

## **Reaction to fire testing of different types of impregnated wood with white primer Single Burning Item test according to EN 13823:2020**

Report no.	2022-Efectis-R000765
Sponsor	Nederlandse Branchevereniging voor de Timmerindustrie Sectie Trappen Westeinde 10 1334 BK ALMERE THE NETHERLANDS
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Project number	ENL-21-000784
Date of issue	November 2022
Number of pages	14

## 1. PRODUCT IDENTIFICATION

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**Different types of impregnated wood with white primer**, further referred to as ‘the product’.

## 2. ABSTRACT

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Determination of the reaction to fire properties of the product, when exposed to the thermal attack by a **Single Burning Item** according to EN 13823:2020 with the objective to obtain the reaction to fire classification according to EN 13501-1:2018.

## 3. DETAILS OF THE PRODUCT TESTED

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### 3.1 INTENDED APPLICATION

The product will be used as the vertical parts of a staircase construction.

### 3.2 MANUFACTURER/IMPORTER

Nederlandse Branchevereniging voor de Timmerindustrie  
Sectie Trappen  
Westeinde 10  
1334 BK ALMERE  
THE NETHERLANDS

### 3.3 PRODUCT DESCRIPTION

According to the sponsor the product is composed of spruce wood (*Picea abies*).

The tested panels are:

- $37.6 \pm 0.4$  mm and have a density from 400 kg/m<sup>3</sup> to 500 kg/m<sup>3</sup>;
- impregnated with Holzprof Fire Retardant Wood protection by immersing it two times during 30 seconds; the impregnating agent yield is within the range of 112 - 146 g/m<sup>2</sup>;
- coated with Magma Industries, Fire Sheen 101 with a usage of 306 – 356 g/m<sup>2</sup>.

Impregnation was carried out with control from certification body SKH. The treatment report, Ref. 22/2851 BH/sg is kept on file by Efectis.

The wood types stated hereafter have been treated and coated in the same way as the spruce wood.

Oak wood (*Quercus robur*)

Surface density (average)	26.5 kg/m <sup>2</sup>
Impregnation usage	From 98 g/m <sup>2</sup> to 131 g/m <sup>2</sup>

Beech wood (*Fagus sylvatica*)

Surface density (as stated by the sponsor)	From 25.9 kg/m <sup>2</sup> to 28.2 kg/m <sup>2</sup>
Impregnation usage	From 340 g/m <sup>2</sup> to 416 g/m <sup>2</sup>

Sapeli (Mahogany) wood (*Entandrophragma cylindricum*)

Surface density (average)	25.2 kg/m <sup>2</sup>
Impregnation usage	From 85 g/m <sup>2</sup> to 111 g/m <sup>2</sup>

## 4. DETAILS OF THE EXAMINATION

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### 4.1 SAMPLES

Sampling procedure	The specimens were prepared and submitted by the sponsor.
Age	At the time of receipt: no information received.
Date of receipt	March 23 <sup>rd</sup> 2022

### 4.2 SPECIMENS

Substrate used	Not applicable
Specimen preparation	The long specimen wing was not provided with a vertical joint at a distance of 200 mm from the inner corner and a horizontal joint at a distance of 500 mm from the bottom. See photographs of the SBI test at the end of the report.

### 4.3 CONDITIONING

Prior to the examinations, the specimens were conditioned over a period of a month at a temperature of  $(23 \pm 2)$  °C and a relative humidity of  $(50 \pm 5)$  % according to § 4.1 of EN 13238.

### 4.4 EXAMINATION

Method of mounting and fixing	The panels were positioned with a ventilated air gap.
Exposed surface	The frontside of the product was exposed by flames during testing.
Deviations from the test method	None
Assessment	One test has been performed on each wood type (spruce, oak, beech, Sapeli (Mahogany)) before deciding to perform the full series on the impregnated spruce wood panels and the impregnated beech wood panels (Cf. 2022-Efectis-R000849) according to the Harmonised product standard mentioned above. The test results on all these wood panels (impregnate with the same technology) are all very comparable.
Number of tests	A total of six Single Burning Item tests were carried out, all in accordance with EN 13823.
Date of examination:	May 4 <sup>th</sup> and 25 <sup>th</sup> 2022
Location of examination	Efectis Nederland BV, Bleiswijk, The Netherlands

The results are given in Table 1.

Table 1: Single Burning Item classification parameter results

Test number	1	2	3	Classification parameter	4	5	6
Test parameter							
Sample variant	Impregnated spruce wood				Oak	Beech	Sapeli (Mahogany)
FIGRA <sub>0.2 MJ</sub> [W/s]	0	0	36	<b>12</b>	0	0	5
FIGRA <sub>0.4 MJ</sub> [W/s]	0	0	0	<b>0</b>	0	0	5
THR <sub>600s</sub> [MJ]	1.0	0.7	0.9	<b>0.9</b>	0.7	0.7	0.0
LFS {Yes, No}	No	No	No	<b>No</b>	No	No	No
SMOGRA [m <sup>2</sup> /s <sup>2</sup> ]	0.0	0.0	0.0	<b>0.0</b>	0.0	0.0	0.0
TSP <sub>600s</sub> [m <sup>2</sup> ]	43	40	46	<b>43</b>	35	34	35
Flaming droplets/particles							
Flaming ≤ 10 s {Yes, No}	No	No	No	<b>No</b>	No	No	No
Flaming > 10 s {Yes, No}	No	No	No	<b>No</b>	No	No	No

- FIGRA Fire growth rate: The maximum of the quotient of heat release rate from the burning specimen and the time of its occurrence, determined during the full test period, using a THR-threshold of 0.2 MJ or 0.4 MJ and a HRR<sub>av</sub>-threshold of 3 kW.
- THR<sub>600s</sub> Total heat release from the burning specimen during the first 600s of exposure to the main burner flames.
- LFS Lateral flame spread over the long specimen wing.
- SMOGRA Smoke growth rate: The maximum of the quotient of smoke production rate from the burning specimen and the time of its occurrence (multiplied by 10.000), determined during the full test period, using the TSP-threshold of 6 m<sup>2</sup> and the SPR<sub>av</sub>-threshold of 0.1 m<sup>2</sup>/s.
- TSP<sub>600s</sub> Total smoke production from the burning specimen during the first 600s of exposure to the main burner flames.

Observations of physical behaviour of the test specimen: None.

## 5. CONCLUSIONS

A formal classification is to be assessed in accordance with EN 13501-1, “Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests”.

Graphs of Rate of Heat Release ( $HRR_{av}(t)$ ), Rate of Smoke Production ( $SPR_{av}(t)$ ), Total Heat release ( $THR(t)$ ), Total Smoke Production ( $TSP(t)$ ),  $FIGRA_{0.2 MJ}$ ,  $FIGRA_{0.4 MJ}$  and SMOGRA, are presented hereafter followed by some photographs of the test setup and test results.

### Remarks:

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.

Regarding the estimated precision of the test method, the following information is given in Annex B of EN 13823.

Table B.2 — Average relative standard deviations

	$FIGRA_{0.2 MJ}$	$FIGRA_{0.4 MJ}$	$THR_{600 s}$	SMOGRA	$TSP_{600 s}$
Average ( $s_r / m$ )	14 %	15 %	11 %	15 %	18 %
Average ( $s_R / m$ )	23 %	25 %	21 %	40 %	44 %



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## APPENDIX: CHARTS

Chart 1	Rate of Heat Release ( $HRR_{av}(t)$ ) [kW]
Chart 2	Rate of Smoke Production ( $SPR_{av}(t)$ ) [m <sup>2</sup> /s]
Chart 3	Total Heat release ( $THR(t)$ ) [MJ]
Chart 4	Total Smoke Production ( $TSP(t)$ ) [m <sup>2</sup> ]
Chart 5	$FIGRA_{0.2 MJ}$ [W/s]
Chart 6	$FIGRA_{0.4 MJ}$ [W/s]
Chart 7	SMOGRA [m <sup>2</sup> /s <sup>2</sup> ]

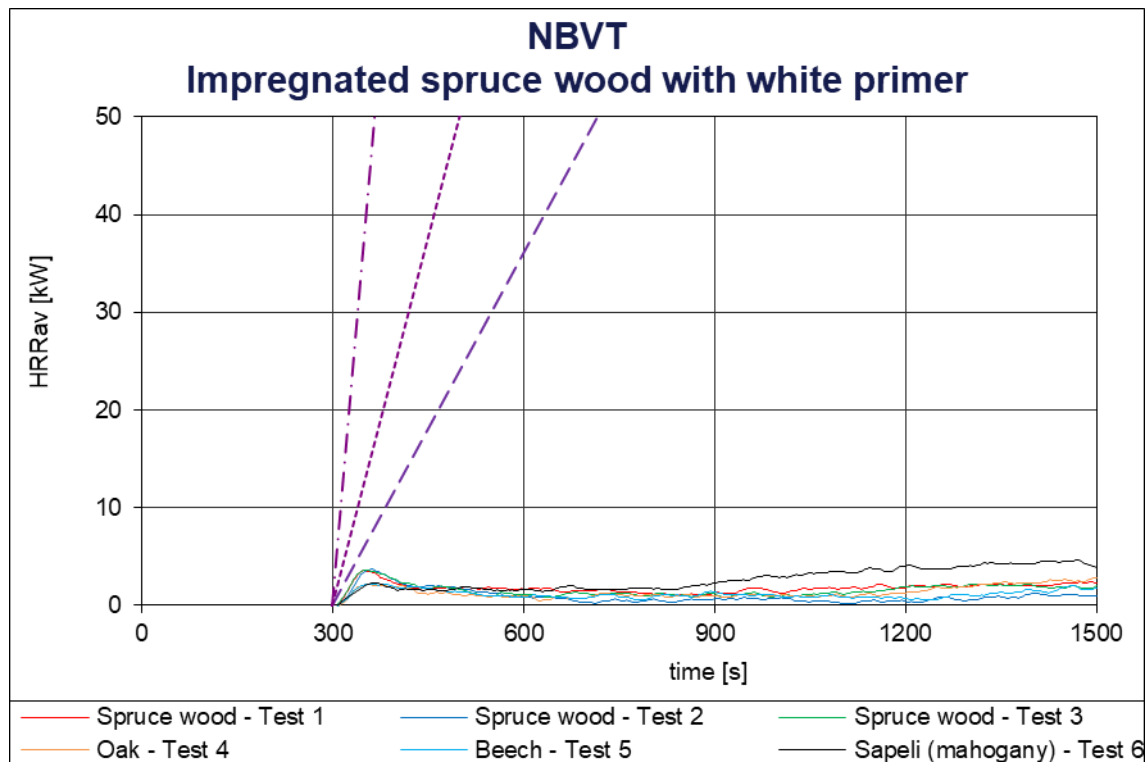


Chart 1: Rate of Heat Release ( $HRR_{av}(t)$ ) [kW]

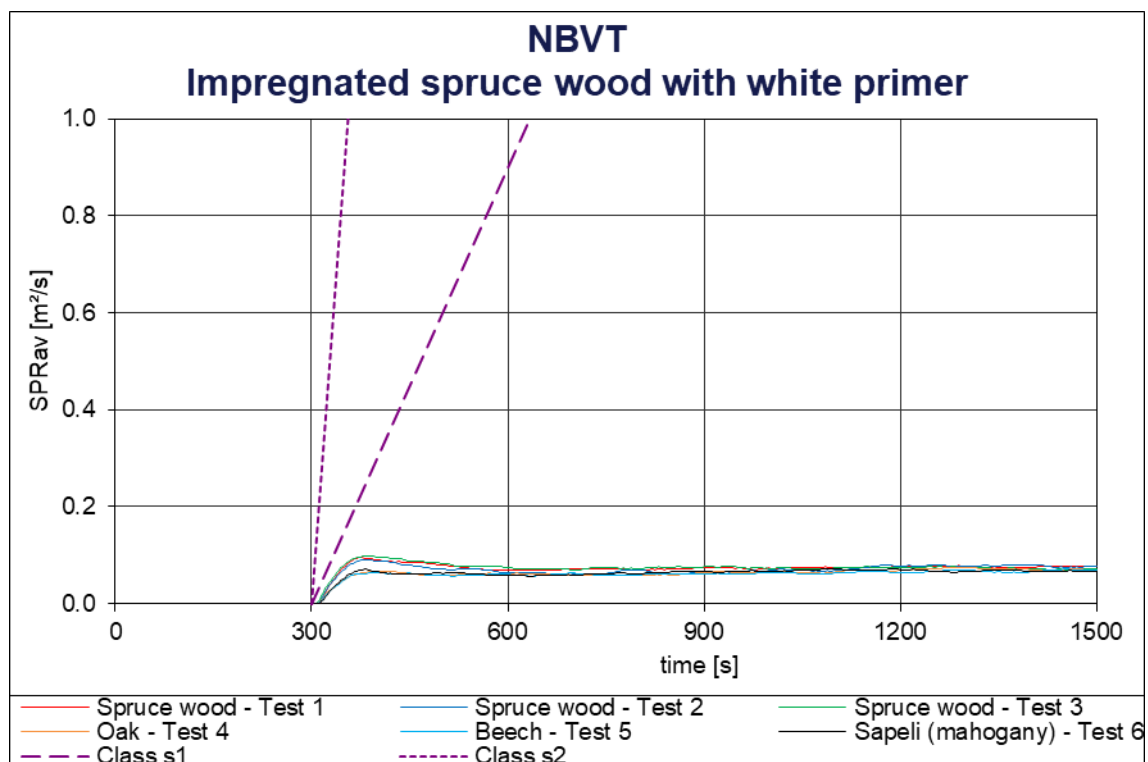


Chart 2: Rate of Smoke Production ( $SPR_{av}(t)$ ) [ $m^2/s$ ]

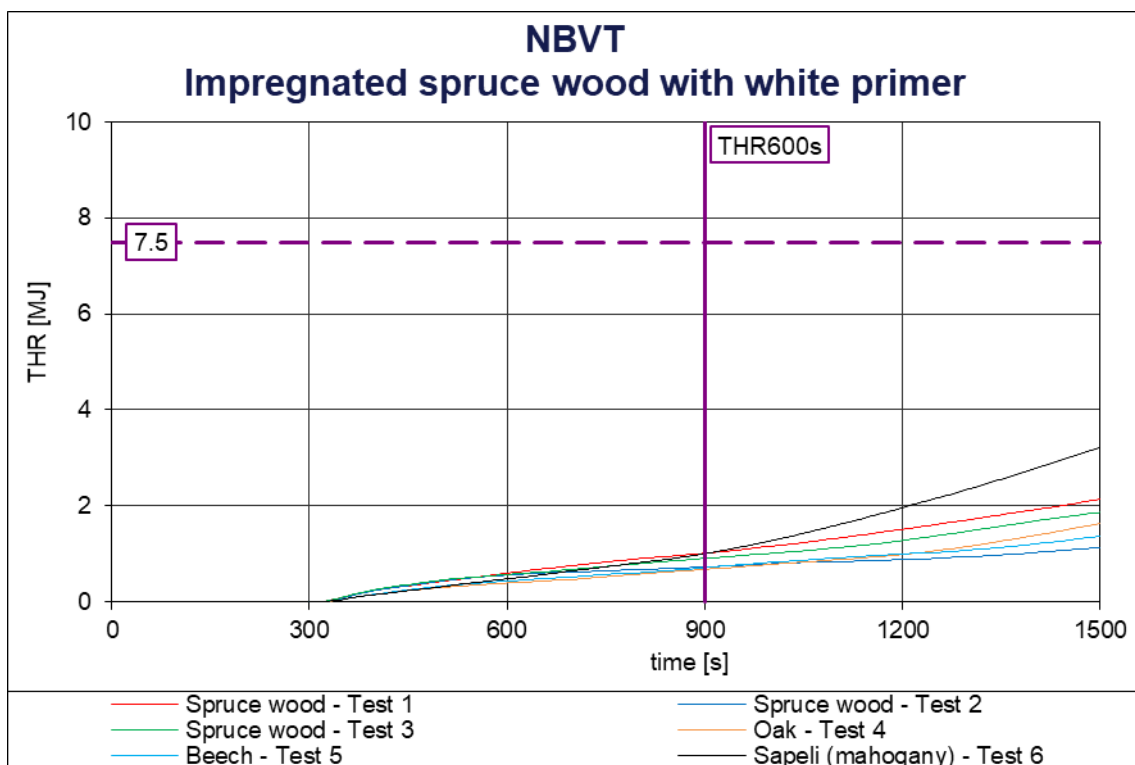


Chart 3: Total Heat release (THR(t)) [MJ]

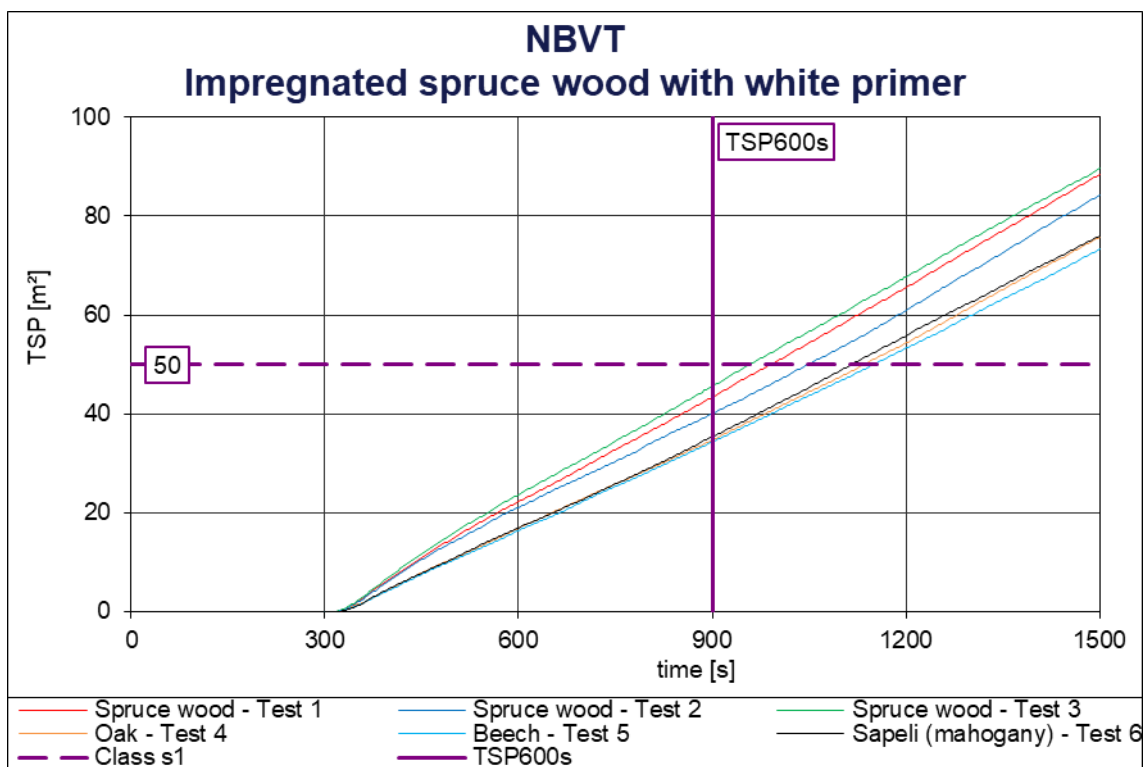


Chart 4: Total Smoke Production (TSP(t)) [m²]



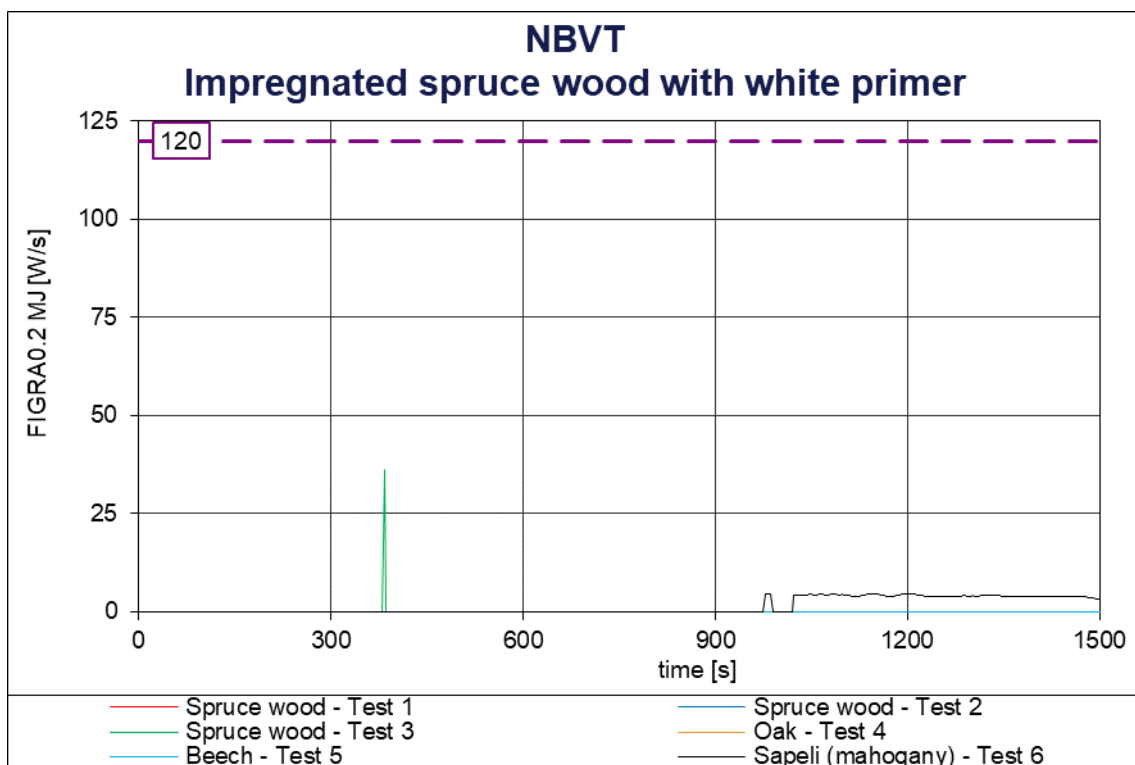


Chart 5: FIGRA<sub>0.2 MJ</sub> [W/s]

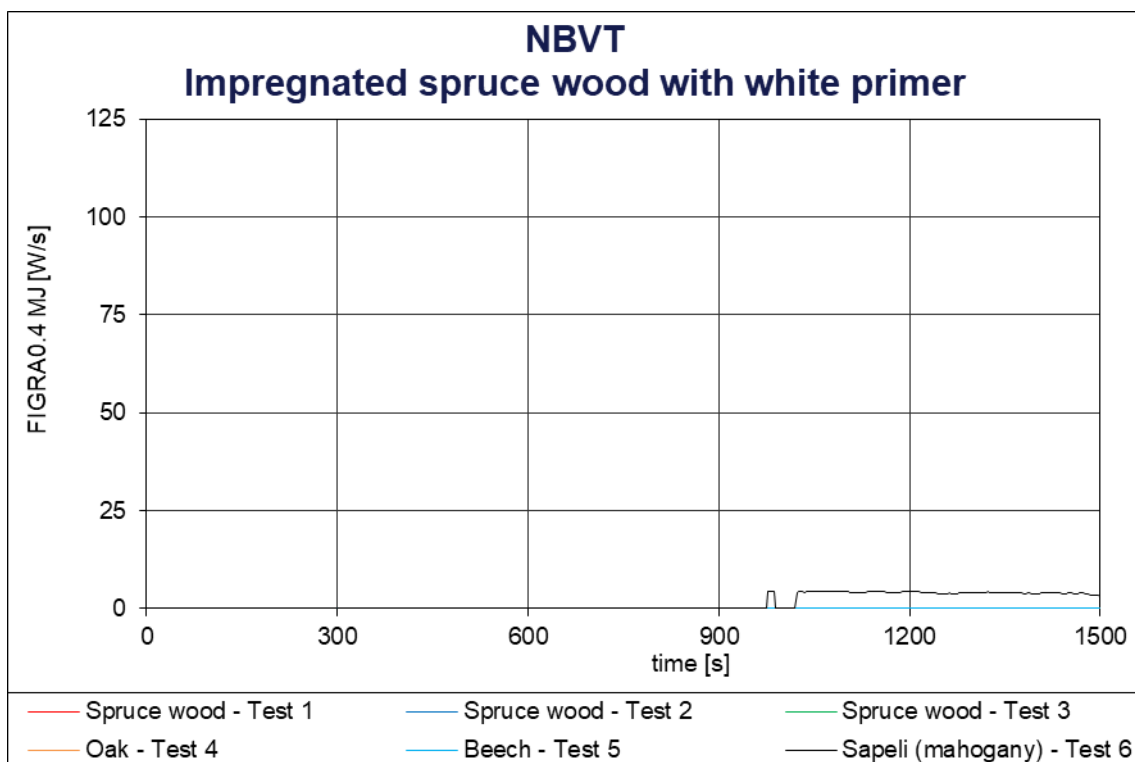


Chart 6: FIGRA<sub>0.4 MJ</sub> [W/s]

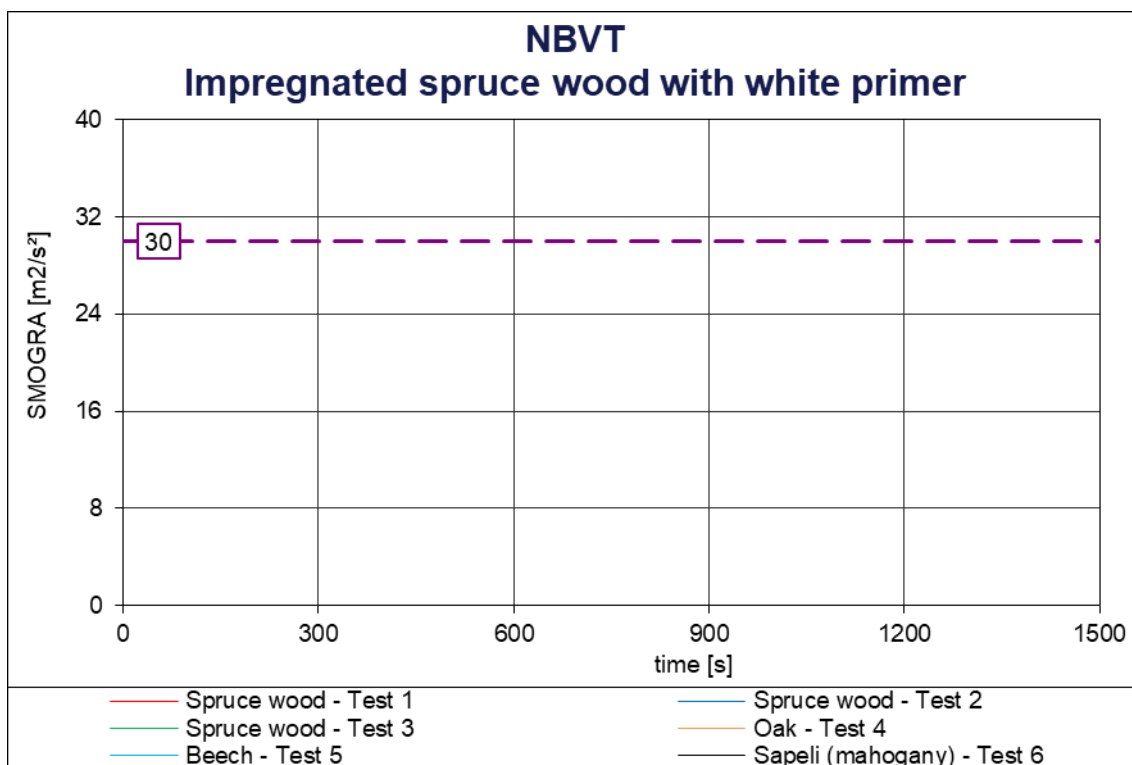


Chart 7: SMOGRA [m²/s²]

## APPENDIX: PHOTOGRAPHS



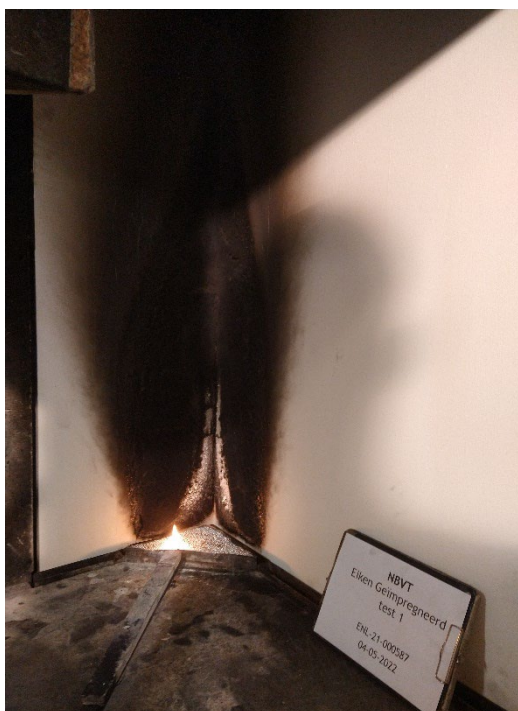
Photographs 1 and 2: Specimens prior to testing (impregnated spruce wood with white primer)



Photographs 3 and 4: Specimens after testing (impregnated spruce wood with white primer)

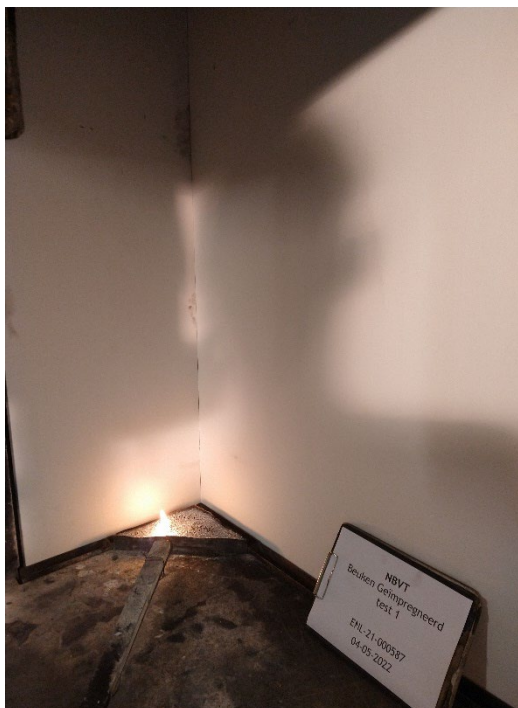


Photographs 5 and 6: Specimens prior to testing (impregnated oak wood with white primer)

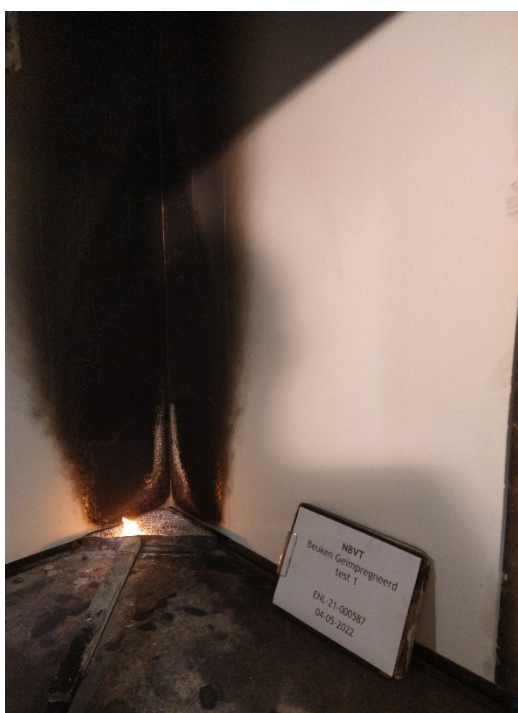


Photographs 7 and 8: Specimens after testing (impregnated oak wood with white primer)

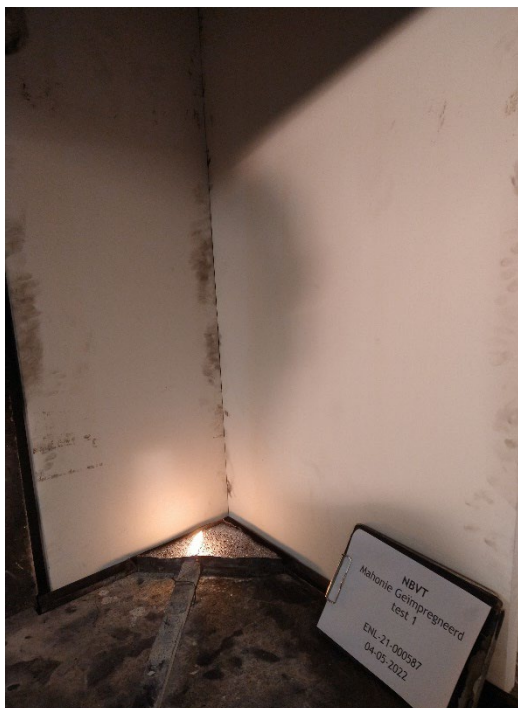




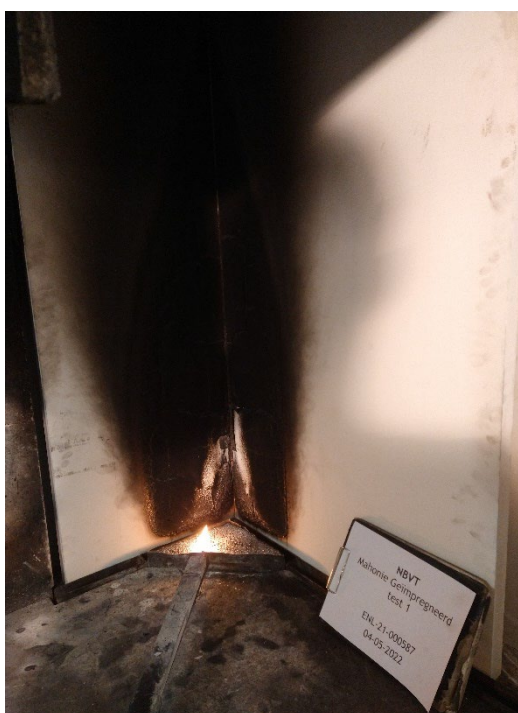
Photographs 9 and 10: Specimens prior to testing (impregnated beech wood with white primer)



Photographs 11 and 12: Specimens after testing (impregnated beech wood with white primer)



Photographs 13 and 14: Specimens prior to testing (impregnated Sapeli (Mahogany) wood with white primer)



Photographs 15 and 16: Specimens after testing (impregnated Sapeli (Mahogany) wood with white primer)