRİLİK KAPLAMA, ISOLLAT-02, -, -, -, 15.00 adet  
(No,Cins, Marka, Tip, Tür, Model vb.)  
**Sample Description**(No, Type, Mark, Model etc.) 551817,WATER BASED ACRYLIC COATING,ISOLLAT-02,-,-,-,15,00 item  
**Numune Kabul Tarihi** : 19.11.2019  
**Test Item Receipt Date**  
*Samples were taken by the client.*  
**Deneylerin Yapıldığı Tarih** : 19.11.2019 - 29.11.2019  
**Date of Test**  
**Uygulanan Standard / Metod** : TS EN ISO 5659-2:2013-06 , IMO FTP CODE:2021-01  
**Applied Standard/Method** TS EN ISO 5659-2:2013-06 , IMO FTP CODE:2021-01  
**Raporun Sayfa Sayısı** : 15  
**Number of pages of the report**

**Açıklamalar**

**Remarks**

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The test and/or measurement results, the uncertainties (if applicable) with confidence probability and test methods are given on the following pages which are part of this report.

Numune müşteri tarafından alınmıştır, bu rapordaki sonuçlar numunenin teslim alındığı hali için geçerlidir. Bu rapor özel deney talebine istinaden düzenlenmiş olup, Standartlara Uygunluk Belgesi niteliğinde değildir. Partiyi temsil etmez, Piyasa Gözetim ve Denetim Faaliyetlerine esas oluşturamaz, ilan, reklam ve ihalelerde 6102 sayılı Türk Ticaret Kanunu'nun 54. Ve 55. Maddelerinde yer alan haksız rekabet hükümlerine aykırı şekilde kullanılabilir. Söz konusu hususlara aykırı hareket edilmesi halinde hukuki ve cezai açıdan TSE sorumlu tutulamaz.

The sample was taken by the customer and the results in this report are valid for the status of the sample being received. This report has been prepared in accordance with the request for special tests and is not qualified as a Certificate of Conformity to Standards. It does not represent the party, does not constitute a basis for Market Surveillance and Audit Activities, and cannot be used in announcement, advertisements and tenders in contradiction with the provisions of unfair competition in Articles 54 and 55 of the Turkish Commercial Law No. 6102. TSE cannot be held responsible in case of violation of these issues in legal and criminal terms.

**Mühür**  
Seal

**Tarih**  
Date

**Deney Sorumlusu**  
Person in charge of tests

**Kontrol Eden**  
Reviewer

**Onaylayan**  
Approved by

Arda ATAKOL  
Deney Personeli  
Testing Expert

Alpay SÜMER  
Teknik Şef V.  
Technical Chief Dep.

Metehan ÇALIŞ  
Laboratuvar Müdürü  
Laboratory Manager

Bu rapor, hazırlayan laboratuvarın yazılı izni olmadan kısmen kopyalanıp çoğaltılamaz. İmzasız ve mühürsüz raporlar geçersizdir.

Bu rapor, sadece deneyi yapılan numune için geçerlidir ve "Ürün Belgesi" yerine geçmez.

This test report shall not be reproduced other than in full except with the written permission of the laboratory. Test reports without signature and seal are not valid.

This test report represents only tested sample(s), and shall not be used as Product Certificate



## TEST RESULTS

### International Maritime Organisation International Code for Application of Fire Test Procedures, 2010 (2012 Edition) Part 2: Smoke and Toxicity Test

The tests, results of which are expressed in this test report were conducted according to the instructions given in "Part 2: Smoke and Toxicity Test" of 2012 version of "International Code for Application of Fire Test Procedures, 2010 (FTP Code 2010)" with regards to International Convention for the Safety of Life at Sea (SOLAS) chapter 11-2 which was put into effect by International Maritime Organisation RESOLUTION MSC.61(67).

The necessary alterations in smoke density and toxicity measurements on TS EN ISO 5659-2 standard test method were made as explained respectively in Appendix 1 and Appendix 2 of the mentioned document.

This test method provides data for a comparative analysis in smoke and toxic gas generation of the analyte, however it does not contain any means of real life fire propagation modelling. For this reason, the reported results are not intended to be used to define the fire hazard of the analyte material in real fire scenarios.

This report was translated from the original TSE test report in Turkish with the same report number and date.

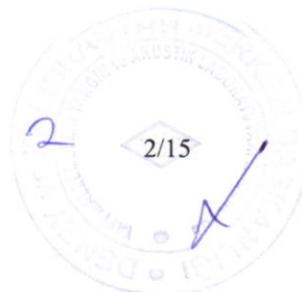
### TS EN ISO 5659-2 Plastics – Smoke generation Part 2: Determination of optical density by a single-chamber test

<b>Sponsor</b>	NOTERSON ENDÜSTRİYEL ENERJİ VERİMLİLİK LTD. ŞTİ. Oğuzlar Mh. 1388.. Sk. No: 30/3 Balgat, Çankaya, ANKARA
<b>Demanded by</b>	NOTERSON ENDÜSTRİYEL ENERJİ VERİMLİLİK LTD. ŞTİ. Oğuzlar Mh. 1388.. Sk. No: 30/3 Balgat, Çankaya, ANKARA
<b>Manufacturer</b>	SPECIAL TECHNOLOGIES LLC. 623704, Sverdlovsk Region, Berezovsky, 39/35 Chapayev St. RUSSIA
<b>Test date</b>	28.11.2019

### Sample Details

<b>Arrival Date</b>	20.11.2019
<b>Sample name</b>	ISOLLAT-02
<b>Description</b>	Multi purpose, water-based acrylic coating material.
<b>Application</b>	
<b>Thickness</b>	1,2 mm
<b>Weight per unit area</b>	0,36 kg/m <sup>2</sup>
<b>Color / surface</b>	White, rough
<b>Substrate</b>	Steel plate (3 mm thickness)

### Sampling and Preparation





## TEST RESULTS

The samples were prepared by the sponsor and were placed in the conditioning environment without any other preparation. They were covered with aluminium foil and were put in the sample holder on top of 9 mm thick CaSi and 10 mm thick mineral wool isolation boards. The excess aluminium foil that resided on the 65 mm x 65 mm exposed surfaces was cut and removed.

### Şartlandırma

The samples were conditioned at  $23 \pm 2$  °C and  $50\% \pm 5\%$  relative humidity until constant mass was achieved for 8 days.

### Test Application

The tests were conducted according to the instructions given in IMO FTP Code 2010 (2012 Edition) Part 2: Smoke and Toxicity Test.

#### Parameters essential to smoke generation measurements

Exposed face	Coated face
Test modes	25 kWm <sup>-2</sup> without pilot flame 25 kWm <sup>-2</sup> with pilot flame 50 kWm <sup>-2</sup> without pilot flame
Wire mesh	Not used
Early termination	None

#### Parameters essential to toxic gas concentration measurements

Analyser	Gasmet CX4000 FTIR Spektrometre
Volume of sample cell	0.4 L
Length of the light path	5.0 m
Temperature of the sample cell and the sampling line	180 °C
Length of the sampling line	2.7 m
Pipe diameter of the sampling line	4 mm
Inner volume of the sampling line	34 cm <sup>3</sup>
Pump capacity	4.0 L/min
$D_{mST}$ (Sampling time at max. smoke density)	999 s (25 kW), 810 s (25 kW pilot flame), 504 s (50 kW)
SRP (Sampling response time)	20 s
Measurement interval	5 s
Number of measurements per second	10

#### Deviations from test method

Toxicity samplings from the chamber were done for 20 s intervals starting from 10 s prior to the point where the maximum density was achieved in the first repetition in each test mode according to IMO FTP Code Part 2 Appendix 2. There was not any other deviation from the test method.





## TEST RESULTS

### Test Results

The average results calculated from 3 consecutive tests in each test mode are given below. Details of all tests are given in the following pages.

### Smoke Emission

Test Mode	25 kWm <sup>-2</sup>	25 kWm <sup>-2</sup> pilot flame	50 kWm <sup>-2</sup>
D <sub>s</sub> max	69,43	26,06	62,59
t <sub>Dsmax</sub>	1133	989	370

### Toxicity

Gaz bileşen	Average concentration (ppm, volume/volume)		
	25 kWm <sup>-2</sup>	25 kWm <sup>-2</sup> pilot flame	50 kWm <sup>-2</sup>
CO	67,42	143,94	197,91
NO <sub>x</sub>	56,02	95,93	51,84
SO <sub>2</sub>	0	0	0
HCl	1,18	1,88	4,85
HF	0	0	0
HCN	2,11	2,27	1,97
HBr	1,33	2,75	1,75

### Requirements

An average of the maximum specific density of smoke of three tests at each test condition shall not exceed the limits below.

Type of Product	D <sub>s</sub> max
Surface of bulkheads, linings or ceilings	200
Primary deck coverings	400
Floor coverings	500
Plastic pipes	400

The average value of gas concentrations measured in any test condition shall not exceed the limits below.

Toxic Species	Upper limit (ppm, volume/volume)
CO	≤ 1450
NO <sub>x</sub>	≤ 600
SO <sub>2</sub>	≤ 600
HCl	≤ 140
HF	≤ 600
HCN	≤ 120 (döşemeler için ≤ 200)
HBr	≤ 350





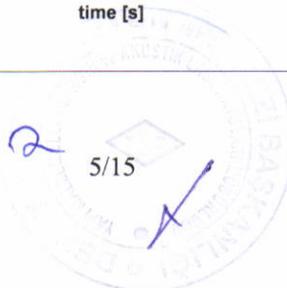
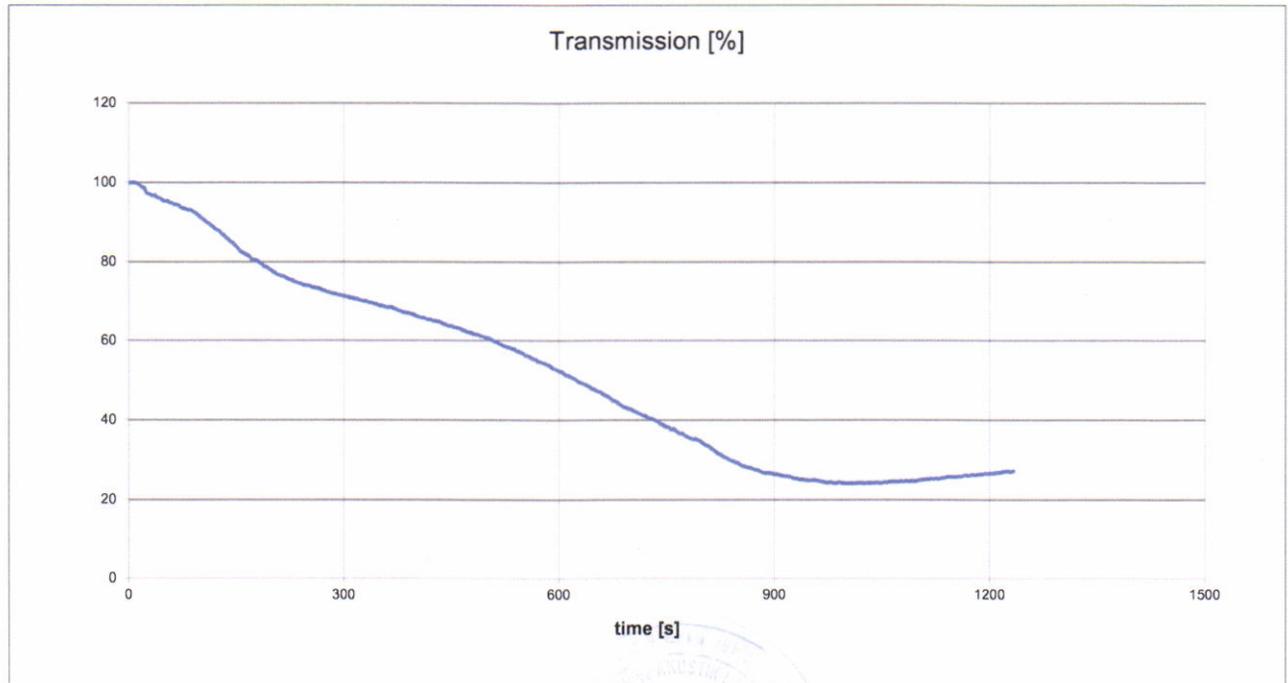
## TEST RESULTS

### 25 kWm<sup>-2</sup> heat flux, no pilot flame

Description	Parameter	Sample 1	Sample 2	Sample 3	Average
Maximum optical density	D <sub>s,max</sub>	75,92	62,01	70,37	69,43
Mean optical density	D <sub>s,mean</sub>	43,87	33,41	47,98	41,75
Minimum transmission	T <sub>min</sub> (%)	24,1	33,0	28,9	28,67
Time to reach maximum density	t <sub>DM</sub> (s)	999	1200	1200	1133
Clear-beam correction factor	D <sub>c</sub>	75,12	62,66	80,88	72,89
Optical density at minute 1	D <sub>s,1</sub>	3,06	3,67	4,72	3,82
Optical density at minute 2	D <sub>s,2</sub>	7,13	10,13	18,28	11,85
Optical density at minute 3	D <sub>s,3</sub>	12,65	19,07	37,27	23,00
Optical density at minute 4	D <sub>s,4</sub>	16,88	23,30	42,80	27,66
Optical density at minute 5	D <sub>s,5</sub>	19,39	24,87	43,90	29,39
Optical density at minute 10	D <sub>s,10</sub>	37,27	29,57	46,42	37,75
Optical density at minute 15	D <sub>s,15</sub>	76,57	45,90	61,01	61,16
Optical density at minute 20	D <sub>s,20</sub>	75,92	62,01	70,37	69,43
D <sub>s,1</sub> + D <sub>s,2</sub> + D <sub>s,3</sub> + D <sub>s,4</sub> /2	VOF4	31,28	44,52	81,66	52,49

### Concentration of toxic species in the smoke

Species	Concentration (ppm, volume/volume)		
	Sample 2	Sample 3	Average
CO	61,16	73,68	67,42
NO <sub>x</sub>	52,92	59,12	56,02
SO <sub>2</sub>	0	0	0
HCl	1,21	1,15	1,18
HF	0	0	0
HCN	2,37	1,84	2,11
HBr	0,42	2,23	1,33





## TEST RESULTS

Figure 1: Transmission plot of *sample 1* under  $25 \text{ kW/m}^2$  flux

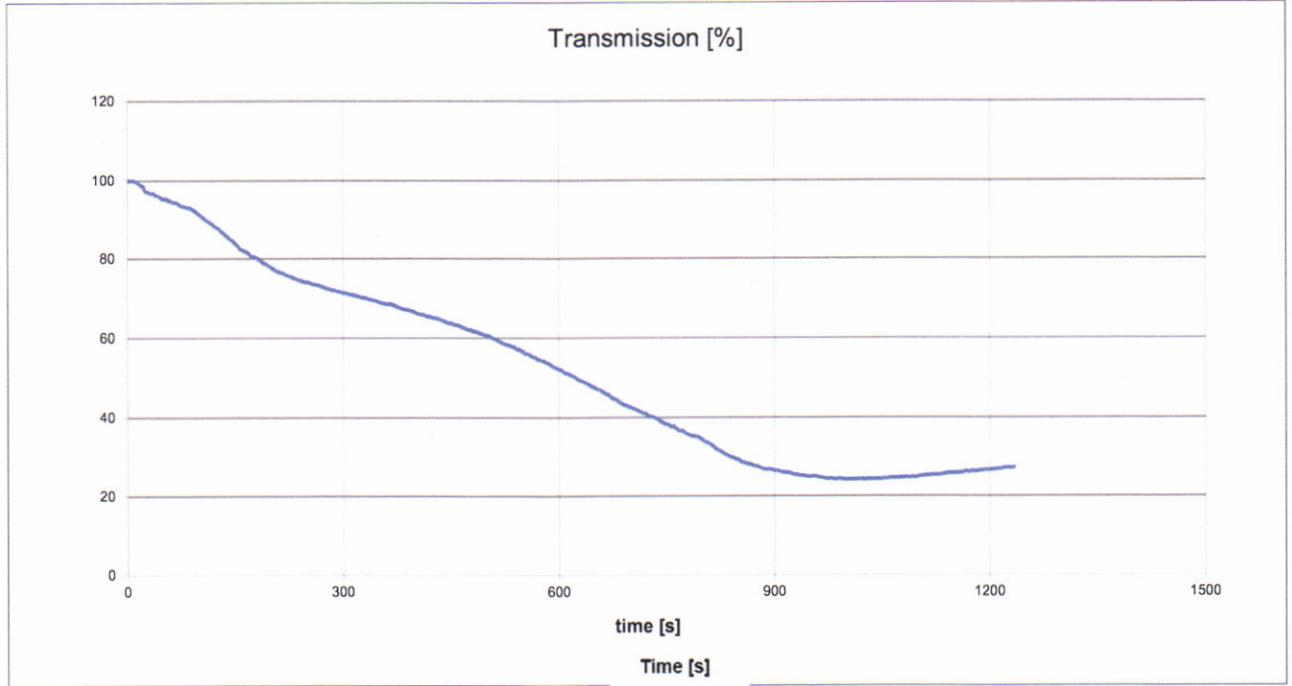


Figure 2: Specific optical density plot of *sample 1* under  $25 \text{ kW/m}^2$  flux

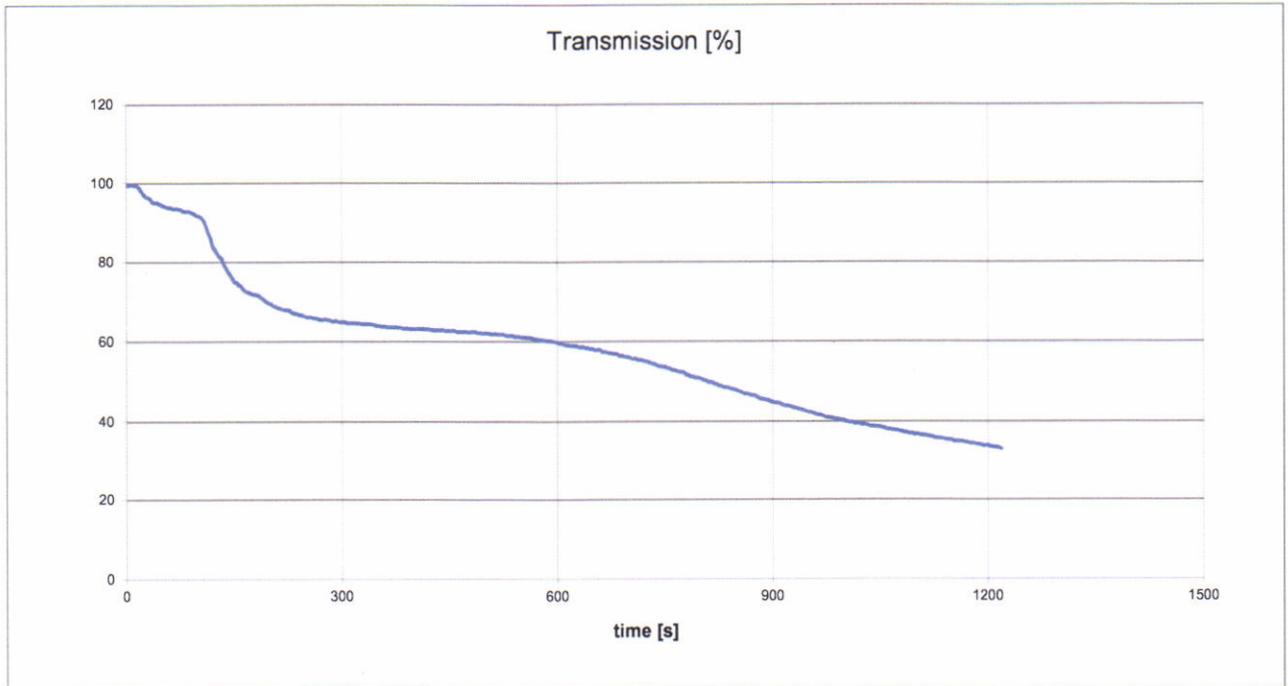


Figure 3: Transmission plot of *sample 2* under  $25 \text{ kW/m}^2$  flux



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## TEST RESULTS

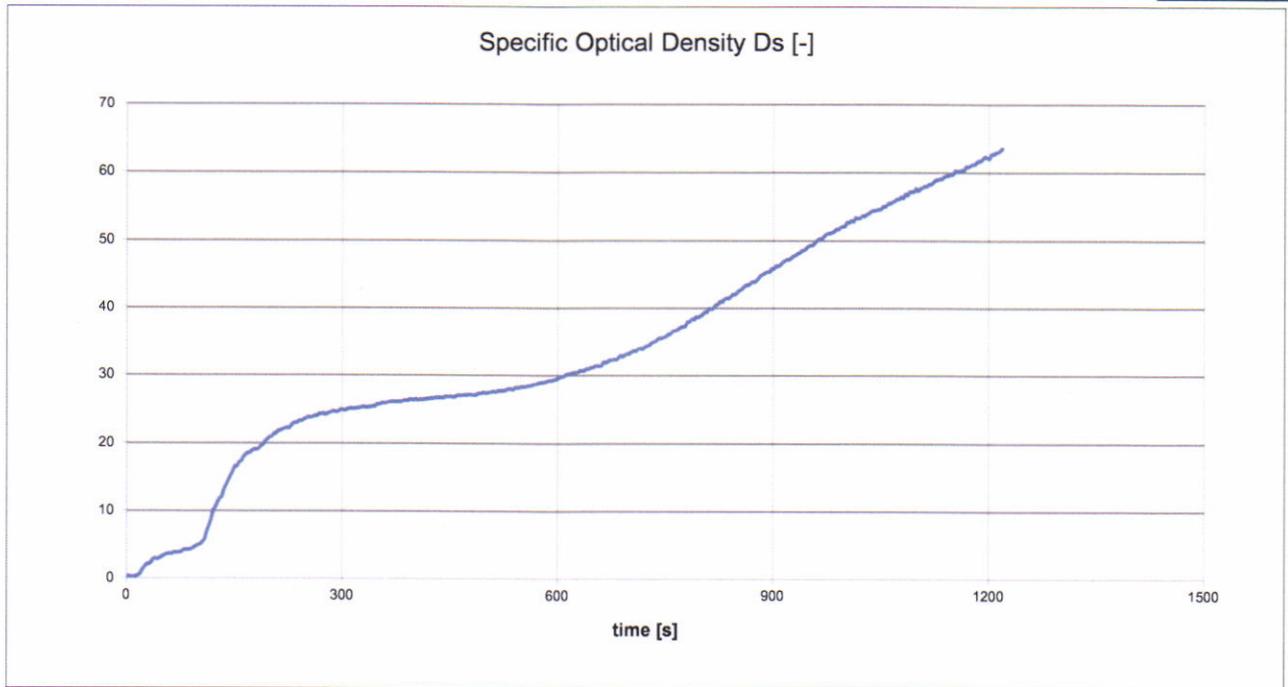


Figure 4: Specific optical density plot of *sample 1* under  $25 \text{ kW/m}^2$  flux

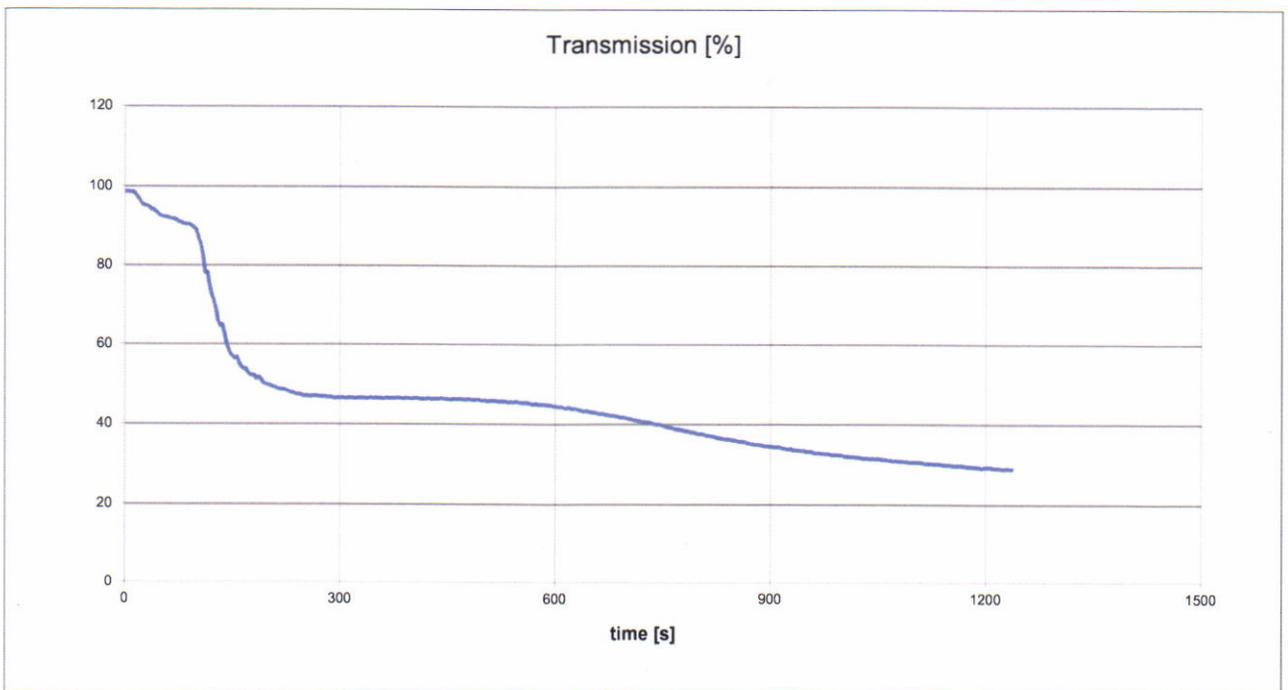


Figure 5: Transmission plot of *sample 3* under  $25 \text{ kW/m}^2$  flux



## TEST RESULTS

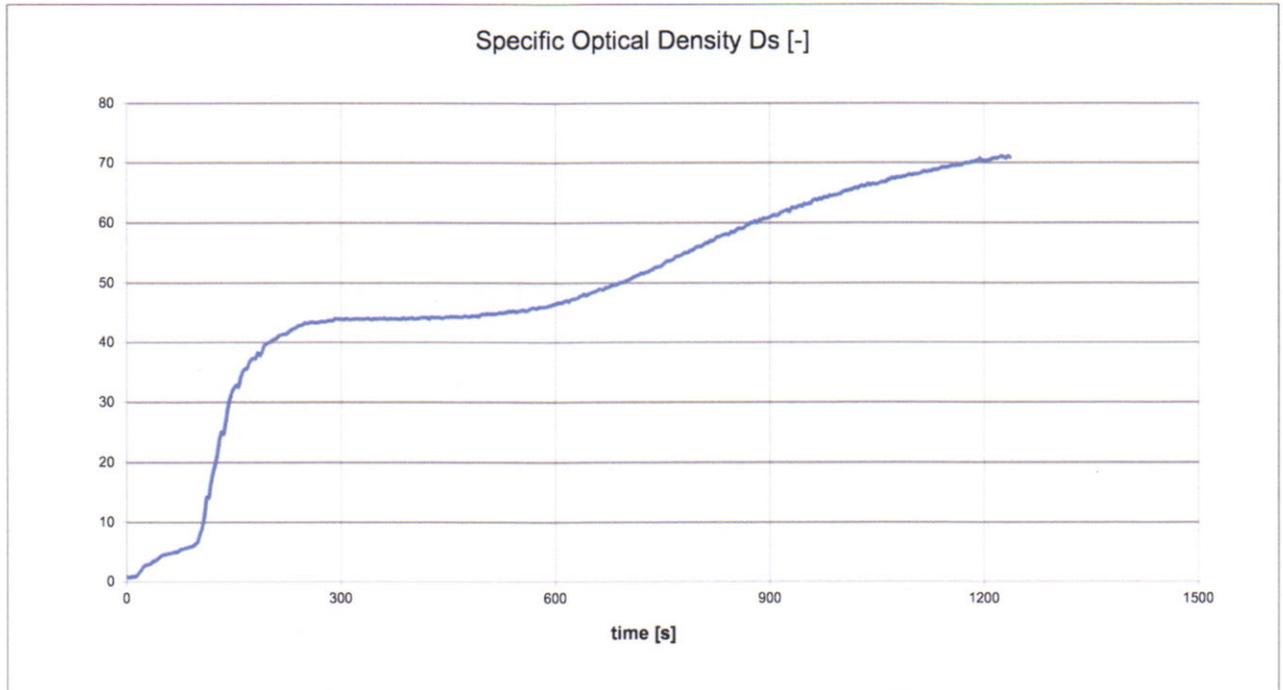


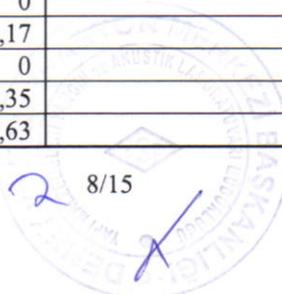
Figure 6: Specific optical density plot of **sample 1** under **25 kW/m<sup>2</sup>** flux

### 25 kWm<sup>-2</sup> heat flux, with pilot flame

Description	Parameter	Sample 1	Sample 2	Sample 3	Average
Maximum optical density	<b>D<sub>s,max</sub></b>	31,03	24,78	22,36	26,06
Mean optical density	<b>D<sub>s,mean</sub></b>	16,00	12,28	8,99	12,42
Minimum transmission	<b>T<sub>min</sub> (%)</b>	58,2	64,9	67,7	63,60
Time to reach maximum density	<b>t<sub>DM</sub> (s)</b>	810	963	1194	989
Clear-beam correction factor	<b>D<sub>c</sub></b>	24,53	23,46	70,88	39,62
Optical density at minute 1	<b>D<sub>s,1</sub></b>	1,75	0,40	0,87	1,01
Optical density at minute 2	<b>D<sub>s,2</sub></b>	12,01	0,81	1,33	4,72
Optical density at minute 3	<b>D<sub>s,3</sub></b>	10,00	0,98	1,63	4,20
Optical density at minute 4	<b>D<sub>s,4</sub></b>	10,13	1,28	1,75	4,39
Optical density at minute 5	<b>D<sub>s,5</sub></b>	10,34	1,75	1,86	4,65
Optical density at minute 10	<b>D<sub>s,10</sub></b>	14,39	10,13	5,22	9,91
Optical density at minute 15	<b>D<sub>s,15</sub></b>	23,91	24,52	17,18	21,87
Optical density at minute 20	<b>D<sub>s,20</sub></b>	24,52	23,47	22,11	23,37
D <sub>s,1</sub> + D <sub>s,2</sub> + D <sub>s,3</sub> + D <sub>s,4</sub> /2	<b>VOF4</b>	28,82	2,83	81,66	37,77

### Concentration of toxic species in the smoke

Species	Concentration (ppm, volume/volume)		
	Sample 1	Sample 2	Sample 3
CO	170,70	117,18	143,94
NO <sub>x</sub>	95,16	96,69	95,93
SO <sub>2</sub>	0	0	0
HCl	2,17	1,59	1,88
HF	0	0	0
HCN	2,35	2,18	2,27
HBr	2,63	2,87	2,75





## TEST RESULTS

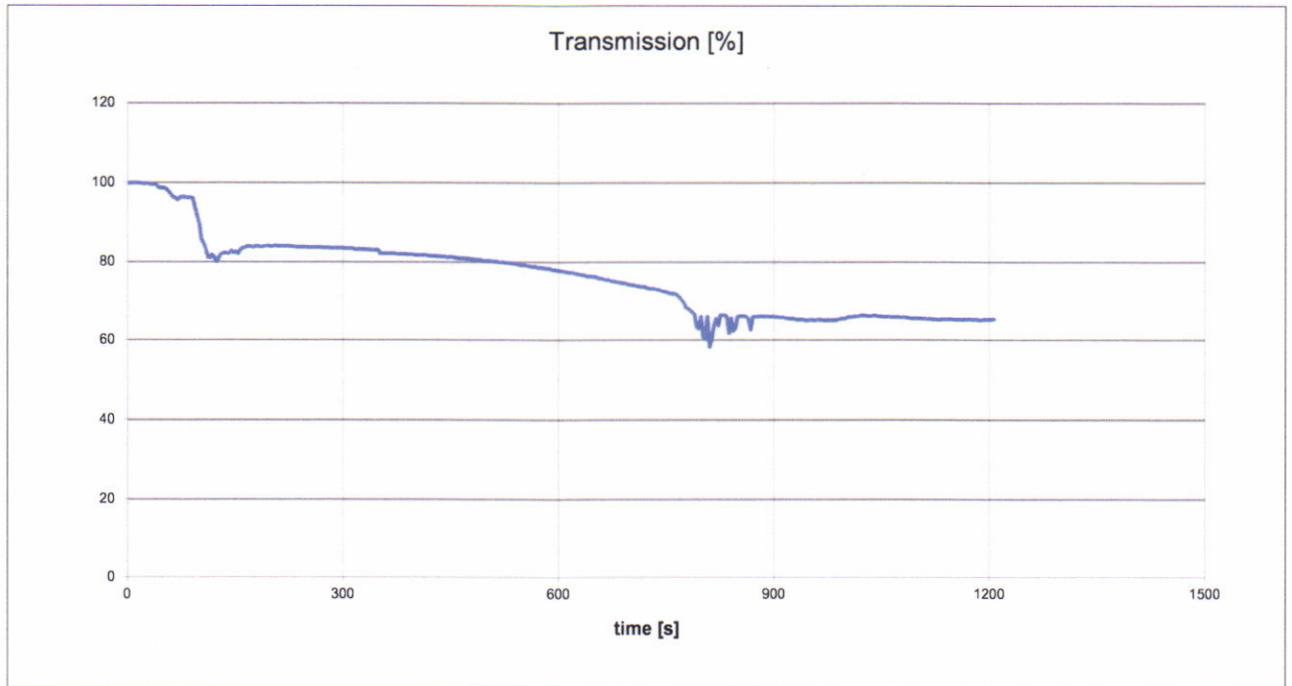


Figure 7: Transmission plot of **sample 1** under  $25 \text{ kW/m}^2$  flux and **pilot flame**

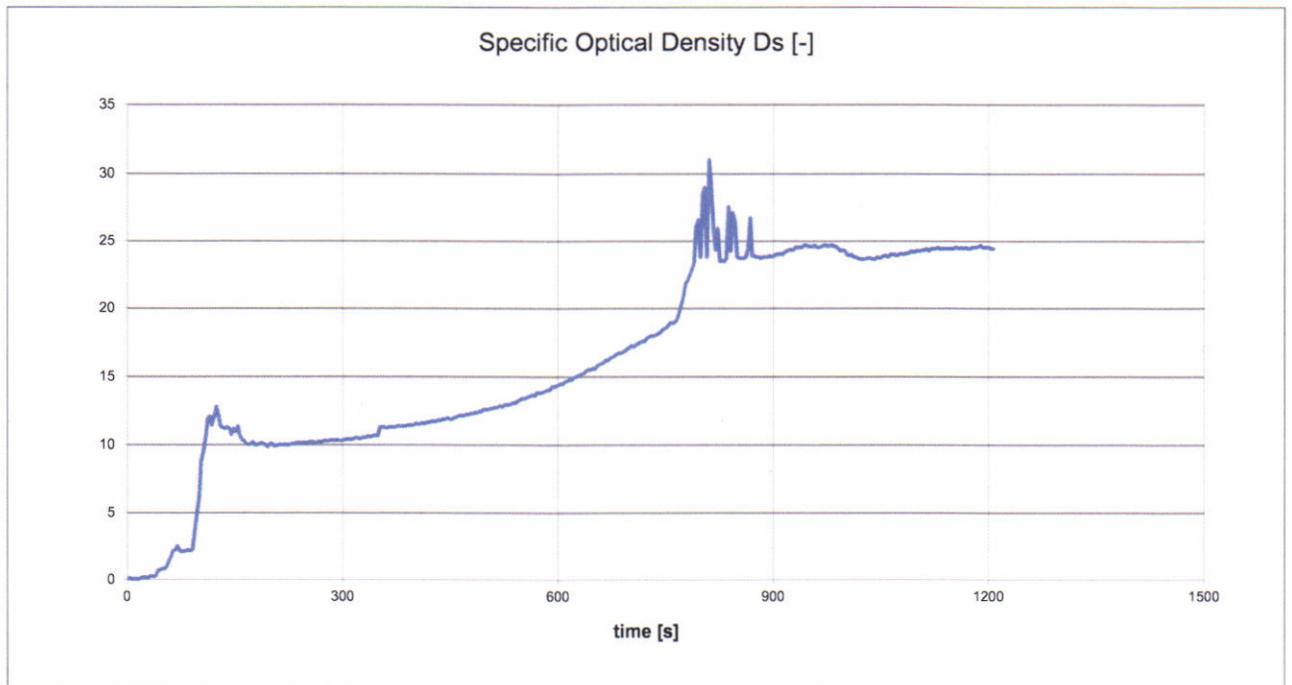


Figure 8: Specific optical density plot of **sample 1** under  $25 \text{ kW/m}^2$  flux and **pilot flame**





## TEST RESULTS

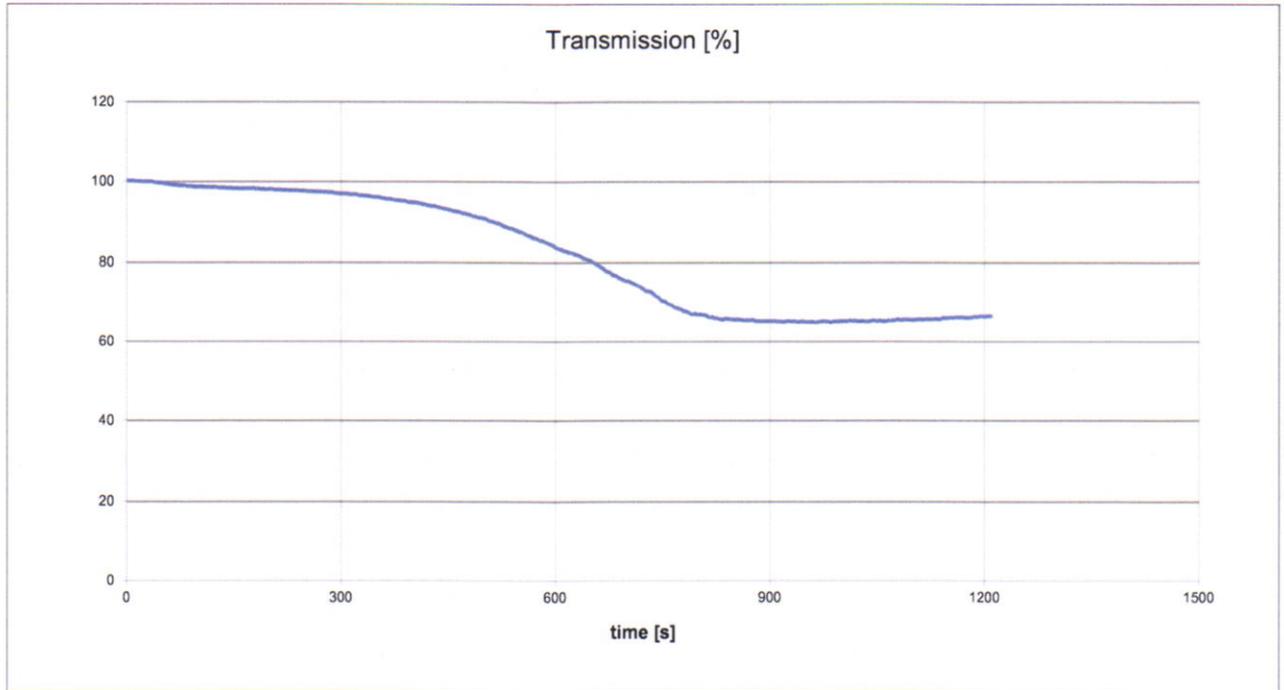


Figure 9: Transmission plot of **sample 2** under **25 kW/m<sup>2</sup>** flux and **pilot flame**

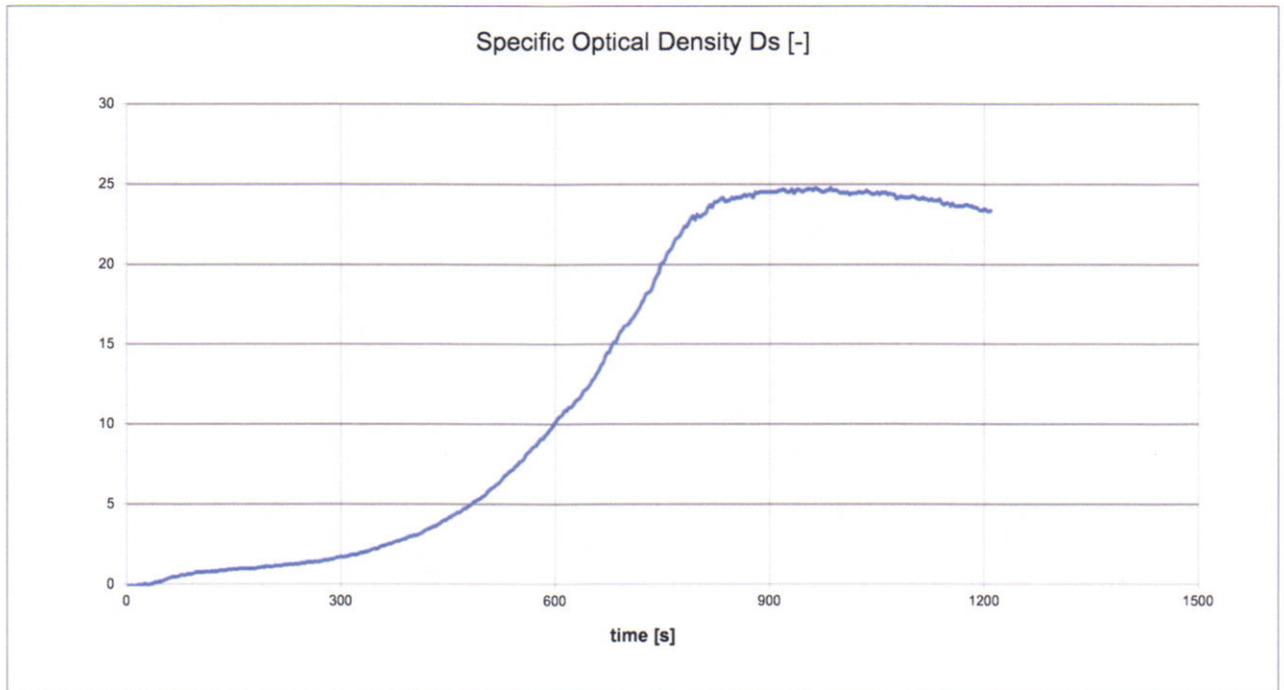


Figure 10: Specific optical density plot of **sample 2** under **25 kW/m<sup>2</sup>** flux and **pilot flame**





## TEST RESULTS

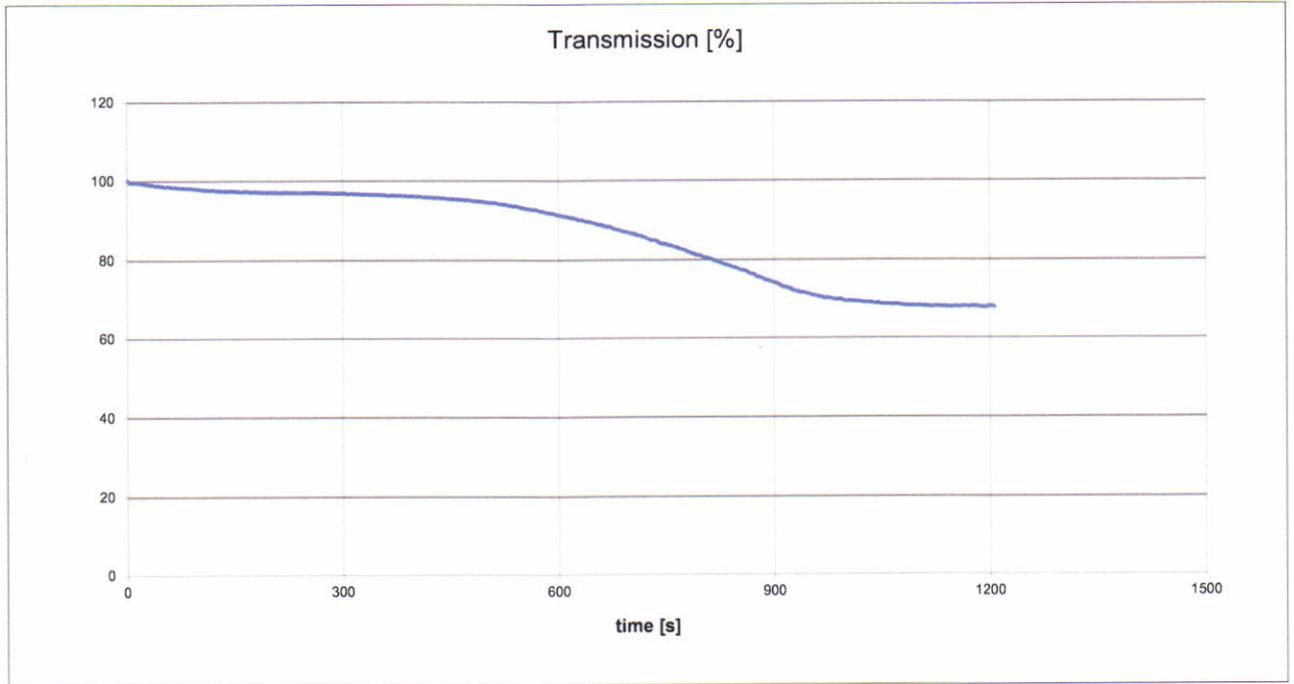


Figure 11: Transmission plot of **sample 3** under **25 kW/m²** flux and **pilot flame**

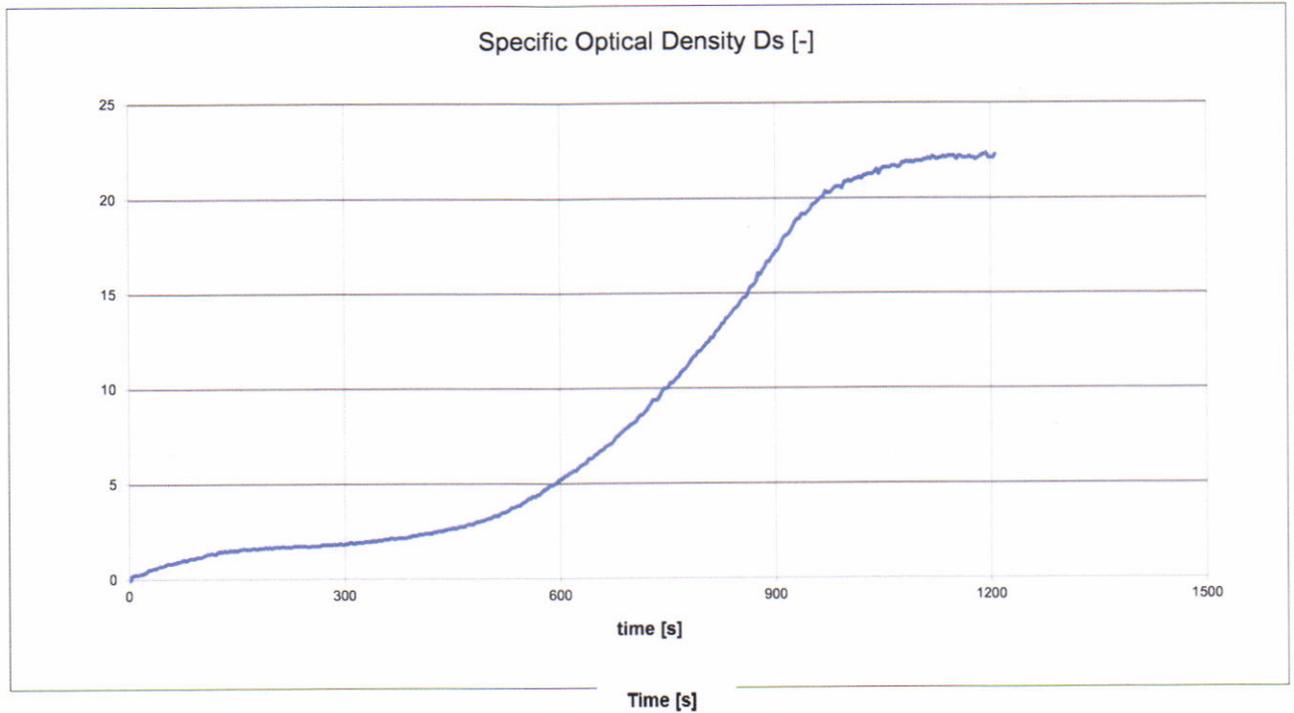
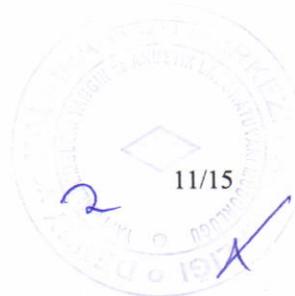


Figure 12: Specific optical density plot of **sample 3** under **25 kW/m²** flux and **pilot flame**





## TEST RESULTS

### 50 kWm<sup>-2</sup> heat flux, no pilot flame

Description	Parameter	Sample 1	Sample 2	Sample 3	Average
Maximum optical density	D <sub>s</sub> max	70,96	62,52	56,38	63,29
Mean optical density	D <sub>s</sub> mean	59,07	52,26	45,21	52,18
Minimum transmission	T <sub>min</sub> (%)	29,0	33,6	37,4	33,33
Time to reach maximum density	t <sub>DM</sub> (s)	72 / 516	534	504	370
Clear-beam correction factor	D <sub>c</sub>	47,92	61,17	37,16	48,75
Optical density at minute 1	D <sub>s</sub> 1	62,69	31,52	36,83	43,68
Optical density at minute 2	D <sub>s</sub> 2	57,00	50,69	41,48	49,72
Optical density at minute 3	D <sub>s</sub> 3	57,46	50,56	46,29	51,44
Optical density at minute 4	D <sub>s</sub> 4	61,34	53,83	50,97	55,38
Optical density at minute 5	D <sub>s</sub> 5	65,14	57,31	55,47	59,31
Optical density at minute 10	D <sub>s</sub> 10	70,18	61,34	37,16	56,23
Optical density at minute 15	D <sub>s</sub> 15	58,57	(-)	(-)	(-)
Optical density at minute 20	D <sub>s</sub> 20	49,05	(-)	(-)	(-)
D <sub>s</sub> 1 + D <sub>s</sub> 2 + D <sub>s</sub> 3 + D <sub>s</sub> 4/2	VOF4	207,83	159,69	138,61	168,71

### Concentration of toxic species in the smoke

Species	Concentration (ppm, volume/volume)		
	Sample 1	Sample 2	Sample 3
CO	212,45	183,37	197,91
NO <sub>x</sub>	56,26	47,42	51,84
SO <sub>2</sub>	0	0	0
HCl	5,32	4,37	4,85
HF	0	0	0
HCN	2,72	1,22	1,97
HBr	0,69	2,80	1,75

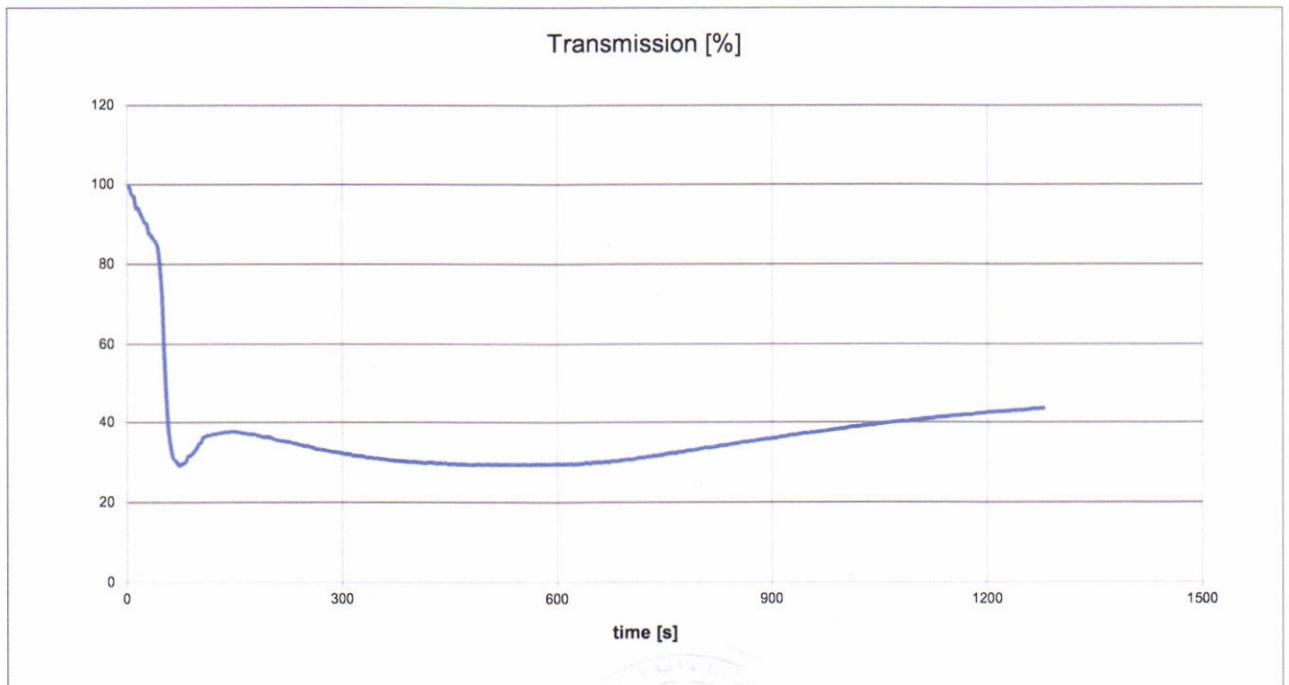


Figure 13: Transmission plot of **sample 1** under 50 kW/m<sup>2</sup> flux



## TEST RESULTS

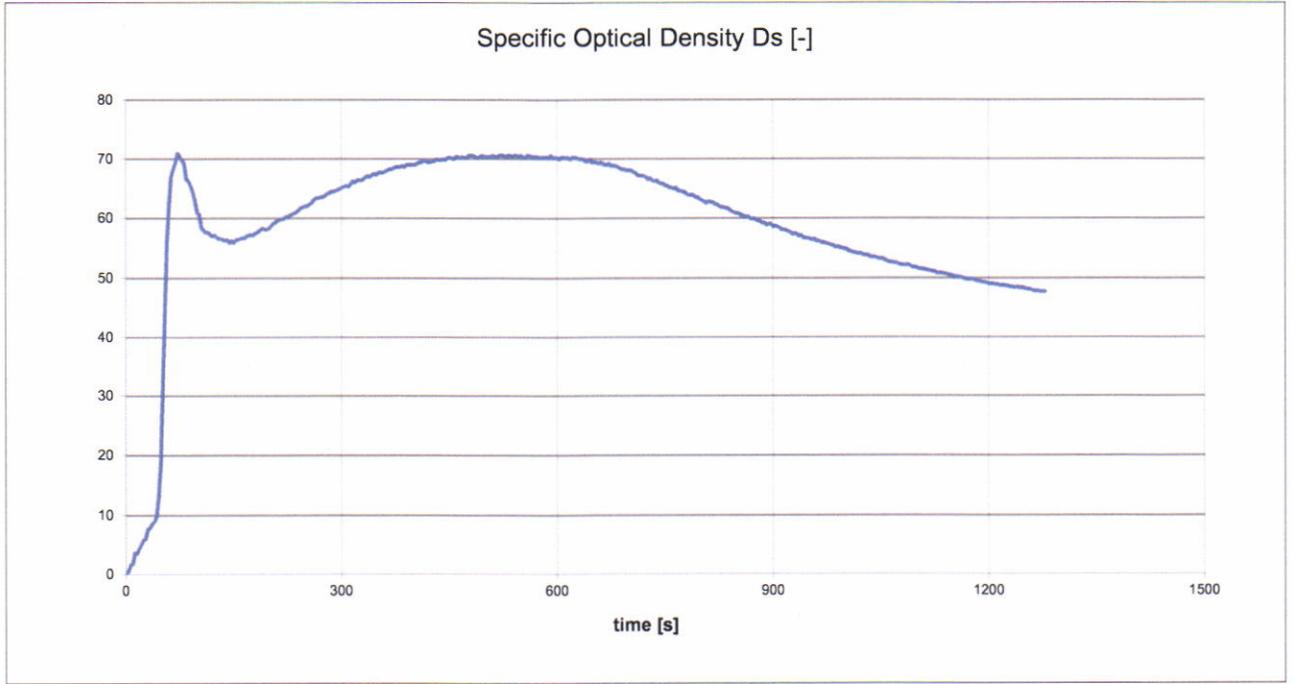


Figure 14: Specific optical density plot of **sample 1** under  $50 \text{ kW/m}^2$  flux

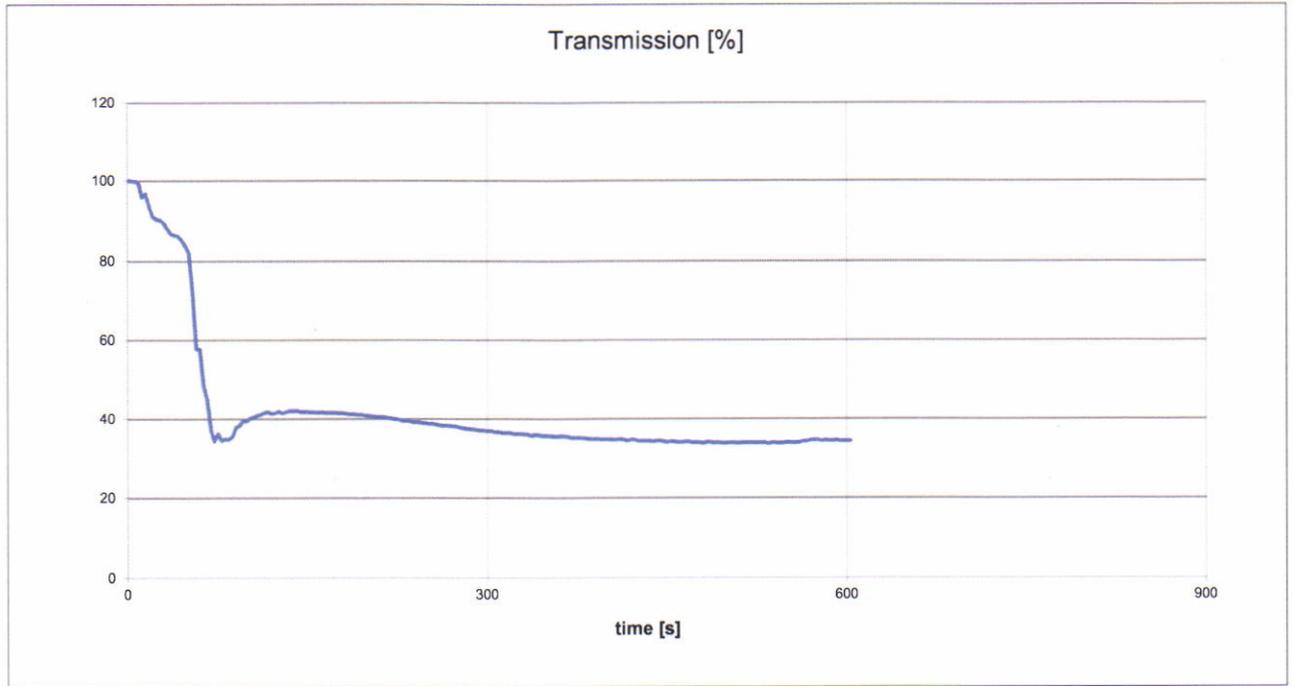


Figure 15: Transmission plot of **sample 2** under  $50 \text{ kW/m}^2$  flux





## TEST RESULTS

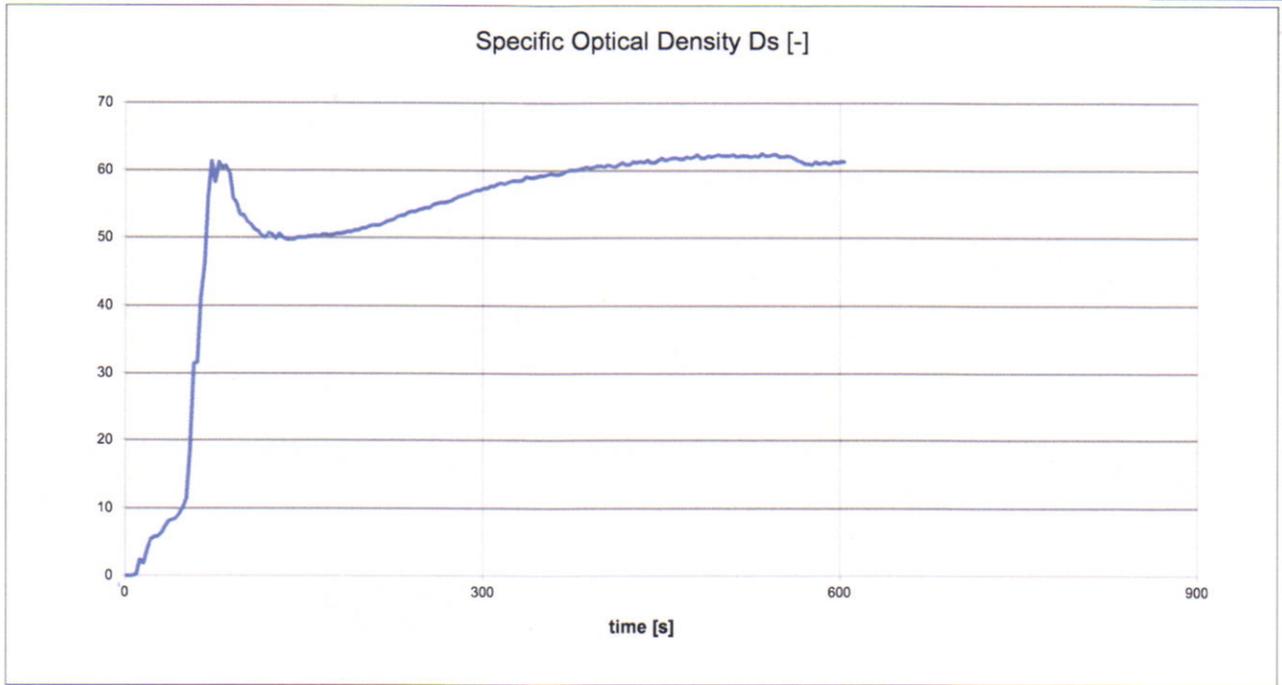


Figure 16: Specific optical density plot of *sample 2* under  $50 \text{ kW/m}^2$  flux

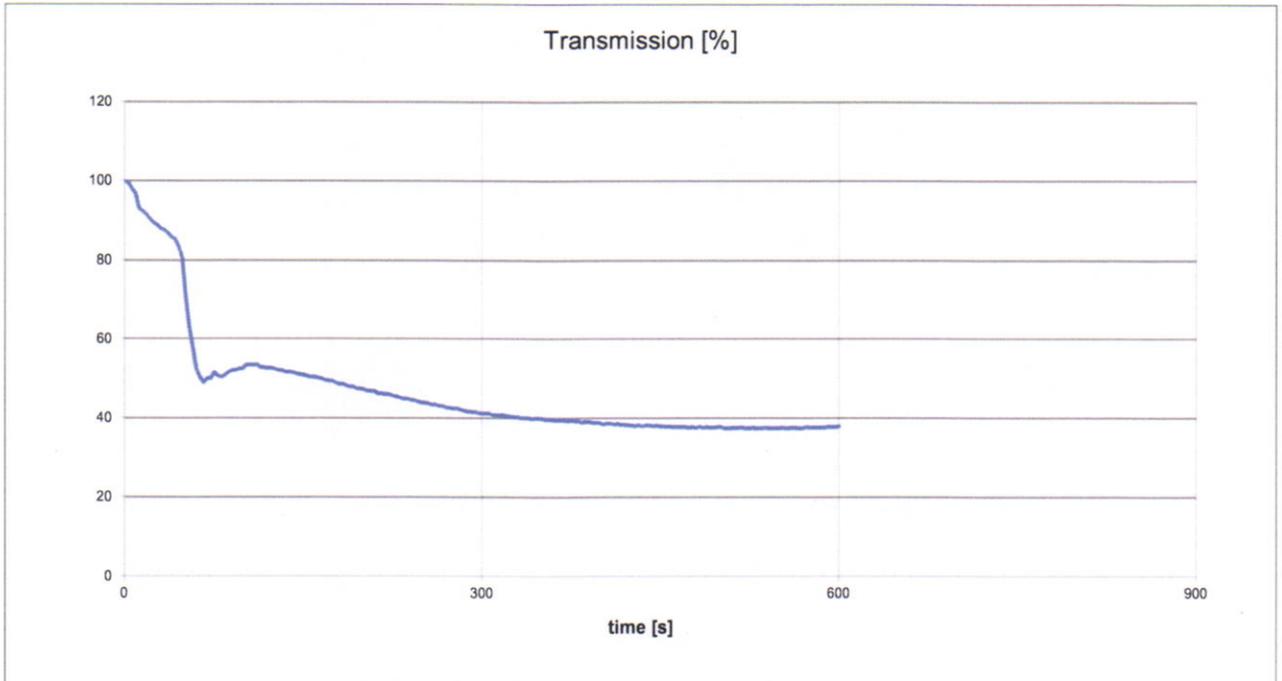


Figure 17: Transmission plot of *sample 3* under  $50 \text{ kW/m}^2$  flux





## TEST RESULTS

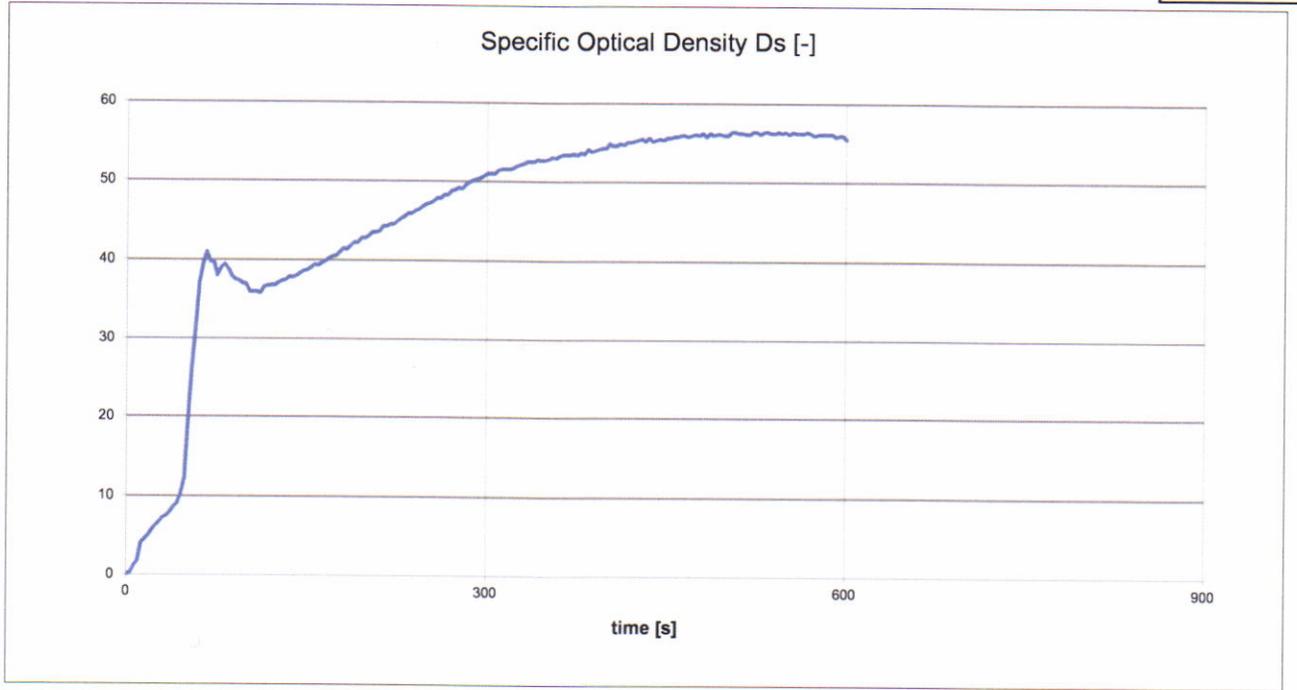


Figure 18: Specific optical density plot of *sample 3* under  $50 \text{ kW/m}^2$  flux

The results of these tests are a representation of the behaviour of the sample under specific conditions; they are not intended to be utilized as the sole criteria to evaluate the potential fire hazard of the product.

*End of test report.*

