

Test report no.: <i>Testrapport nr.:</i>	89221176 044	Order No.: <i>Opdracht nr.:</i>	221176	Page 1 of 14 <i>Pagina 1 van 14</i>
Client Reference No.: <i>Klantreferentie nr.:</i>	N/A	Order date: <i>Opdrachtdatum:</i>	03.08.2023	
Client: <i>Klant:</i>	Forbo Flooring B.V., PO Box 13, 1560 AA Krommenie, The Netherlands			
Test item: <i>Testvoorwerp:</i>	Resilient floor covering			
Identification/ Type No.: <i>Benaming / Type nr.:</i>	Marmoleum 2.0 mm – Batch 61652			
Order content: <i>Inhoud opdracht:</i>	Classification of burning behaviour			
Test specification: <i>Testomschrijving:</i>	EN 13501-1:2018 ^a Classification of burning behaviour Test methods: Ignitability of products subjected to direct impingement of flame (EN ISO 11925-2:2020) and determination of the burning behaviour using a radiant heat source (EN ISO 9239-1:2010)			
Date of sample receipt: <i>Ontvangstdatum monster:</i>	05.09.2023			
Test sample No: <i>Testproefstuk nr.:</i>	MT23-221176.32			
Testing period: <i>Testperiode:</i>	2023-09-12 - 2023-09-15			
Place of testing: <i>Testlocatie:</i>	Westervoortsedijk 73, 6827 AV Arnhem			
Testing laboratory: <i>Testlaboratorium:</i>	TÜV Rheinland Nederland B.V.			
Test result*: <i>Testresultaat*:</i>	See Other			
compiled by: <i>samengesteld door:</i>	X 	authorized by: <i>geautoriseerd door:</i>	X 	
Date: 27.09.2023 <i>Datum:</i>	Ondertekend door: Jaring de Wolff	Issue Date: 27.09.2023 <i>Datum uitgave:</i>	Ondertekend door: Salah El Bardai	
Position / functie:	LFM	Position / functie:	Expert	
Others / <i>Andere:</i>	See individual test results			
Condition of the test item at delivery: <i>Toestand van het test voorwerp bij ontvangst:</i>	Test item complete and undamaged			
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
* Legenda:	P(ass) = voldoet aan test omschrijving	F(ail) = voldoet niet aan test omschrijving	N/A = niet van toepassing	N/T = niet getest
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark. <i>Dit testrapport heeft alleen betrekking op het voorgenoemde test voorwerp. Zonder toestemming van het testcentrum mag dit testrapport niet in delen worden vermenigvuldigd. Dit keuringsrapport geeft geen recht op het dragen van enig keurmerk.</i>				

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Remarks
Opmerkingen

1	The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. The decision rule for statements of conformity in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance to and ILAC-G8:09/2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account. <i>De apparatuur die tijdens de gespecificeerde testperiode is gebruikt, is gekalibreerd volgens ons testlaboratoriumkalibratieprogramma. De apparatuur voldoet aan de eisen die zijn opgenomen in de relevante normen. De traceerbaarheid van de gebruikte testapparatuur wordt gewaarborgd door naleving van de voorschriften van ons managementsysteem. De beslisregel voor conformiteitsverklaringen in dit testrapport is gebaseerd op de "Zero Guard Band Rule" en "Simple Acceptance" in overeenstemming met en ILAC - G8:09/2019 en IEC Guide 115:2021, tenzij anders aangegeven in de toegepaste norm vermeld op pagina 1 van dit rapport of aangevraagd door de klant. Dit betekent dat er geen rekening wordt gehouden met de meetonzekerheid.</i>
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3	Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report. Tests clauses marked with ^a are performed under ISO 17025 accreditation. Deviations of testing specification(s), test locations or customer requirements are listed in specific test clause in the report. This report is only to be read as a whole. No opinions or interpretation are included in this report. This test report consists of multiple pages and is only to be read as a whole. The number of pages can be seen in the header on the top right of each page, the report ends when the last page is reached. TÜV Rheinland Nederland B.V. is solely responsible for the content. <i>Test onderdelen welke met * zijn gemarkeerd zijn uitbesteed aan gekwalificeerde onderaannemers en zijn beschreven in het respectievelijke test onderdeel van dit rapport. Test onderdelen welke met ^a zijn gemarkeerd zijn onder ISO 17025 accreditatie uitgevoerd. Afwijkingen van testspecificatie(s), testlocaties of klant eisen zijn vermeld in het van toepassing zijnde onderdeel in het rapport. Het rapport dient als geheel te worden gelezen. Er zijn geen opinies en interpretaties opgenomen binnen het rapport. Dit rapport bestaat uit meerdere pagina's en dient al geheel gelezen te worden. Het aantal pagina's is rechtsboven in de koptekst van dit rapport vermeld en eindigt wanneer de laatste pagina is bereikt. TÜV Rheinland Nederland is als enige verantwoordelijk voor de inhoud van het rapport.</i>
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Product description
Product omschrijving

1	Product details: <i>Product details:</i>	Product identity: Marmoleum 2.0 mm – Batch 61652 Product type: Resilient floor covering Dessin: 3032
2	Other: <i>Andere:</i>	Test sample(s), as well sample information, description, product details and intended usage was provided by customer.
3	Test sample obtaining: <i>Selectie van het proefstuk:</i>	☒ Sending by customer ☐ Sampling by TÜV Rheinland Group ☐ others:

Figure 1: Picture of the received sample (surface)



Figure 2: Picture of the received sample (back)



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Clause Deel	Requirements - Tests / Vereisten - Tests	Measuring results – Remarks Meetresultaten – Opmerkingen	Result Resultaat
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1	Construction data (indicative) of the product obtained by the testlaboratory after pre-conditioning <i>01-4.3-P.02-322-WI01</i>	
	Test condition	23 ± 2°C and 50 ± 4% relative humidity
	Pre conditioning, duration	≥ 48 h & until constant mass is achieved
	Total thickness (mm)	20.5
	Total mass (g/m²)	14851.0
	Density (kg/m³)	728
	<i>Note: the determined construction data are used for determination of constant mass, the used testmethod is not in accordance with the determination of construction data according the specification standard. Therefore the testresults should be handled as indicative.</i>	

2	Ignitability of products subjected to direct impingement of flame <i>EN ISO 11925-2:2020^a</i>								
	Date of testing			15.09.2023					
	Pre-conditioning, climate			23 ± 2°C and 50 ± 4% relative humidity					
	Pre-conditioning, duration			≥ 48 h & until constant mass is achieved					
	Description of substrate			Particle board, thickness 20 ± 2 mm, density 680 ± 50 kg/m3 conforming to EN 13238:2018					
	Flame application			Surface					
	Flame application time (s)			15					
	Requirements according EN 13501-1			See clause 5 of this report					
	Test result(s)								
	Orientation			Length			Width		
	Test sample			1	2	3	1	2	3
	Ignition of the sample			No	No	No	No	No	No
	Flame tip reached 150 mm above the application point			No	No	No	No	No	No
	Duration after application when the flame tip reached the 150 mm above the application point (s)			N/A	N/A	N/A	N/A	N/A	N/A
	Extent of damaged area, length (mm)			16	44	51	47	52	35
	Extent of damaged area, width (mm)			5	10	16	10	10	9
	Material melts			No	No	No	No	No	No
	Shrinks away from flame without being ignited			No	No	No	No	No	No
	After glowing			No	No	No	No	No	No
	Flaming droplets/particles which caused ignition of filter paper			No	No	No	No	No	No

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Clause Deel	Requirements - Tests / Vereisten - Tests	Measuring results – Remarks Meetresultaten – Opmerkingen	Result Resultaat
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3	Determination of the burning behaviour using a radiant heat source <i>EN ISO 9239-1:2010^a</i>						
	Date of testing		13.09.2023				
	Pre-conditioning, climate		23 ± 2°C and 50 ± 4% relative humidity				
	Pre-conditioning, duration		≥ 48 h & until constant mass is achieved				
	Description of substrate		Particle board, thickness 20 ± 2 mm, density 680 ± 50 kg/m ³ conforming to EN 13238:2018				
	Fixing method		The samples are glued to the substrate with Eurocol 611				
	Precision of the test method		The measurement uncertainty for this test strongly depends on the products that are tested, based on that influence a measurement uncertainty for the method can't be determined. Information on the influence of the different products can be found in ISO 9239-1:2010 Annex B.				
	Requirements according EN 13501-1		See clause 5 of this report				
	Test result(s)						
	Test sample		1	2	3	4	Mean
	Orientation (Length: ↑ , Width: T)		↑	T	↑	↑	↑

Flame spread (cm)	39	36	41	39	39
CHF / HF-30 (kW/m ²)	5.4	5.9	4.0	5.4	5.2
Maximum light attenuation (%)	38.4	26.7	46.1	38.7	37.5
Smoke production (%.min)	237	194	281	237	237

Observed significant phenomena during the test:
Specimen 1, 2, 3 and 4: Penetration of the flame through to the substrate.
Specimen 1, 2, 3 and 4: Sustained Flaming.
Specimen 1, 2 and 3: Extinguished naturally before the end of the test duration.
Specimen 4: Extinguished manually after the end of the test duration.

4	Classification of burning behaviour <i>EN 13501-1:2018^a</i>	
	The product, Marmoleum 2.0 mm – Batch 61652, in relation to its reaction to fire behaviour is classified:	C_{fl}
	The additional classification in relation to smoke production is:	s1
	Reaction to fire classification : C_{fl} – s1	
	Field of application - As a floor covering in accordance with the nominal product parameters given on page 3. - On end use substrates of (wood and of) classes A1 and A2-s1,d0 according to EN 13238:2010. - Glued down with Eurocol 611.	
	Statements - This document does not represent type approval or certification of the product. - The test results only relate to the behaviour of the test specimens of the examined product under the particular conditions of the test in laboratory conditions; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use. - The validity of this report will expire directly after alterations or modifications of the examined product (combination(s) and/or the criteria.	

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Clause Deel	Requirements - Tests / Vereisten - Tests	Measuring results – Remarks Meetresultaten – Opmerkingen	Result Resultaat
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5	Potential classes of reaction to fire performance for floorings EN 13501-1:2018 ^a			
	Class	Test method(s)	Classification criteria	Additional classifications
	A1 _{fl}	EN ISO 1182 ^{a2} and	$\Delta T \leq 30 \text{ }^{\circ}\text{C}$; and $\Delta m \leq 50 \%$; and $t_f = 0$ (i.e. no sustained flaming)	-
		EN ISO 1716	$PCS \leq 2.0 \text{ MJ/kg}$ ^{a2} and $PCS \leq 2.0 \text{ MJ/m}^2$ ^b and $PCS \leq 1.4 \text{ MJ/m}^2$ ^c and $PCS \leq 2.0 \text{ MJ/kg}$ ^d	-
	A2 _{fl}	EN ISO 1182 ^{a2} or	$\Delta T \leq 50 \text{ }^{\circ}\text{C}$ and $\Delta m \leq 50 \%$ and $t_f \leq 20 \text{ s}$	-
		EN ISO 1716 and	$PCS \leq 3.0 \text{ MJ/kg}$ ^{a2} and $PCS \leq 4.0 \text{ MJ/m}^2$ ^b and $PCS \leq 4.0 \text{ MJ/m}^2$ ^c and $PCS \leq 3.0 \text{ MJ/kg}$ ^d	-
		EN ISO 9239-1 ^e	$CHF \geq 8.0 \text{ kW/m}^2$	Smoke production ^g
	B _{fl}	EN ISO 9239-1 ^e and	$CHF \geq 8.0 \text{ kW/m}^2$	Smoke production ^g
		EN ISO 11925-2 ^h : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-
	C _{fl}	EN ISO 9239-1 ^e and	$CHF \geq 4.5 \text{ kW/m}^2$	Smoke production ^g
		EN ISO 11925-2 ^h : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-
	D _{fl}	EN ISO 9239-1 ^e and	$CHF \geq 3.0 \text{ kW/m}^2$	Smoke production ^g
		EN ISO 11925-2 ^h : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-
	E _{fl}	EN ISO 11925-2 ^h : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-
	F _{fl}	EN ISO 11925-2 ^h : Exposure = 15 s	$F_s > 150 \text{ mm}$ within 20 s	-
	^{a2} For homogeneous products and substantial components of non-homogeneous products. ^b For any external non-substantial component of non-homogeneous products. ^c For any internal non-substantial component of non-homogeneous products. ^d For the product as a whole. ^e Test duration = 30 min. ^f Critical flux is defined as the radiant flux at which the flame extinguishes or the radiant flux after a test period of 30 min, whichever is the lower (i.e. the flux corresponding with the furthest extent of spread of flame). ^g s1 = Smoke $\leq 750 \%$ minutes; s2 = not s1. ^h Under conditions of surface flame attack and, if appropriate to the end use application of the product, edge flame attack.			

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Flooring Radiant Panel Single Specimen Report

Standard : EN ISO 9239-1:2010
Laboratory : TÜV Rheinland Nederland B.V.
Sponsor : 89221176
Date of test : Sep. 13 2023

Specimen description : MT23-221176.32
Test name : # Prod 1
File name : F:\23090017.CSV
Test number in series : 4

Flux calibration file name : C:\FRPSOFT2.9A\CALIB\FLX23004.CSV

Thickness (mm) : 20.5
Density (kg/m³) : 728

Test duration : 25 minutes 03 seconds (1503 s)
Substrate used? : Yes
Substrate : Particle board
Fixing method : adhesive
Conditioned? : Yes
Conditioning temp. (°C) : 23
Conditioning RH (%) : 50

Test Results

Time to ignition : 2 minutes 07 seconds (127 s)
Time to flameout : 25 minutes 01 seconds (1501 s)
Extent of burning (mm) : 390
Critical flux at extinguishment (kW/m²) : 5.36
HF-10 (kW/m²) : 7.53
HF-20 (kW/m²) : 5.36
HF-30 (kW/m²) : Not calculated (test duration < 30 minutes)
Flame spread at 10 minutes (mm) : 280
Flame spread at 20 minutes (mm) : 390
Flame spread at 30 minutes (mm) : Not measured
Peak light attenuation (%) : 32.77
Time to peak light attenuation : 7 minutes 47 seconds (467 s)
Total integrated smoke (%.min) : 224.88

Potential classification : C(f)
Smoke production classification : s1

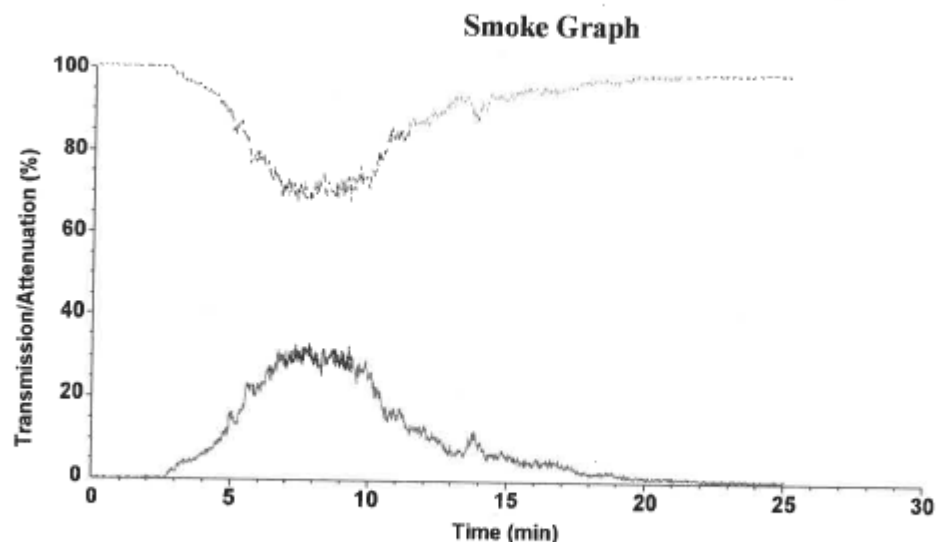
These results relate only to the behaviour of the specimens of the product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

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Test name : # Prod 1
File name : F:\23090017.CSV

Rake Results

Position (mm)	Time (s)	Flux (kW/m²)	Qsb (MJ/m²)	Position (mm)	Time (s)	Flux (kW/m²)	Qsb (MJ/m²)
60	236	11.3	2.656	510	-	3.4	-
110	326	10.5	3.408	560	-	2.9	-
160	395	9.8	3.856	610	-	2.5	-
210	466	9.0	4.172	660	-	2.1	-
260	546	7.9	4.322	710	-	1.8	-
310	671	6.9	4.657	760	-	1.6	-
360	941	5.9	5.574	810	-	1.4	-
410	-	5.0	-	860	-	1.3	-
460	-	4.1	-	910	-	1.2	-

Comments

Specimen extinguished naturally.

These results relate only to the behaviour of the specimens of the 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.

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Flooring Radiant Panel Single Specimen Report

Standard : EN ISO 9239-1:2010
Laboratory : TÜV Rheinland Nederland B.V.
Sponsor : 89221176
Date of test : Sep. 13 2023

Specimen description : MT23-221176.32
Test name : # Cross 2
File name : D:\FRPFILES\23090018.CSV
Test number in series : 4

Flux calibration file name : C:\FRPSOFT2.9A\CALIB\FLX23004.CSV

Thickness (mm) : 20.5
Density (kg/m³) : 728

Test duration : 25 minutes 43 seconds (1543 s)
Substrate used? : Yes
Substrate : Particle board
Fixing method : adhesive
Conditioned? : Yes
Conditioning temp. (°C) : 23
Conditioning RH (%) : 50

Test Results

Time to ignition : 2 minutes 10 seconds (130 s)
Time to flameout : 25 minutes 38 seconds (1538 s)
Extent of burning (mm) : 360
Critical flux at extinguishment (kW/m²) : 5.92
HF-10 (kW/m²) : 7.92
HF-20 (kW/m²) : 6.13
HF-30 (kW/m²) : Not calculated (test duration < 30 minutes)
Flame spread at 10 minutes (mm) : 260
Flame spread at 20 minutes (mm) : 350
Flame spread at 30 minutes (mm) : Not measured
Peak light attenuation (%) : 28.65
Time to peak light attenuation : 8 minutes 06 seconds (486 s)
Total integrated smoke (%.min) : 193.58

Potential classification : C(II)
Smoke production classification : s1

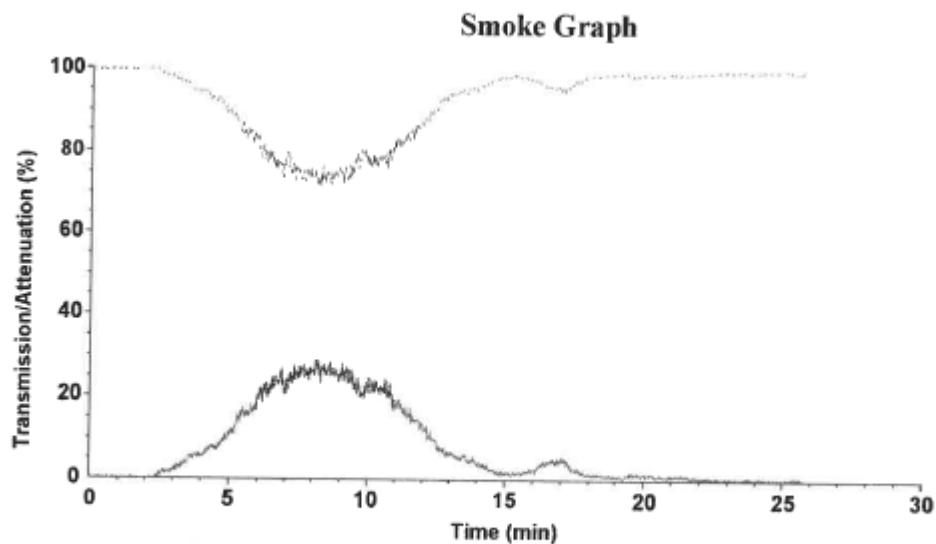
These results relate only to the behaviour of the specimens of the product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

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Test name : # Cross 2

File name : D:\FRPFILES\23090018.CSV

Rake Results

Position (mm)	Time (s)	Flux (kW/m ²)	Qsb (MJ/m ²)	Position (mm)	Time (s)	Flux (kW/m ²)	Qsb (MJ/m ²)
60	236	11.3	2.656	510	-	3.4	-
110	352	10.5	3.680	560	-	2.9	-
160	407	9.8	3.974	610	-	2.5	-
210	525	9.0	4.700	660	-	2.1	-
260	607	7.9	4.805	710	-	1.8	-
310	747	6.9	5.185	760	-	1.6	-
360	1357	5.9	8.039	810	-	1.4	-
410	-	5.0	-	860	-	1.3	-
460	-	4.1	-	910	-	1.2	-

Comments

Specimen extinguished naturally.

These results relate only to the behaviour of the specimens of the 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.

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Flooring Radiant Panel Single Specimen Report

Standard : EN ISO 9239-1:2010
Laboratory : TÜV Rheinland Nederland B.V.
Sponsor : 89221176
Date of test : Sep. 13 2023

Specimen description : MT23-221176.32
Test name : # Prod 3
File name : F:\23090019.CSV
Test number in series : 4

Flux calibration file name : C:\FRPSOFT2.9A\CALIB\FLX23004.CSV

Thickness (mm) : 20.5
Density (kg/m³) : 728

Test duration : 24 minutes 24 seconds (1464 s)
Substrate used? : Yes
Substrate : Particle board
Fixing method : adhesive
Conditioned? : Yes
Conditioning temp. (°C) : 23
Conditioning RH (%) : 50

Test Results

Time to ignition : 2 minutes 08 seconds (128 s)
Time to flameout : 2 minutes 26 seconds (146 s)
Extent of burning (mm) : 410
Critical flux at extinguishment (kW/m²) : 4.99
HF-10 (kW/m²) : 6.94
HF-20 (kW/m²) : 5.17
HF-30 (kW/m²) : Not calculated (test duration < 30 minutes)
Flame spread at 10 minutes (mm) : 310
Flame spread at 20 minutes (mm) : 400
Flame spread at 30 minutes (mm) : Not measured
Peak light attenuation (%) : 46.06
Time to peak light attenuation : 8 minutes 22 seconds (502 s)
Total integrated smoke (%.min) : 281.4

Potential classification : C(II)
Smoke production classification : s1

These results relate only to the behaviour of the specimens of the 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.

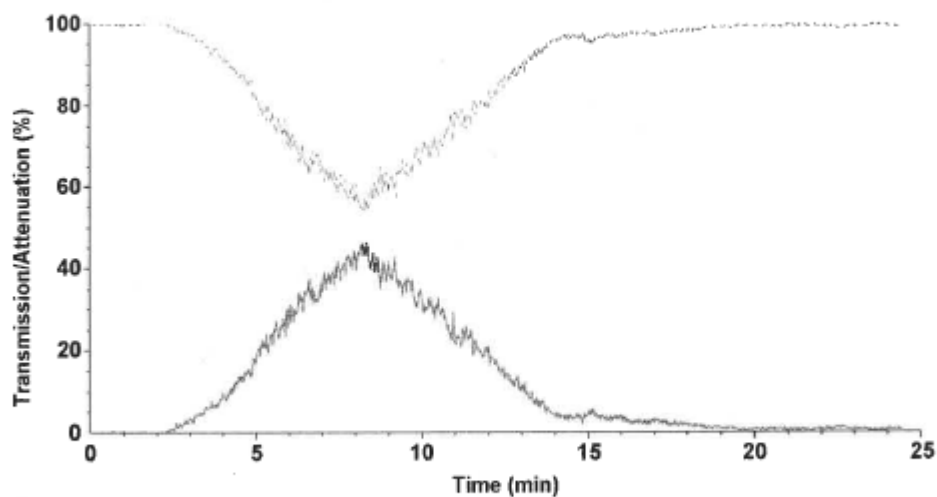
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Smoke Graph



Test name : # Prod 3
File name : F:\23090019.CSV

Rake Results

Position (mm)	Time (s)	Flux (kW/m ²)	Qsb (MJ/m ²)	Position (mm)	Time (s)	Flux (kW/m ²)	Qsb (MJ/m ²)
60	214	11.3	2.409	510	-	3.4	-
110	301	10.5	3.147	560	-	2.9	-
160	366	9.8	3.573	610	-	2.5	-
210	435	9.0	3.894	660	-	2.1	-
260	505	7.9	3.998	710	-	1.8	-
310	596	6.9	4.137	760	-	1.6	-
360	783	5.9	4.638	810	-	1.4	-
410	1344	5.0	6.703	860	-	1.3	-
460	-	4.1	-	910	-	1.2	-

Comments

Specimen extinguished naturally.

These results relate only to the behaviour of the specimens of the 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.

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Flooring Radiant Panel Single Specimen Report

Standard	: EN ISO 9239-1:2010
Laboratory	: TÜV Rheinland Nederland B. V.
Sponsor	: 89221176
Date of test	: Sep. 13 2023
Specimen description	: MT23-221176.32
Test name	: # Prod 4
File name	: D:\FRPFILES\23090020.CSV
Test number in series	: 4
Flux calibration file name	: C:\FRPSOFT2.9A\CALIB\FLX23004.CSV
Thickness (mm)	: 20.5
Density (kg/m³)	: 728
Test duration	: 30 minutes (1800 s)
Substrate used?	: Yes
Substrate	: Particle board
Fixing method	: adhesive
Conditioned?	: Yes
Conditioning temp. (°C)	: 23
Conditioning RH (%)	: 50

Test Results

Time to ignition	: 2 minutes 06 seconds (126 s)
Time to flameout	: 30 minutes (1800 s)
Extent of burning (mm)	: 390
Critical flux at extinguishment (kW/m²)	: 5.36
HF-10 (kW/m²)	: 7.72
HF-20 (kW/m²)	: 5.74
HF-30 (kW/m²)	: 5.36
Flame spread at 10 minutes (mm)	: 270
Flame spread at 20 minutes (mm)	: 370
Flame spread at 30 minutes (mm)	: 390
Peak light attenuation (%)	: 38.66
Time to peak light attenuation	: 7 minutes 33 seconds (453 s)
Total integrated smoke (%.min)	: 236.6
Potential classification	: C(f)
Smoke production classification	: s1

These results relate only to the behaviour of the specimens of the 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.

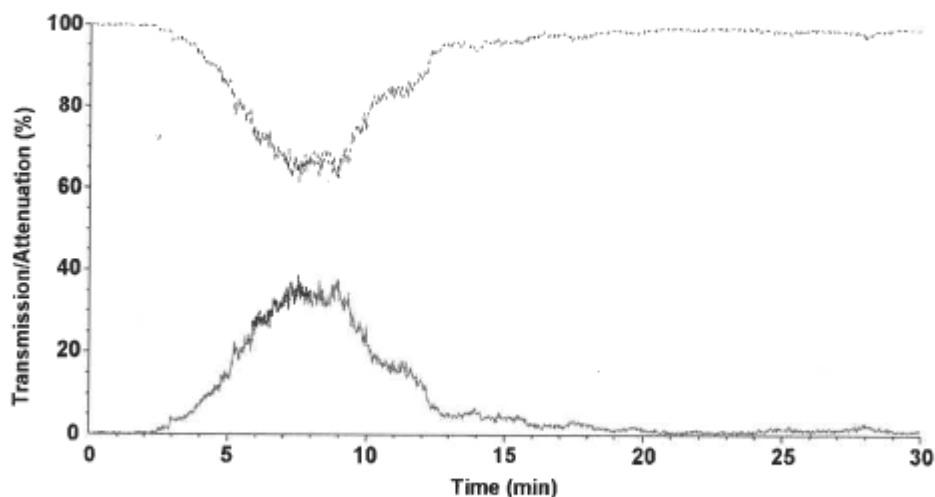
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Smoke Graph



Test name : # Prod 4

File name : D:\FRPFILES\23090020.CSV

Rake Results

Position (mm)	Time (s)	Flux (kW/m ²)	Qsb (MJ/m ²)	Position (mm)	Time (s)	Flux (kW/m ²)	Qsb (MJ/m ²)
60	222	11.3	2.499	510	-	3.4	-
110	311	10.5	3.251	560	-	2.9	-
160	405	9.8	3.954	610	-	2.5	-
210	456	9.0	4.082	660	-	2.1	-
260	567	7.9	4.488	710	-	1.8	-
310	802	6.9	5.567	760	-	1.6	-
360	1143	5.9	6.771	810	-	1.4	-
410	-	5.0	-	860	-	1.3	-
460	-	4.1	-	910	-	1.2	-

Comments

Specimen was extinguished manually after end of test.

These results relate only to the behaviour of the specimens of the 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.