

Reaction to fire test report

Issuing laboratory: WFRGENT NV

Test standard: EN 13823: 2020 + A1: 2022

Test sponsor(s): FR Clear



Product(s): FR Clear

Report number: 23328B

Version: 1

WFRGENT NV , accredited for compliance with ISO/IEC 17025:2017 – Testing

Quality management

Version	Summary of amendments including reasons	
1	Description	Initial issue
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*Signed for and on behalf of WFRGENT NV		

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1. Introduction

This report documents the findings of the reaction to fire test of "FR Clear" in accordance with EN 13823: 2020 + A1: 2022.

WFRGENT NV (Warringtonfire) performed the test on 21 February 2024, 04 March 2024 at the request of the test sponsor listed in Table 1.

Table 1 Test sponsor details

Entity	Address
Test sponsor	
FLAMEOFF COATINGS INC.	3915 Beryl Rd, Suite 130, Raleigh, NC 27607 United States
Supplier	
FLAMEOFF COATINGS INC.	3915 Beryl Rd, Suite 130, Raleigh, NC 27607 United States

2. Test specimens

The description of the test specimens is detailed in Table 2. Unless otherwise specified:

- The information including measurements was provided by the test sponsor.
- All measurements taken by Warringtonfire are clearly identified.

Warringtonfire was commissioned to modify the test specimens so they met the geometric requirements of the test standard.

Table 2 Test specimen description

FR Clear	Nominal values (1)	Measured values (2)
Type of product	Fire Inhibitor on water and phosphate basis. The fire inhibitor was delivered to the lab as a bottle of liquid. The lab applied the fire inhibitor onto a particle board substrate.	
Manufacturer	(4)	
Appearance	Liquid	Liquid
Density (kg/m ³ ;wet)	1223	(3)
Solid content (weight %)	40	(3)
End-use application (prepared by the lab)		
<i>Application method</i>	Sprayed	
<i>Wet applied amount per layer</i>	0,15l/m ²	0,13l/m ² (applied by the lab onto the substrate)
<i>Dried weight (g/m²;dry)</i>	183	(3)
Use of fire retardants	Yes	
Amounts of fire retardants (m/m %)	40	(3)
Colour	Transparent	Transparent

(1) Based on the information given by the sponsor

(2) Values verified by the laboratory

(3) Unverifiable by the laboratory

(4) Known by the laboratory

3. Test procedure

Table 3 details the test procedure for this reaction to fire test.

Table 3 Test procedure

Item	Detail
Test standard	The test was performed in accordance with EN 13823: 2020 + A1: 2022.
Supplementary standard	EN 13501-1: 2018
Deviations from the test standard	None
Product standard and/or EAD	According to the information provided by the sponsor, there was no product standard for CE marking available at the time the test report for the tested material/product was drafted. When such a product standard is published, this report may be submitted again to the laboratory to evaluate the adequacy of the report for product certification.
EGOLF agreements and/or recommendations	None
Pre-test conditioning	<p>Test specimens were received on 09/01/2024 (2 bottles of FR Clear).</p> <p>Before testing, the test specimens were conditioned in accordance with the requirements of EN 13238: 2010 at a temperature of 23 ± 2 °C and a relative humidity of $50 \pm 5\%$ for a minimum period of 48 hours, until constant mass was achieved.</p>
Sampling / test specimen selection (bottles of FR Clear)	<p>The test specimens were supplied by the test sponsor. Warringtonfire was not involved in any selection or sampling procedure.</p> <p>Production place: Windsor ON</p> <p>Production line: FR Clear line</p> <p>Production date: not known by the test sponsor</p> <p>ID within the quality system: not known by the test sponsor</p>
Supplier of the particle board substrate	Warringtonfire
Test face	The fire-retardant treated side of the particle board substrate was exposed to the heating conditions of the test when the test specimens were mounted in the test position.
Number of replicate tests	Three
Intended application	Fire inhibitor for wood applications
Test specimen preparation	<p>The test specimen walls (or wings) were installed in the trolley in accordance with the requirements of section 5.3 of EN 13823: 2020 + A1: 2022.</p> <p>The lab sprayed the FR Clear fire inhibitor onto the particle board standard substrate (12 mm, 743 kg/m³) in a wet application rate of 0,13 l/m² just below the target value of 0,15 l/m² (total amount of 0,24 kg was added over the full surface of the long wing (1,5m²) and 0,12 kg was added over the full surface of the short wing (0,75 m²).</p>

4. Test results and observations

4.1 Pre-test conditions

Table 4 details pre-test conditions.

Table 4 Pre-test conditions

Parameter	Unit	Value		
		Specimen 1	Specimen 2	Specimen 3
Ambient temperature	(°C)	11	11	20
Barometric pressure	Pa	101700	100700	100200
Relative humidity	%	70	70	52

4.2 Test results

Table 5 shows a summary of the results for the test specimens.

Table 5 Test results

Parameter	Unit	Results			
		Specimen 1	Specimen 2	Specimen 3	Mean
Test date	-	21/02/2024	21/02/2024	04/03/2024	-
Fire spread					
FIGRA (THR(t) threshold of 0.2MJ)	W/s	227	252	234	238
FIGRA (THR(t) threshold of 0.4MJ)	W/s	227	252	234	238
THR600s	MJ	13.1	14.3	14.7	14.0
Lateral flame spread to edge of test specimen?	-	No	No	No	No
Smoke production					
SMOGRA	m ² /s ²	1	3	3	2
TSP600s	m ²	28	33	47	36
Flaming droplets and particles					
Fall of flaming droplets/particles < 10s?	-	No	No	No	No
Fall of flaming droplets/particles > 10s?	-	No	No	No	No

4.3 Test observations

Table 6 shows a list of initial observations noted for every tested specimen.

Table 6 Common specimen observations

Min	Sec	Initial observations for each specimen
0	0	Pre-checks performed on analysers
2	0	Auxiliary burner switched on to check correct burner operating conditions
5	0	Gas flow switched from auxiliary burner to main burner & test flames impinge on specimen

Observations of any significant behaviour of the specimen during the tests are summarised in Table 7 below.

Table 7 Test observations

Min	Sec	Observations during test
Specimen 1		
23	54	Falling of test specimen parts
26	0	End of test conditions. All flaming ceased.
Specimen 2		
23	30	Falling of test specimen parts
26	0	End of test conditions. All flaming ceased.
Specimen 3		
23	39	Falling of test specimen parts
26	0	End of test conditions. All flaming ceased.

5. Application of test results

5.1 Validity

This document is the original version of this test report and is written in English. In case of doubt the original version prevails over a translation.

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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, nor can the results be extrapolated and applied to other products.

Test reports are statements of fact prepared in accordance with the referenced version of the standards stated in Section 3 of this report. Test reports are based upon the information provided to Warringtonfire. Warringtonfire takes no responsibility for the accuracy or completeness of such information.

The results stated in this report apply to the sample as received. Any differences in composition, production process, thickness, density or colour of the product may significantly affect the performance and will therefore invalidate the application of the test results to the variant product. It is recommended that any proposed variation to the tested configuration or product should be referred to the test sponsor. The test sponsor should then obtain appropriate documentary evidence of compliance from Warringtonfire or another notified testing authority. The supplier of the product is responsible for ensuring that the product which is supplied for use is identical to the test sample as received.

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5.2 Uncertainty of measurement

The uncertainty of test results for this test report is described in Annex B of the test standard. As this annex only covers generic products and as we know at this moment that the uncertainty can be influenced by the nature of the product in the test, the values in Annex B can only give an indication of the actual uncertainty of the tests described in this report.

Appendix A Test data

A.1 Heat release rate

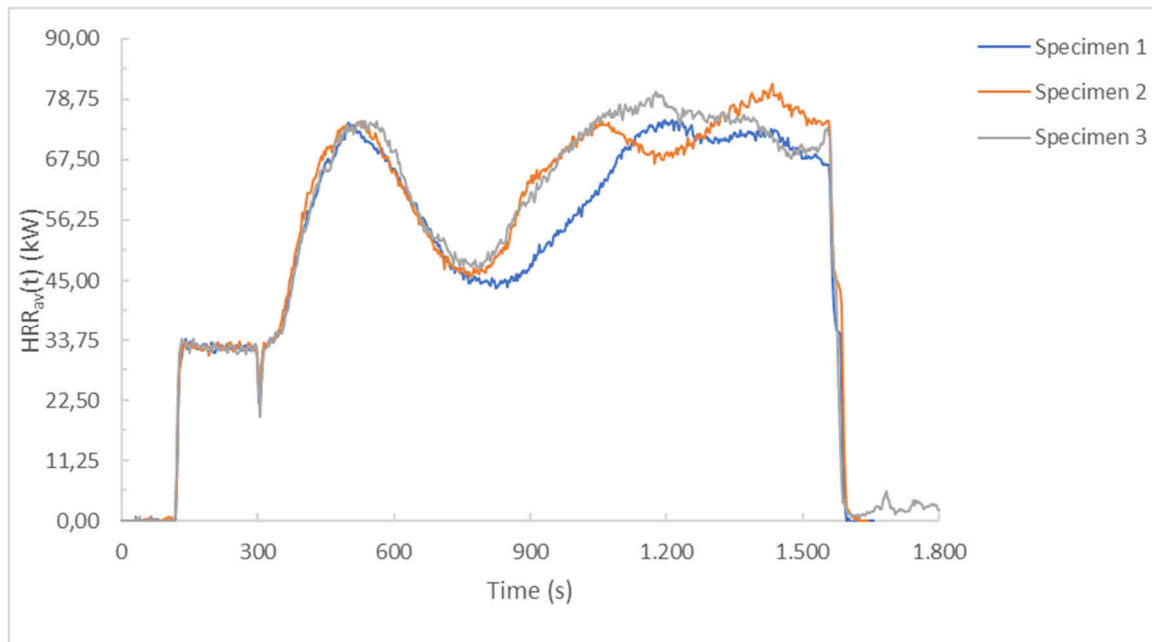


Figure 1 Heat release rate vs time

A.2 Total heat release

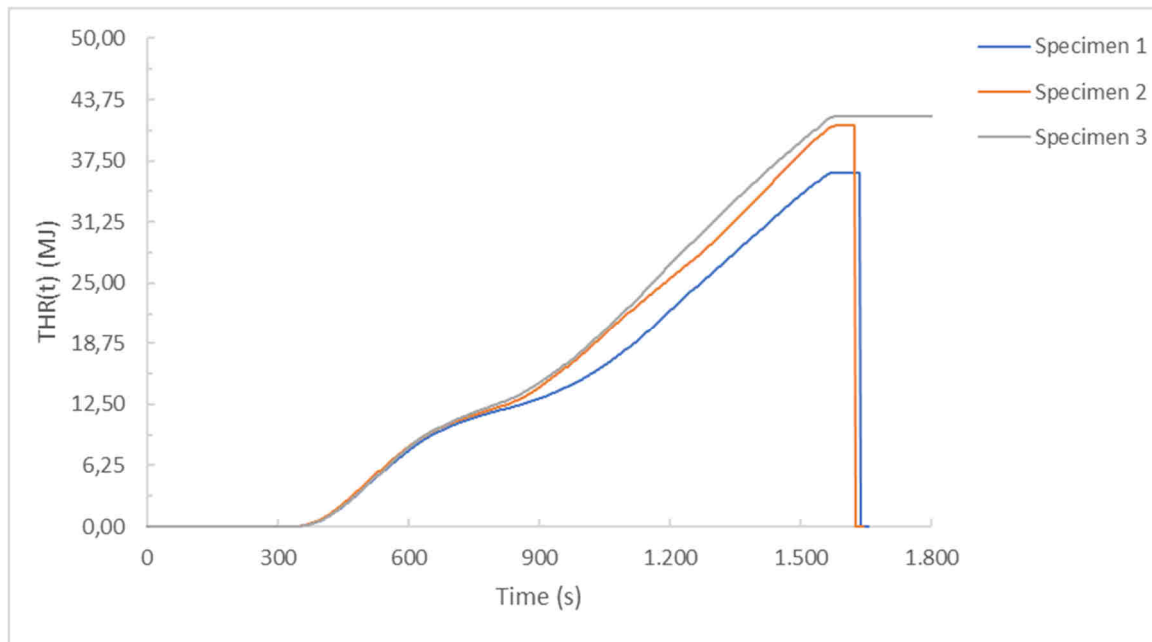


Figure 2 Total heat release vs time

A.3 $1000 \times \text{HRR}_{\text{av}}(t) / (t-300)$

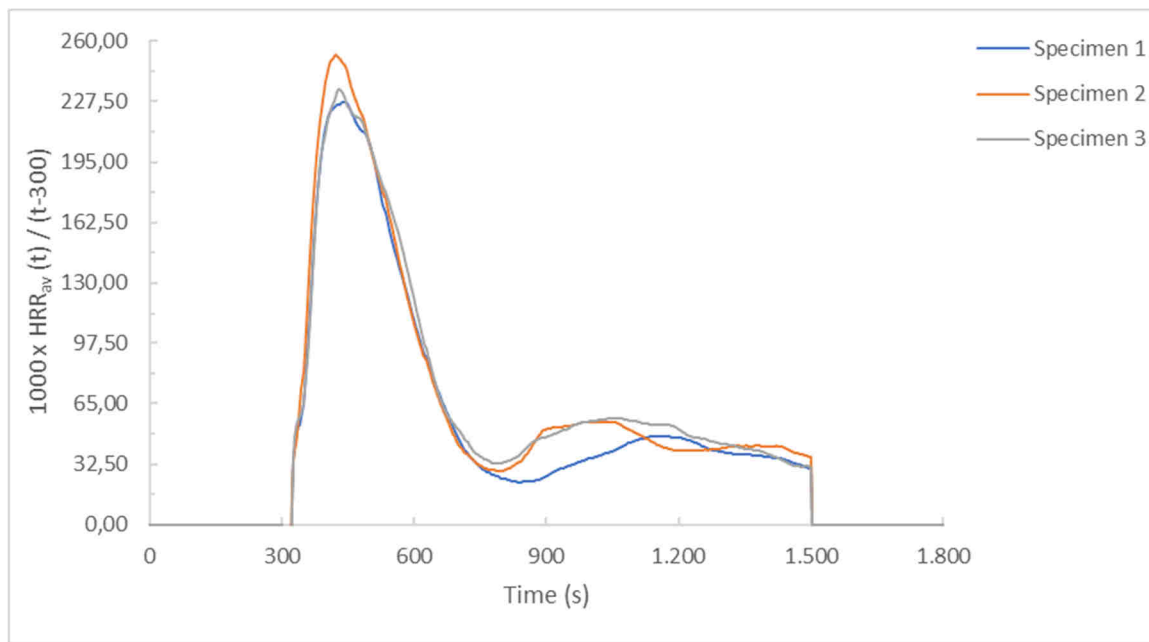


Figure 3 $1000 \times \text{HRR}_{\text{av}}(t) / (t-300)$ vs time

A.4 Smoke production rate

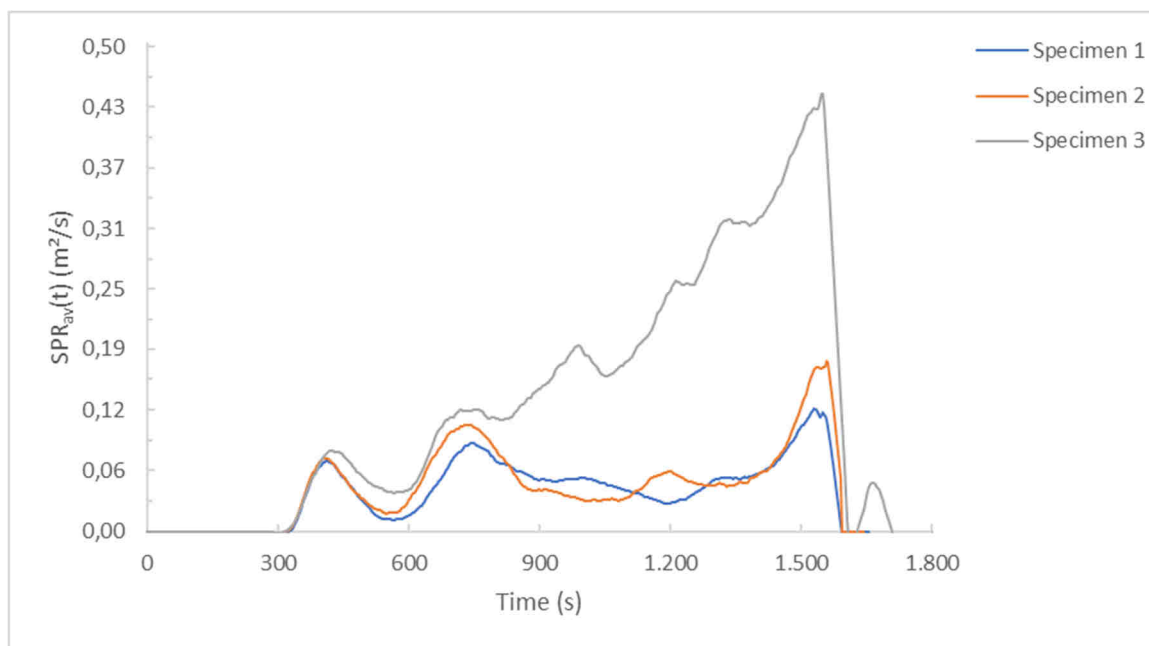


Figure 4 Smoke production rate vs time

A.5 Total smoke production

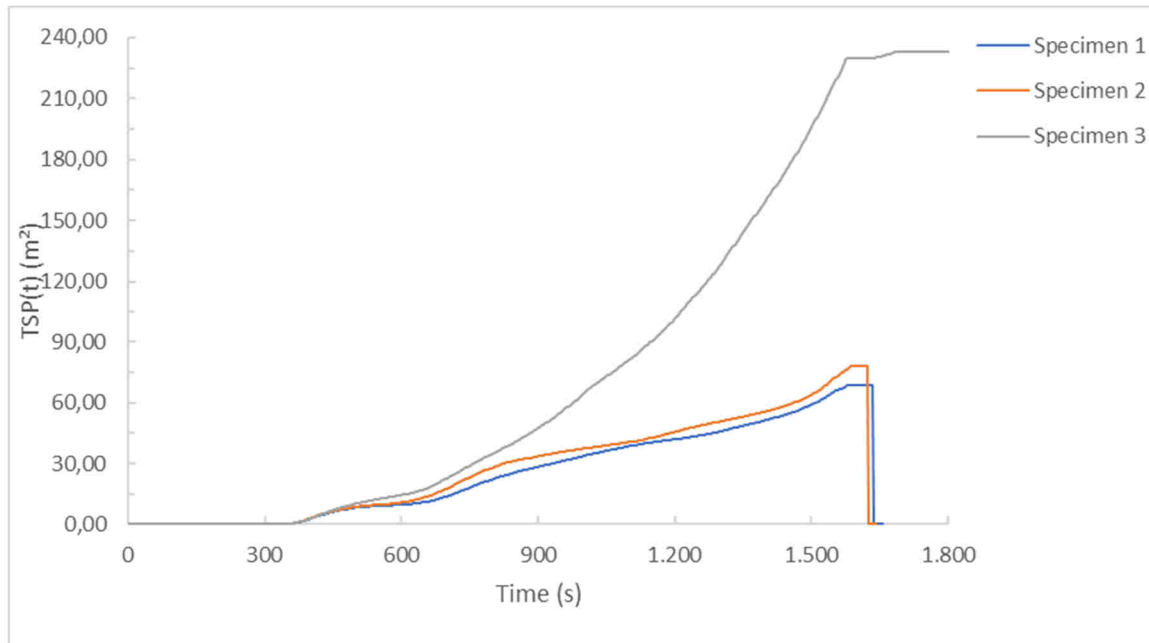


Figure 5 Total smoke production vs time

A.6 10000 x SPR_{av} (t) / (t-300)

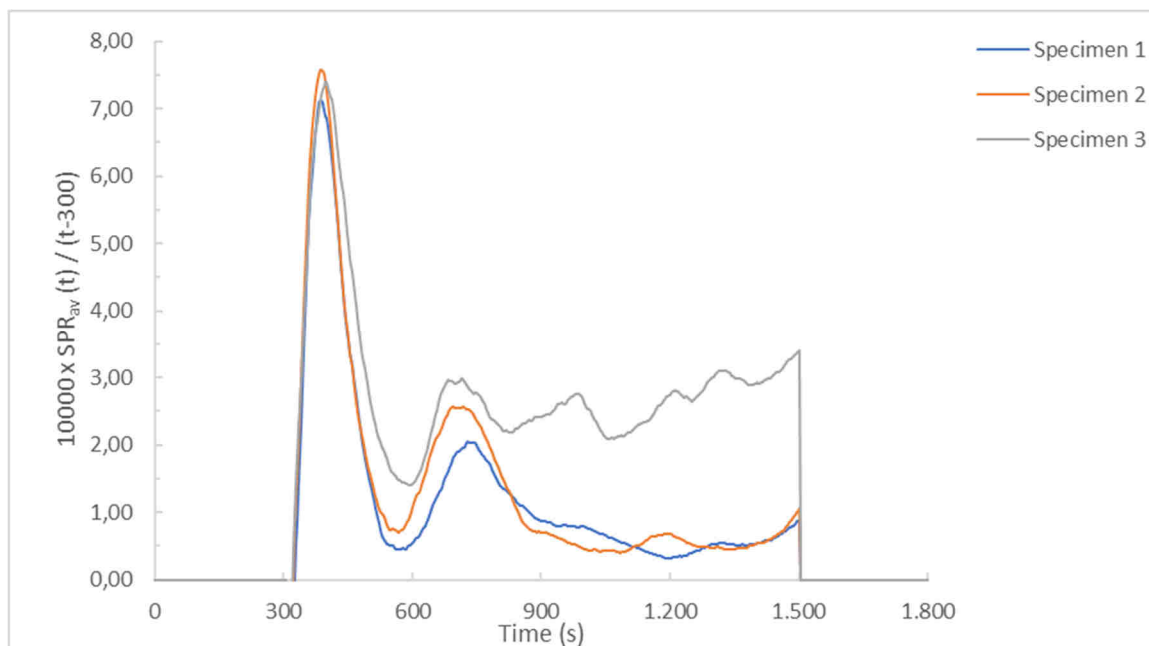


Figure 6 10000 x SPR_{av} (t) / (t-300) vs time

Appendix B Test specimen photographs

SAMPLE 1: Before



SAMPLE 1: Before



SAMPLE 1: After



SAMPLE 1: After



SAMPLE 2: Before



SAMPLE 2: Before



SAMPLE 2: After



SAMPLE 2: After



SAMPLE 3: Before



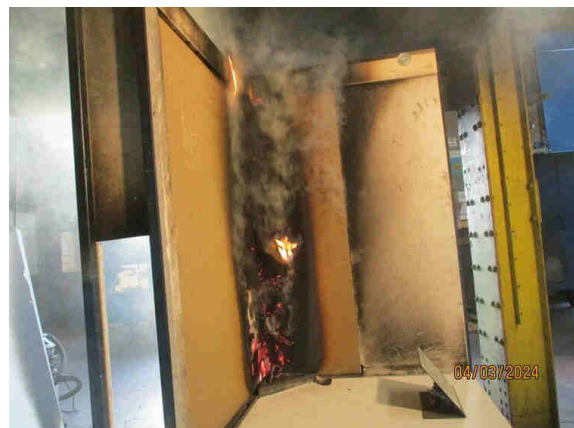
SAMPLE 3: Before



SAMPLE 3: After



SAMPLE 3: After





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