

# Test report

## Outercore Vindueskassetter



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**Name of client:** Outer-Core IVS  
**File no.:** PFA10724  
**Date:** 27-04-2015  
**Pages:** 7                      **Encl.:** 13  
**Ref:** MPA      /    BP

## Client information

Client: Outer-Core IVS  
Address: Elmevej 8  
DK-7870, Roslev  
Denmark

The results relate only to the items tested. The test report should only be reproduced in extenso - in extracts only with a written agreement with this institute.

**1. Material**

Construction cassette for windows.

**Trade name**

Outercore Vindueskassetter.

**2. Manufacturer**

The client is the manufacturer.

**3. Nature of test**

The sponsor desired initial type testing (ITT) in accordance with EN 13823:2010 +A1:2014 and EN ISO 11925-2:2010.

**4. Sample**

2015-03-30 DBI - Danish Institute of Fire and Security Technology received the following sample:

3 PVC profiles with dimensions approx. 1000 mm x 350 mm with varying thickness of the profile of 34.5 mm to 99.1 mm.

6 PVC profiles with dimensions approx. 1500 mm x 350 mm with varying thickness of the profile of 34.5 mm to 99.1 mm.

6 ABS corner profiles with a length of 350 mm.

Furthermore on 2015-04-09 DBI received:

21 ABS corner profiles with a length of 350 mm.

Finally on 2015-04-10 DBI received:

11 PVC profiles with dimensions approx. 2800 mm x 350 mm with varying thickness of the profile of 34.5 mm to 99.1 mm.

The gauge thickness of the PVC profiles was measured to 3.5 mm.

The gauge thickness of the ABS corner profiles was measured to 3.0 mm.

The construction principle of Outercore Vindueskassetter is shown in enclosure 1 and 2.

The following information was given by the client:

- Material properties of the PVS profiles: Enclosure 3
- Material properties of the ABS corner profiles: Enclosure 4-5
- Drawings of Outercore Vindueskassetter are shown in Enclosure 6-7

#### **4.1 Mounting of specimen for Single Burning Item test (SBI)**

The PVS and the ABS corner profiles were assembled to cover the exposed area of the SBI as EN 13823 prescribes. 3 modules plus a smaller sized cut module of the profiles were stacked on top of each other in order to get 1500 mm height of the test specimen. The modules were fixed to each other with several screws to give stability to the test specimen. 80 mm thick insulation of mineral wool of class A1 taken from DBI's stock was placed behind the test specimen as substrate complying with EN 13238. The backing boards of the test equipment were fixed to the test specimen with 100 mm screws in order to stabilize the test specimen furthermore.

#### **5. Conditioning**

2015-04-10 the specimens were stored in a conditioning room with an atmosphere of relative humidity of  $50 \pm 5 \%$  and a temperature of  $23 \pm 2 \text{ }^{\circ}\text{C}$ . The test specimens were kept in this room until the tests were performed.

#### **6. Test method**

The test was performed in accordance with:

EN 13823:2010+A1:2014	Reaction to fire tests for building products - Building products excluding flooring exposed to the thermal attack by a single burning item
EN ISO 11925-2:2010	Reaction to fire tests – ignitability of building products subjected to direct impingement of flame – Part 2 Single-flame source test

#### **7. Test results**

##### **7.1 EN 13823:2010 +A1:2014**

Date of test: 2015-04-15/16

3 tests were performed.

During the test the following measurements were made: Volume flow in the exhaust duct, production of carbon dioxide, concentration of oxygen, and production of light-obscuring smoke. Based on these measurements the rate of heat release and the rate of smoke production were calculated.

The graphs, enclosures 8-11, show for the 3 tests performed:

Enclosure 3

- Average Heat Release Rate  $\text{HRR}_{\text{av}}(t)$
- Total Heat Release THR (t)



#### Enclosure 4

- Average Heat Release Rate per unit time  $[1000 \times \text{HRR}_{\text{av}}(t)/(t-300)]$
- $\text{Figra}_{0.2\text{MJ}}$ -values

#### Enclosure 5

- $\text{Figra}_{0.4\text{MJ}}$ -values
- Smoke Production Rate  $\text{SPR}_{\text{av}}(t)$

#### Enclosure 6

- Total Smoke Production  $\text{TSP}(t)$
- Smoke Production Rate per unit time  $[10000 \times \text{SPR}_{\text{av}}(t)/(t-300)]$

The test results are shown in table 1.

	Test No. 1	Test No. 2	Test No. 3	Mean value
<b>FIGRA<sub>0.2MJ</sub> [W/s]</b>	143.6	121.1	124.6	<b>130</b>
<b>FIGRA<sub>0.4MJ</sub> [W/s]</b>	143.6	121.1	124.6	<b>130</b>
<b>THR<sub>600s</sub> [MJ]</b>	11.73	14.22	12.1	<b>12.7</b>
<b>SMOGRA [m<sup>2</sup>/s<sup>2</sup>]</b>	63.95	57.09	57.1	<b>59</b>
<b>TSP<sub>600 s</sub> [m<sup>2</sup>]</b>	660.9	667.1	645.2	<b>658</b>
<b>FDP<sub>f≤10s</sub> [yes/no]</b>	No	No	No	-
<b>FDP<sub>f&gt;10s</sub> [yes/no]</b>	No	No	No	-
<b>LFS &lt; edge of specimen [yes/no]</b>	Yes	Yes	Yes	-

Table 1.

- FDP<sub>f≤10s</sub>: Flaming Droplets/Particles burning less than 10 seconds.  
FDP<sub>f>10s</sub>: Flaming Droplets/Particles burning more than 10 seconds.  
LFS: Lateral Flame Spread on the long wing of the test specimen.

#### Test No. 1

##### Minutes:seconds

00:00	Start of test
19:47	Fall of material from the short wing with burning droplets
20:27	Full collapse of the short test specimen
21:00	Gas burner stopped

No observations of importance occurred during test No. 2 and 3

Photographs of the test specimens show the effect of the damages, see enclosures 12-14

Enclosure 12: Test No. 1

Enclosure 13: Test No. 2

Enclosure 14: Test No. 3

## 7.2 EN ISO 11925-2:2010

Date of test: 2015-04-22

Flame application time: 30 sec.

Test running time: 60 sec.

Grey plastic profile:

### Edge flame impingement

Specimen No.	Ignition (yes/no)	Flame spread > 150 mm	Time (sec) to reach 150 mm mark	Ignition of filter paper (yes/no)
1L	Yes	No - 25 mm	-	No
2L	Yes	No - 25 mm	-	No
3L	Yes	No - 20 mm	-	No
4C	Yes	No - 25 mm	-	No
5C	Yes	No - 25 mm	-	No
6C	Yes	No - 20 mm	-	No

L: Lengthwise C: Crosswise

### Surface flame impingement

Specimen No.	Ignition (yes/no)	Flame spread > 150 mm	Time (sec) to reach 150 mm mark	Ignition of filter paper (yes/no)
1L	Yes	No - 45 mm	-	No
2L	Yes	No - 45 mm	-	No
3L	Yes	No - 45 mm	-	No
4C	Yes	No - 50 mm	-	No
5C	Yes	No - 45 mm	-	No
6C	Yes	No - 45 mm	-	No

L: Lengthwise C: Crosswise

Black corner profile:

Test in the crosswise direction was not performed as the exposed length in that direction is only approx. 10 mm.

#### Surface flame impingement

Specimen No.	Ignition (yes/no)	Flame spread > 150 mm	Time (sec) to reach 150 mm mark	Ignition of filter paper (yes/no)
1L	Yes	No - 130 mm	-	No
2L	Yes	No - 130 mm	-	No
3L	Yes	No - 130 mm	-	No
4L	Yes	No - 130 mm	-	No
5L	Yes	No - 130 mm	-	No
6L	Yes	No - 130 mm	-	No

L: Lengthwise C: Crosswise

#### Edge flame impingement

Specimen No.	Ignition (yes/no)	Flame spread > 150 mm	Time (sec) to reach 150 mm mark	Ignition of filter paper (yes/no)
1L	Yes	No - 140 mm	-	No
2L	Yes	No - 130 mm	-	No
3L	Yes	No - 130 mm	-	No
4L	Yes	No - 130 mm	-	No
5L	Yes	No - 130 mm	-	No
6L	Yes	No - 130 mm	-	No

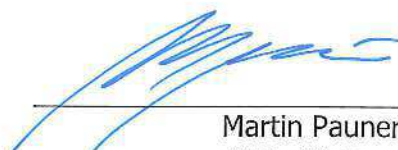
L: Lengthwise C: Crosswise

## 8. Statement

The test results relate to the behavior 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.



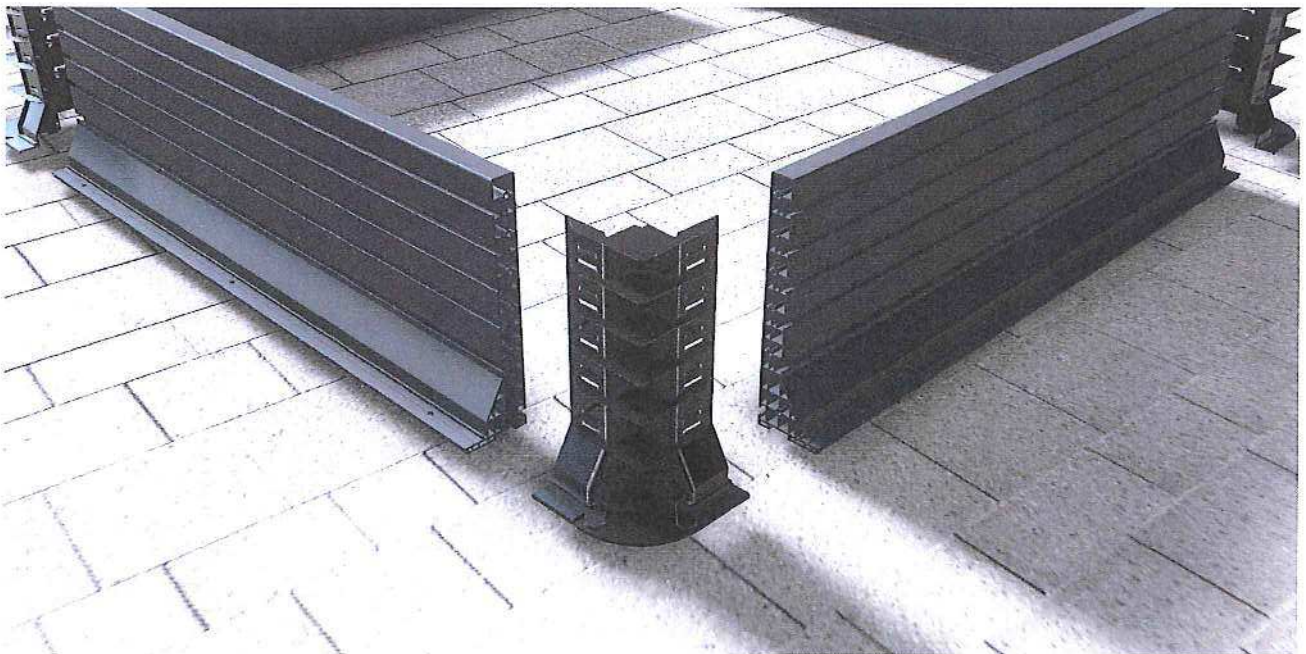
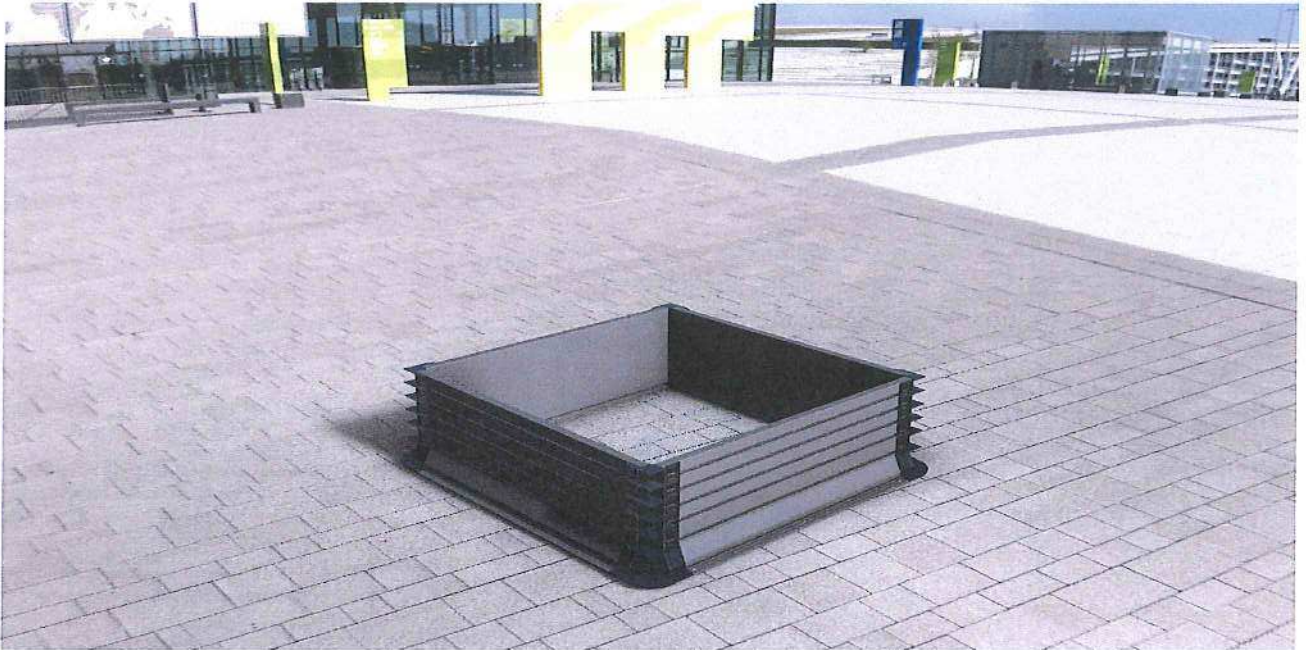
Bjørn Petersen  
Laboratory Technician




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Denmark







<b>Product Information</b>	<b>Terluran®</b>	BASF Plastics key to your success
05/2007	<b>GP-35</b>  <b>ABS</b>	 <b>BASF</b> The Chemical Company

#### Product description

Easy-flow Injection moulding product with good ductility, intended for mouldings with thin walls and/or adverse flow length to wall ratio.

#### Physical form and storage

Terluran® is delivered as spherical pellets. The bulk density of the pellets is from 0.55 to 0.65 g/cm³.  
 Standard Packaging unit: 25 kg PE-bag on palette, shrunk or wrapped with PE film or delivery in silo trucks.  
 PE bags should not be stored outside.  
 In dry areas with normal temperature control, Terluran® pellets can be stored for relatively long periods of time without any change in mechanical properties. Under poor storage conditions, Terluran® absorbs moisture, but this can be removed by drying.

#### Product safety

No adverse effects on the health of processing personnel have been observed if the products are correctly processed and the production areas are suitably ventilated.  
 For styrene, acrylonitrile and 1,3-butadiene the maximum allowable workplace concentrations must be observed according to the pertaining national regulations. In Germany, the following limit values are valid (Oct. 2002): styrene, MAK-value: 20 ml/m³ = 86 mg/m³; acrylonitrile, TRK-value: 3 ml/m³ = 7 mg/m³ and 1,3-butadiene, TRK-value: 5 ml/m³ = 11 mg/m³.  
 According to EU directive 67/548/EWG, Annex I and TRGS 905 (Oct. 2002), acrylonitrile and 1,3-butadiene are classified as carcinogenic, category 2 ('substances which should be regarded as if they are carcinogenic to man') and 1 (substances known to be carcinogenic to man), respectively.  
 Experience has shown that during appropriate processing of Terluran with suitable ventilation the values obtained are well below the limits mentioned above. TRGS 402 (Germany) can be used for determining and assessing the concentrations of hazardous substances in the air within working areas.  
 Inhalation of gaseous degradation products, such as those which may arise on severe overheating of the material or during pumped evacuation, must be avoided. Further information can be found in our Terluran safety data sheets. These can be downloaded from the Plastics Portal, [www.plasticsportal.net](http://www.plasticsportal.net).

#### Note

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed. In order to check the availability of products please contact us or our sales agency.

# Terluran® GP-35



The Chemical Company

## Typical values at 23°C<sup>1)</sup>

Properties	Test method <sup>2)</sup>	Unit	Values <sup>3)</sup>
Polymer abbreviation	-	-	ABS
Density	ISO 1183	kg/m <sup>3</sup>	1040
Water absorption, equilibrium in water at 23°C	similar to ISO 62	%	0.95
Moisture absorption, equilibrium 23°C/50% r.h.	similar to ISO 62	%	0.24
Processing			
Processing: Injection moulding (M), Extrusion (E), Blow moulding (B)	-	-	M
Melt volume-flow rate MVR 220 °C/10 kg	ISO 1133	cm <sup>3</sup> /10min	34
Pre-drying: Temperature	-	°C	80
Pre-drying: Time	-	h	2 - 4
Melt temperature, injection moulding	-	°C	220 - 260
Mould temperature, injection moulding	-	°C	30 - 60
Moulding shrinkage, free, longitudinal	-	%	0.4 - 0.7
Flammability			
UL94 rating at 1.6 mm thickness	UL-94	class	HB
Automotive materials (thickness d >= 1mm)	-	-	+
Mechanical Properties			
Tensile modulus	ISO 527-1/-2	MPa	2300
Yield stress, 50 mm/min	ISO 527-1/-2	MPa	44
Yield strain, 50 mm/min	ISO 527-1/-2	%	2.4
Nominal strain at break, 50 mm/min	ISO 527-1/-2	%	12
Flexural strength	ISO 178	MPa	65
Charpy impact strength (23°C)	ISO 179/1eU	kJ/m <sup>2</sup>	125
Charpy impact strength (-30°C)	ISO 179/1eU	kJ/m <sup>2</sup>	90
Izod notched impact strength (23°C)	ISO 180/A	kJ/m <sup>2</sup>	22
Izod notched impact strength (-30°C)	ISO 180/A	kJ/m <sup>2</sup>	7
Charpy notched impact strength (23°C)	ISO 179/1eA	kJ/m <sup>2</sup>	19
Charpy notched impact strength (-30°C)	ISO 179/1eA	kJ/m <sup>2</sup>	7
Izod notched impact strength, method A (23°C)	ASTM D 256	J/m	240
Ball indentation hardness at 358 N/30 s	ISO 2039-1	MPa	99
Thermal properties			
HDT A (1.80 MPa)	ISO 75-1/-2	°C	78
HDT B (0.45 MPa)	ISO 75-1/-2	°C	89
Vicat softening temperature VST/A/50	ISO 308	°C	102
Vicat softening temperature VST/B/50	ISO 308	°C	95
Max. service temperature (short cycle operation)	-	°C	80
Coefficient of linear thermal expansion, longitudinal (23-80)°C	ISO 11359-1/-2	E-4/°C	0.8 - 1.1
Thermal conductivity	DIN 52612-1	W/(m K)	0.17
Electrical properties			
Volume resistivity	IEC 60093	Ohm*m	1E13
Electric strength K20/P50, d = 0.6 - 0.8 mm	IEC 60243-1	kV/mm	38

### Footnotes

- 1) If the product definition doesn't state otherwise.
- 2) Specimens according to CAMPUS.
- 3) The asterisk symbol \* signifies applicable properties.

BASF Aktiengesellschaft  
67056 Ludwigshafen, Germany

# INEOS Compounds

## MATERIAL TECHNICAL DATA SHEET

Issue 27 February 2014

<u>Grade:</u>	<b>norvinyl @ GA.100.91.00804</b>
<u>Description:</u>	Rigid PVC Extrusion Compound
<u>Stabiliser:</u>	Ca/Zn-system
<u>Colour:</u>	Grey
<u>Application:</u>	Profiles
<u>Compliances:</u>	REACH Regulations 1907/2006 and 2011/65/EC (RoHS)
<u>Form:</u>	Granules.

Material properties	Method	Results	Units
Specific Gravity	ISO/R 1183	1.53	g/cm <sup>3</sup>
Hardness (15 secs@23°C)	ISO/R 868	N/A	Shore D
Fire retardant	UL94	V0	
Impact	Charpy v-notch	N/A	J
Elongation at Break @ 500mm/min	ISO/R 527	N/A	%
Tensile Strength @ 500 mm/min	ISO/R 527	N/A	MPa
Cold Flex Temperature	ISO/R 458	N/A	°C
HCL	VDE 0472-614	>15	min.
Vicat		81	°C
SVHC		N/A	> 0,1%

### Processing conditions

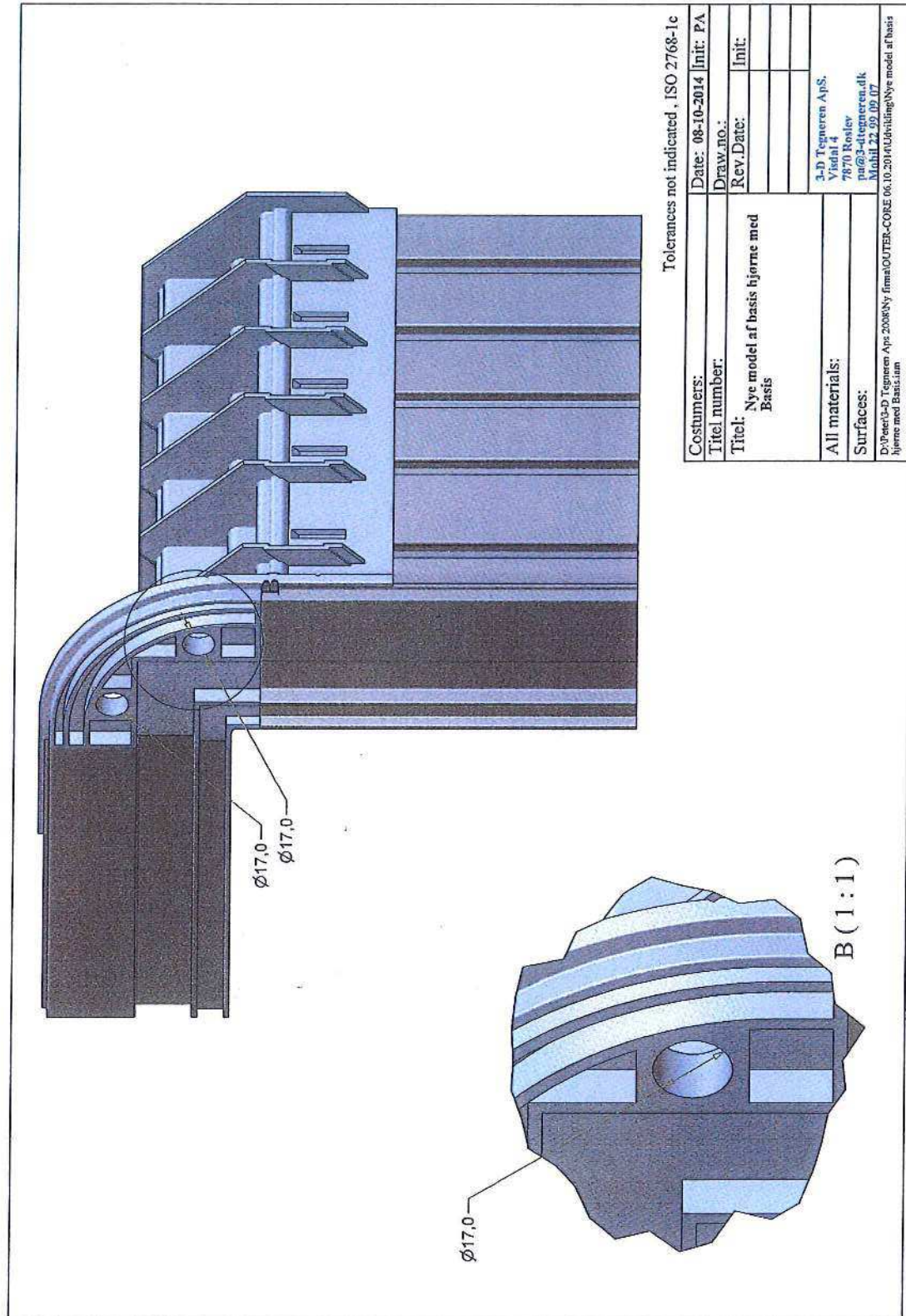
Customers are recommended to determine optimum conditions for themselves, as these will vary with the type of extruder, tool and extrusion line speed. The mechanical properties could vary depending on the production conditions or circumstances.

General guide, Barrel Temp: 145 150 160 170 °C

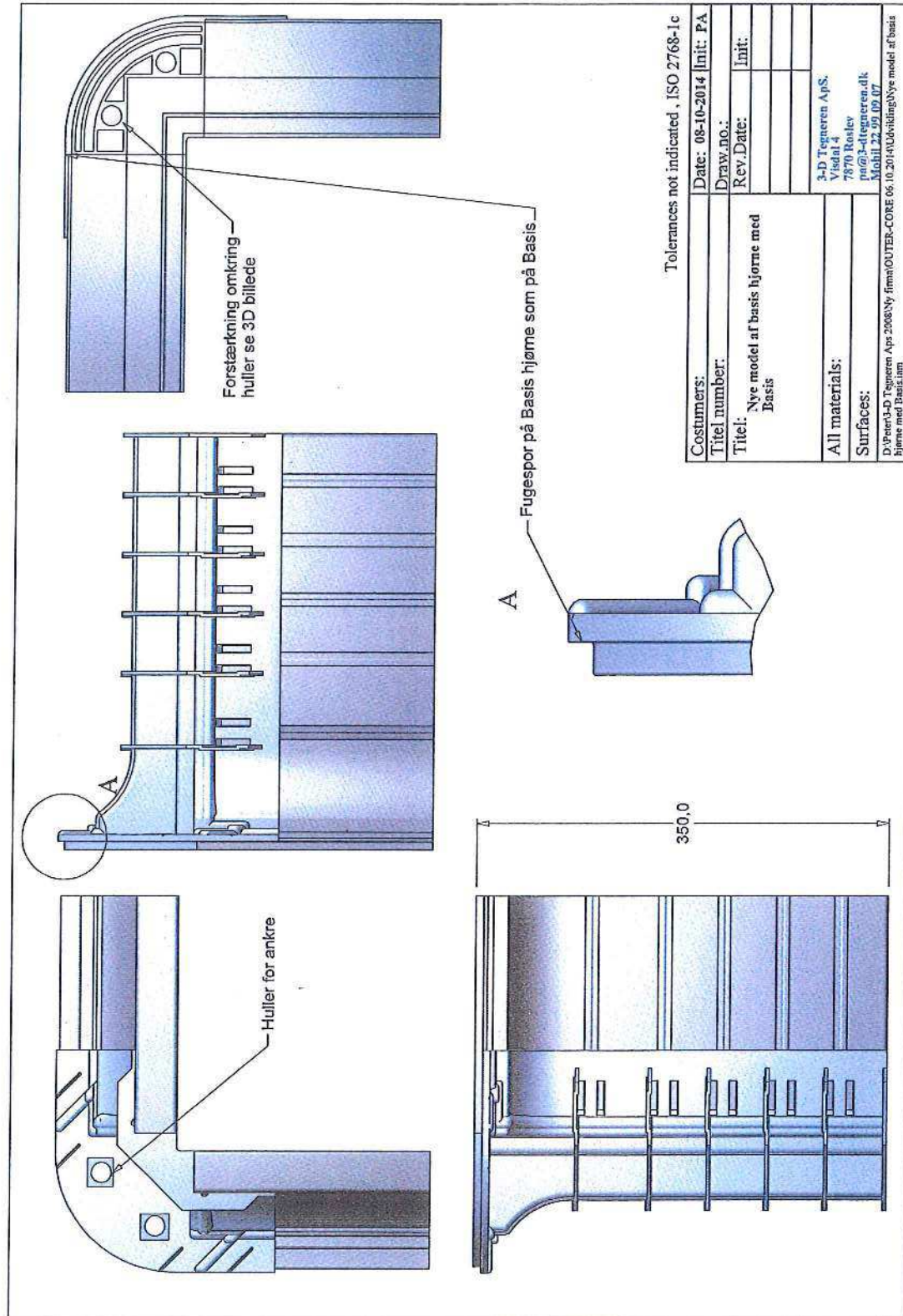
The values given above are derived from mean results of laboratory tests, and may therefore be taken as representative. These values do not form part of a specification.

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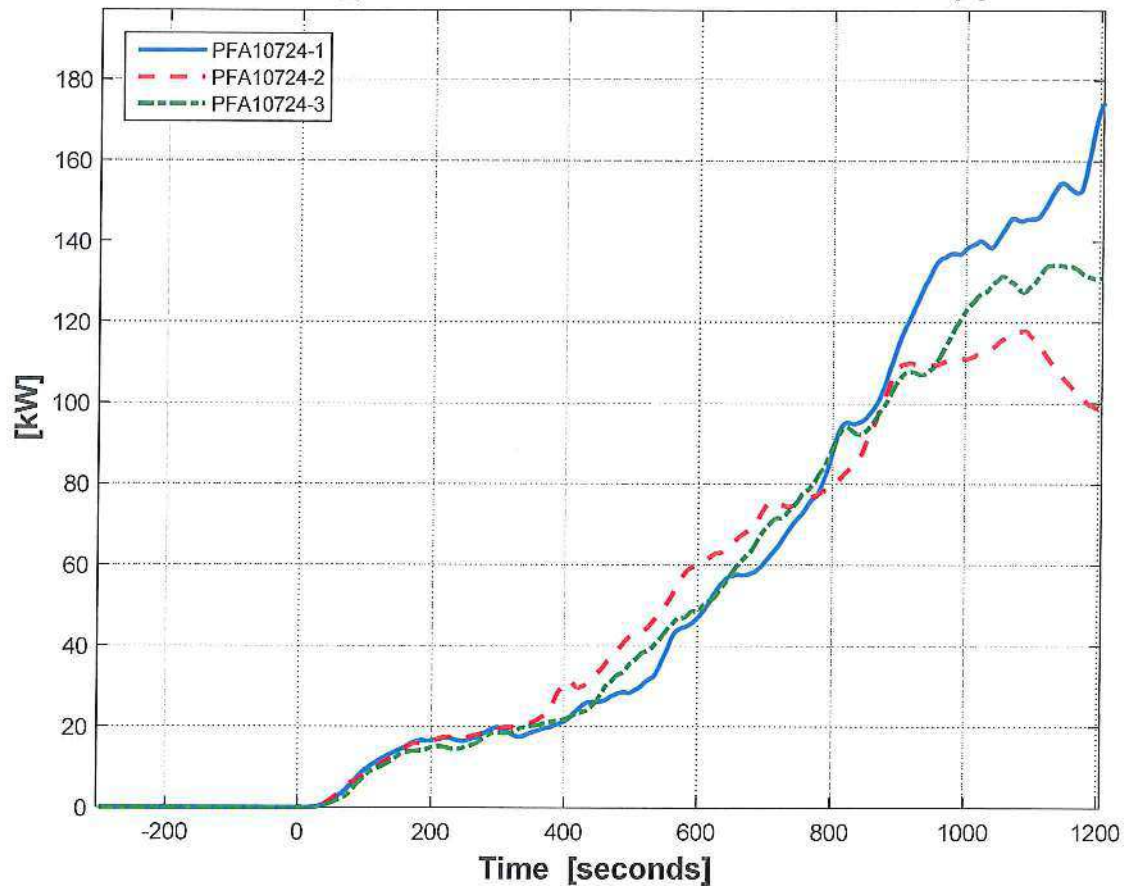
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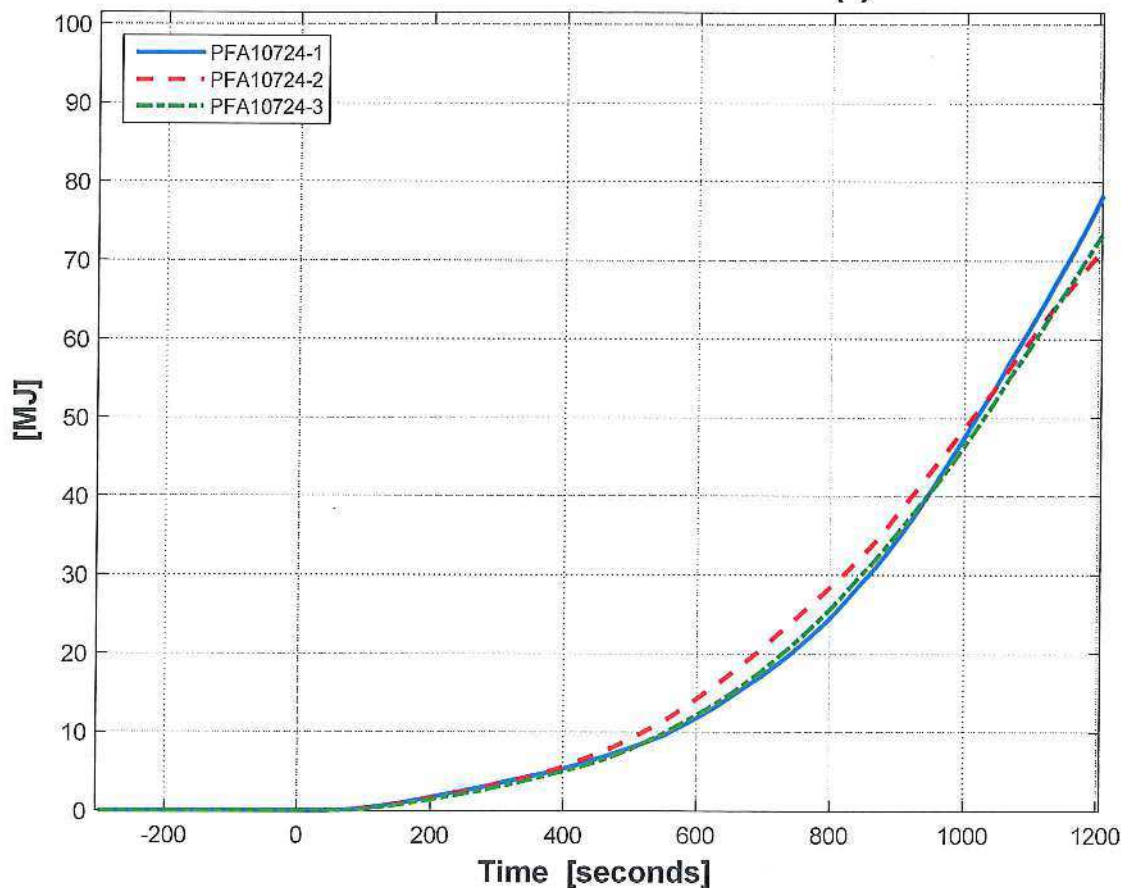
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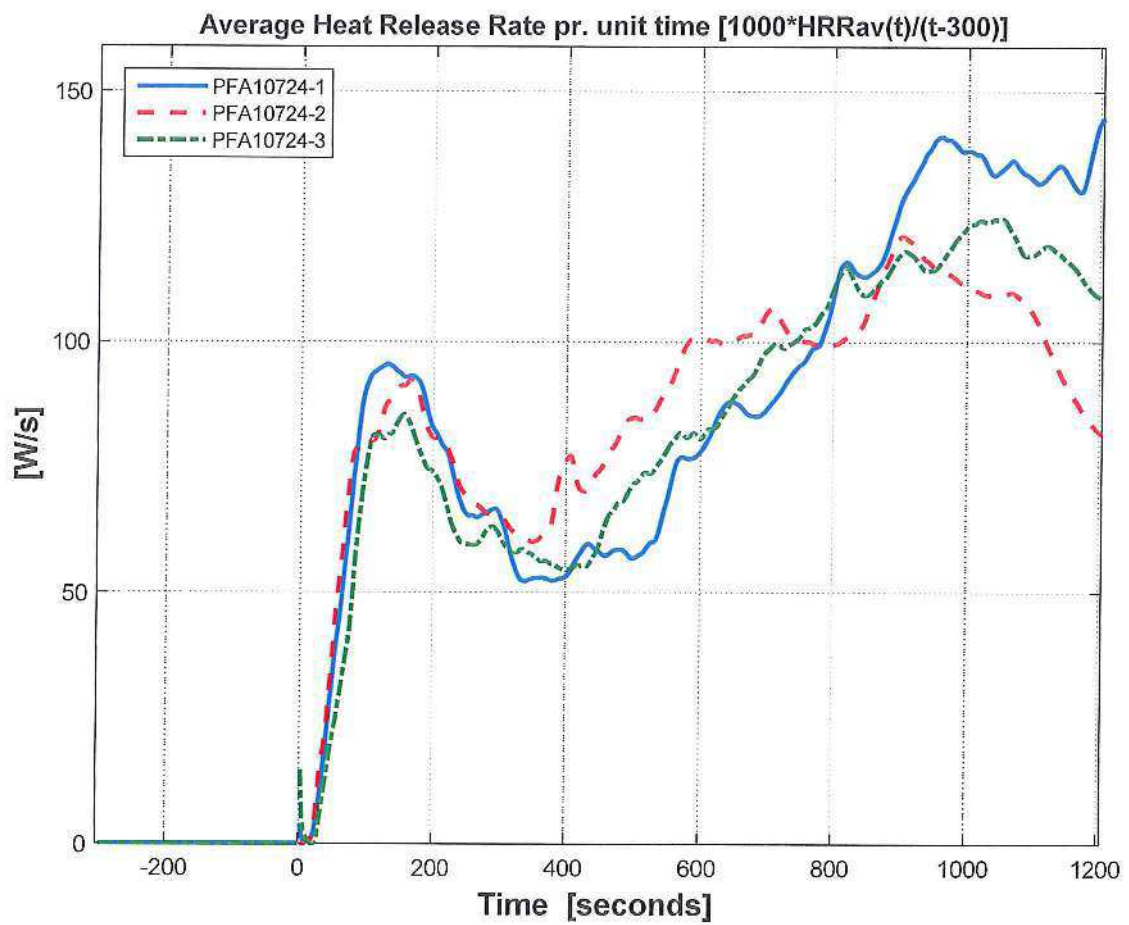
## Average Heat Release Rate HRRav(t)



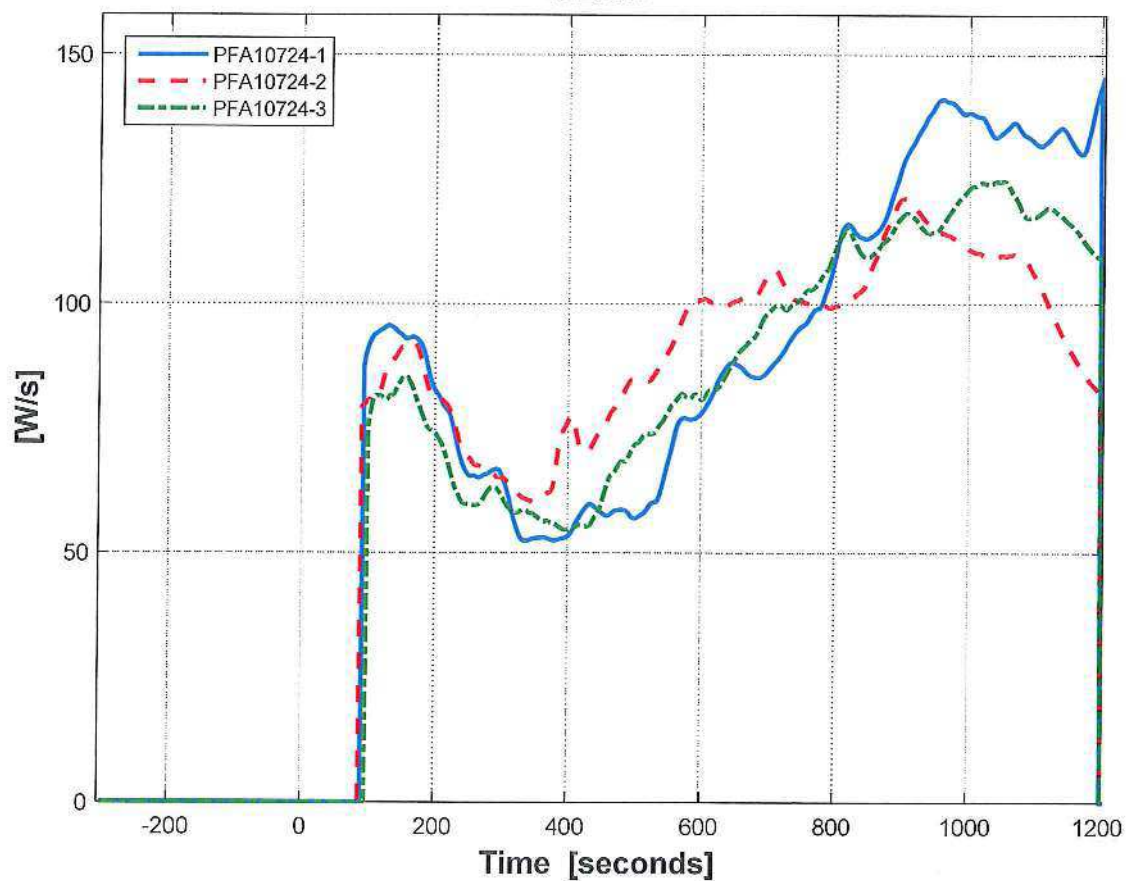
## Total Heat Release THR(t)



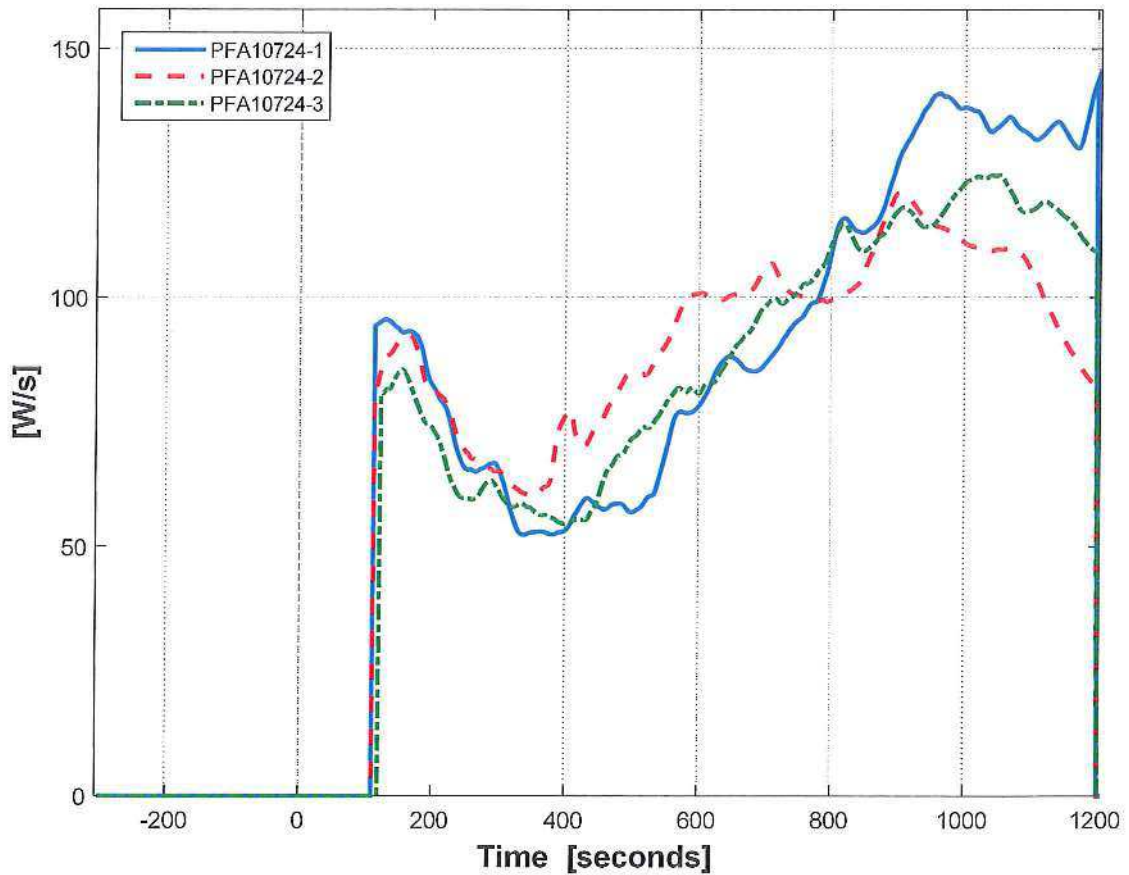




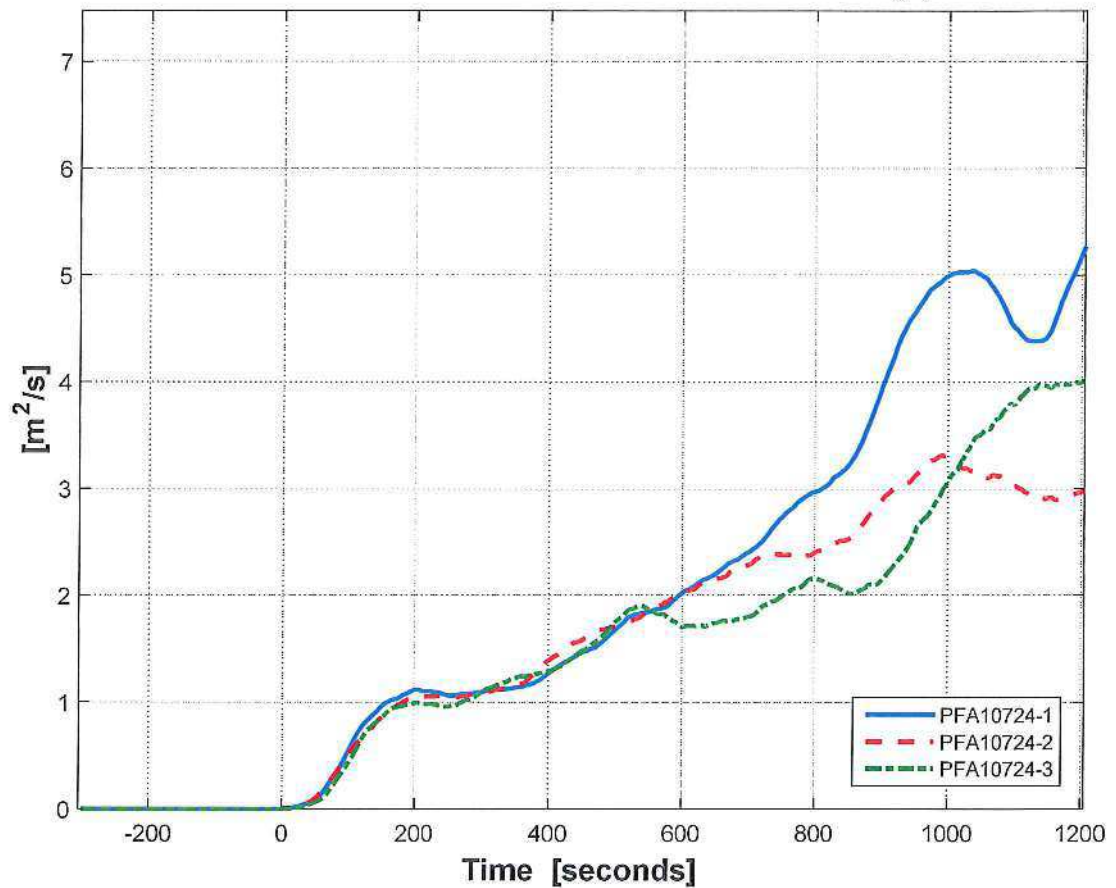
FIGRA<sub>0.2MJ</sub>-values



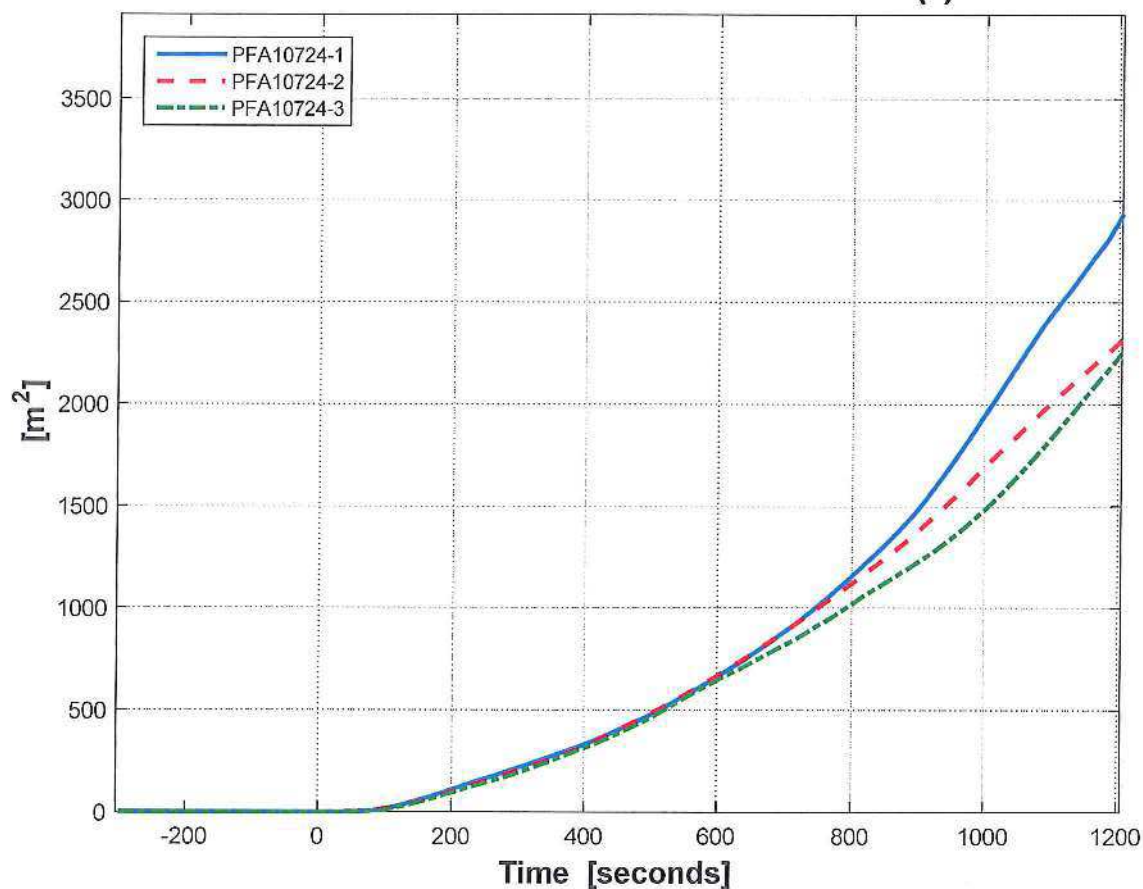
## FIGRA<sub>0.4MJ</sub>-values



## Smoke Production Rate SPRav(t)



## Total Smoke Production TSP(t)



## Smoke Production Rate pr. unit time [10000\*SPRav(t)/(t-300)]

