

<b>Test report no.:</b> <i>Testrapport nr.:</i>	<b>89218788 001</b>	<b>Order No.:</b> <i>Opdracht nr.:</i>	218788
<b>Client Reference No.:</b> <i>Klantreferentie nr.:</i>	4501162414	<b>Order date:</b> <i>Opdrachtdatum:</i>	14.04.2021
<b>Client:</b> <i>Klant:</i>	Forbo Flooring B.V., PO Box 13, 1560 AA Krommenie, The Netherlands		
<b>Test item:</b> <i>Testvoorwerp:</i>	Resilient floor covering		
<b>Identification/ Type No.:</b> <i>Benaming / Type nr.:</i>	Marmoleum Real 2.5 mm Topshield Pro		
<b>Order content:</b> <i>Inhoud opdracht:</i>	Classification of burning behaviour		
<b>Test specification:</b> <i>Testomschrijving:</i>	EN 13501-1:2018 Classification of burning behaviour <i>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)</i>		
<b>Date of sample receipt:</b> <i>Ontvangstdatum monster:</i>	15.04.2021 & 09.11.2021		
<b>Test sample No.:</b> <i>Testproefstuk nr.:</i>	MT21-218788.09 & MT21-218788.19		
<b>Testing period:</b> <i>Testperiode:</i>	15.04.2021 - 04.05.2021 & 09.11.2021 - 18.11.2021		
<b>Place of testing:</b> <i>Testlocatie:</i>	Westervoortsedijk 73, 6827 AV Arnhem		
<b>Testing laboratory:</b> <i>Testlaboratorium:</i>	TÜV Rheinland Nederland B.V.		
<b>Test result*:</b> <i>Testresultaat*:</i>	See Other		
<b>tested by:</b> <i>getest door:</i>	<input checked="" type="checkbox"/>	<b>authorized by:</b> <i>geautoriseerd door:</i>	<input checked="" type="checkbox"/>
<b>Date:</b> 19.11.2021 <i>Datum:</i>	<small>Ondertekend door: Michiel van de Vlekkert</small>	<b>Issue Date:</b> 19.11.2021 <i>Datum uitgave:</i>	<small>Ondertekend door: Jaring de Wolff</small>
<b>Position / functie:</b>	jr. Engineer	<b>Position / functie:</b>	LFM
<b>Others /</b> <i>Andere:</i>	Test result: See clause 4 on page 5		
<b>Condition of the test item at delivery:</b> <i>Toestand van het test voorwerp bij ontvangst:</i>	Test item complete and undamaged		
<small>* Legend:</small>	<small>P(ass) = passed a.m. test specification(s)</small>	<small>F(ail) = failed a.m. test specification(s)</small>	<small>N/A = not applicable N/T = not tested</small>
<small>* Legenda:</small>	<small>P(ass) = voldoet aan test omschrijving</small>	<small>F(ail) = voldoet niet aan test omschrijving</small>	<small>N/A = niet van toepassing N/T = niet getest</small>
<p><b>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.</b></p> <p><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></p>			



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**Remarks**  
*Opmerkingen*

1	<p>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. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request. For the influence of the measuring uncertainties on the results, reference is made to the validation of the respective methods.</p> <p><i>De apparatuur welke tijdens de gespecificeerde testperiode is gebruikt, is gekalibreerd volgens ons kalibratieprogramma. De apparatuur voldoet aan de eisen welke zijn opgenomen in de relevante normen. De traceerbaarheid van de gebruikte testapparatuurs is gewaarborgd door naleving van de voorschriften in ons kwaliteitsmanagementsysteem. Gedetailleerde informatie over testomstandigheden, apparatuur en meetonzekerheid is beschikbaar in het testlaboratorium en kan op verzoek worden verstrekt. Voor de invloed van de meetonzekerheden op de resultaten wordt verwezen naar de validatie van de respectievelijke methode c.q. verrichting</i></p>
2	<p>As contractually agreed, this document has been signed digitally only. TÜV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TÜV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged.</p> <p><i>Zoals contractueel overeengekomen is dit document enkel digitaal ondertekend. TÜV Rheinland heeft niet geverifieerd en kan niet verifiëren welke wettelijke of andere vereisten van toepassing zijn op dit document. Een dergelijke verificatie valt onder de verantwoordelijkheid van de gebruiker van het document. Op verzoek van de opdrachtgever kan TÜV Rheinland de geldigheid van de digitale handtekening bevestigen door een apart document. Een dergelijk verzoek moet worden gericht aan onze verkoopafdeling. Voor een dergelijke extra service zal een milieutoeslag in rekening worden gebracht.</i></p>
3	<p>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report. Tests clauses marked with <sup>a</sup> 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.</p> <p><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 <sup>a</sup> 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></p>
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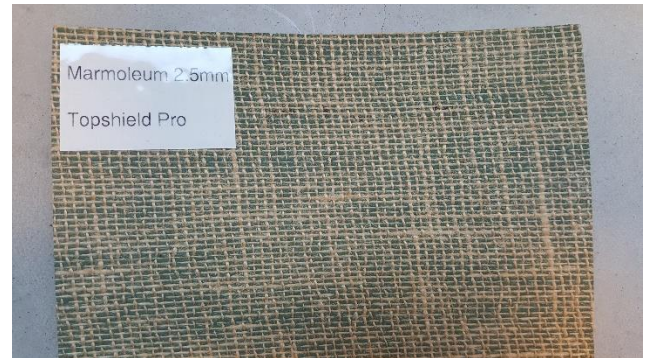
**Product description**  
*Product omschrijving*

1	<b>Product details:</b> <i>Product details:</i>	Product identity: Marmoleum Real 2.5 mm Topshield Pro Product type: Resilient floor covering
2	<b>Other:</b> <i>Andere:</i>	Test sample(s), as well sample information, description, product details and intended usage was provided by customer.
3	<b>Test sample obtaining:</b> <i>Selectie van het proefstuk:</i>	<input checked="" type="checkbox"/> Sending by customer <input type="checkbox"/> Sampling by TÜV Rheinland Group <input type="checkbox"/> others:

Figure 1: Picture of the received sample (surface)



Figure 2: Picture of the received sample (back)



<b>Test report no.: 89218788 001</b> Testrapport nr.:			
<b>Clause</b> Deel	<b>Requirements - Tests /</b> Vereisten - Tests	<b>Measuring results – Remarks</b> Meetresultaten – Opmerkingen	<b>Result</b> Resultaat

<b>1</b>	<b>Construction data (indicative) of the product obtained by the testlaboratory after pre-conditioning</b> 01-4.3-P.02-322-WI01		
	Test condition	23 ± 2°C and 50 ± 4% relative humidity	
	Pre conditioning, duration	≥ 48 h & until constant mass is achieved	
	Total thickness (mm)	20.7	
	Total mass (g/m <sup>2</sup> )	14965	
	Density (kg/m <sup>3</sup> )	723	
	<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>		

<b>2</b>	<b>Ignitability of products subjected to direct impingement of flame</b> EN ISO 11925-2:2020 <sup>a</sup>						
	Date of testing	18.11.2021					
	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 <sup>3</sup> conforming to EN 13238:2018					
	Flame application	Surface					
	Flame application time (s)	15					
	Measurement uncertainty	Caused by the destructive nature of the test and pass/fail result no measurement uncertainty can be determined. Based on the validation of the test procedure and measurement set-up there is a presumption of conformity established which is approved with ISO 17025 accreditation.					
	Requirements according EN 13501-1	See clause 5 of this report					
	<b>Test result(s)</b>						
	Orientation	Length			Width		
	Test sample	1	2	3	1	2	3
	Ignition of the sample	Yes	Yes	Yes	Yes	Yes	Yes
	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)	44	40	45	47	45	45
	Extent of damaged area, width (mm)	10	10	10	12	12	12
	Material melts	Yes	Yes	Yes	Yes	Yes	Yes
	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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<b>Clause</b> Deel	<b>Requirements - Tests /</b> Vereisten - Tests	<b>Measuring results – Remarks</b> Meetresultaten – Opmerkingen	<b>Result</b> Resultaat

<b>3</b>	<b>Determination of the burning behaviour using a radiant heat source</b> EN ISO 9239-1:2010 <sup>a</sup>					
	Date of testing	04.05.2021				
	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 <sup>3</sup> conforming to EN 13238:2018				
	Fixing method	The samples are glued to the substrate with Eurocol 611.				
	Measurement uncertainty	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 "Precision of the test method". Based on the validation of the test procedure and measurement set-up there is a presumption of conformity established which is approved with ISO 17025 accreditation.				
	Requirements according EN 13501-1	See clause 5 of this report				
	<b>Test result(s)</b>					
	Test sample	1	2	3	4	Mean
	Orientation (Length: ↑, Width: T)	↑	T	T	T	T
	Flame spread (cm)	40	41	43	41	<b>42</b>
	CHF / HF-30 (kW/m <sup>2</sup> )	5.5	5.3	4.9	5.3	<b>5.2</b>
	Maximum light attenuation (%)	74.7	77.1	72.6	80.4	<b>76.7</b>
Smoke production (%.min)	289	314	338	336	<b>329</b>	
Observations: Specimen 1, 2, 3 and 4: No flashing, transitory- or sustained flaming are observed. Specimen 1, 2, 3 and 4: Extinguished naturally before the end of the test duration.						

<b>4</b>	<b>Classification of burning behaviour</b> EN 13501-1:2018 <sup>a</sup>				
	The product, <b>Marmoleum Real 2.5 mm Topshield Pro</b> , in relation to its reaction to fire behaviour is classified:				<b>C<sub>fl</sub></b>
	The additional classification in relation to smoke production is:				<b>s1</b>
	<b>Reaction to fire classification : C<sub>fl</sub> – s1</b>				
	Field of application <ul style="list-style-type: none"> <li>- As a floor covering in accordance with the nominal product parameters given on page 3.</li> <li>- On end use substrates of wood and of classes A1 and A2-s1,d0 according to EN 13238:2010.</li> <li>- Glued down with Eurocol 611.</li> </ul>				
Statements <ul style="list-style-type: none"> <li>- This document does not represent type approval or certification of the product.</li> <li>- 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.</li> <li>- The validity of this report will expire directly after alterations or modifications of the examined product (combination)(s) and/or the criteria.</li> </ul>					

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Clause Deel	Requirements - Tests / Vereisten - Tests	Measuring results – Remarks Meetresultaten – Opmerkingen	Result Resultaat
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5	<b>Potential classes of reaction to fire performance for floorings</b> EN 13501-1:2018			
	Class	Test method(s)	Classification criteria	Additional classifications
	A1 <sub>fl</sub>	EN ISO 1182 <sup>a</sup> 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	$PCS \leq 2.0 \text{ MJ/kg}$ <sup>a</sup> and $PCS \leq 2.0 \text{ MJ/m}^2$ <sup>b</sup> and $PCS \leq 1.4 \text{ MJ/m}^2$ <sup>c</sup> and $PCS \leq 2.0 \text{ MJ/kg}$ <sup>d</sup>	-
	A2 <sub>fl</sub>	EN ISO 1182 <sup>a</sup> 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	$PCS \leq 3.0 \text{ MJ/kg}$ <sup>a</sup> and $PCS \leq 4.0 \text{ MJ/m}^2$ <sup>b</sup> and $PCS \leq 4.0 \text{ MJ/m}^2$ <sup>c</sup> and $PCS \leq 3.0 \text{ MJ/kg}$ <sup>d</sup>	-
		EN ISO 9239-1 <sup>e</sup>	$CHF \geq 8.0 \text{ kW/m}^2$	Smoke production <sup>g</sup>
	B <sub>fl</sub>	EN ISO 9239-1 <sup>e</sup> and	$CHF \geq 8.0 \text{ kW/m}^2$	Smoke production <sup>g</sup>
		EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-
	C <sub>fl</sub>	EN ISO 9239-1 <sup>e</sup> and	$CHF \geq 4.5 \text{ kW/m}^2$	Smoke production <sup>g</sup>
		EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-
	D <sub>fl</sub>	EN ISO 9239-1 <sup>e</sup> and	$CHF \geq 3.0 \text{ kW/m}^2$	Smoke production <sup>g</sup>
		EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-
E <sub>fl</sub>	EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s \leq 150 \text{ mm}$ within 20 s	-	
F <sub>fl</sub>	EN ISO 11925-2 <sup>h</sup> : Exposure = 15 s	$F_s > 150 \text{ mm}$ within 20 s	-	
<sup>a</sup> For homogeneous products and substantial components of non-homogeneous products. <sup>b</sup> For any external non-substantial component of non-homogeneous products. <sup>c</sup> For any internal non-substantial component of non-homogeneous products. <sup>d</sup> For the product as a whole. <sup>e</sup> Test duration = 30 min. <sup>f</sup> 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). <sup>g</sup> s1 = Smoke $\leq 750 \%$ minutes; s2 = not s1. <sup>h</sup> Under conditions of surface flame attack and, if appropriate to the end use application of the product, edge flame attack.				

Report produced with the Fire Testing Technology FRPSoft software

page 1

## Flooring Radiant Panel Single Specimen Report

Standard : EN ISO 9239-1:2010  
Laboratory : TÜV Rheinland Nederland B.V.  
Sponsor : Forbo 89218788 MT 21-218788.09  
Date of test : May 04 2021

Specimen description : Marmoleum Real 25 mm 39575-25  
Test name : Prod # 1  
File name : D:\FRPFILES\21050013.CSV  
Test number in series : 4

Flux calibration file name : C:\FRPSOFT2.9A\CALIB\FLX21002.CSV

Thickness (mm) : 20.7  
Density (kg/m<sup>3</sup>) : 723

Test duration : 14 minutes 34 seconds (874 s)  
Substrate used? : Yes  
Substrate : Particle board  
Fixing method : adhesive  
Conditioned? : Yes  
Conditioning temp. (°C) : 23  
Conditioning RH (%) : 50

### Test Results

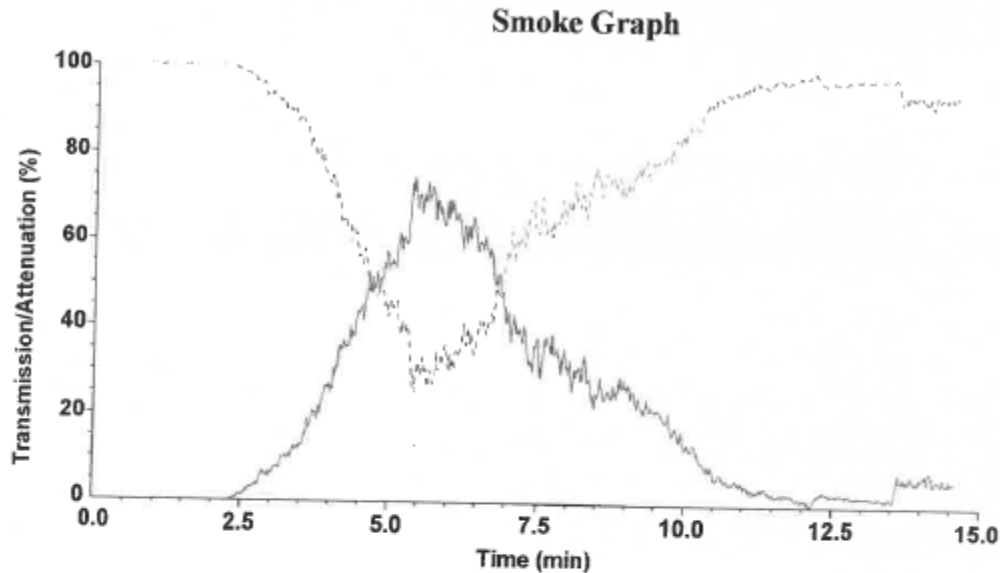
Time to ignition : 2 minutes 04 seconds (124 s)  
Time to flameout : 14 minutes 32 seconds (872 s)  
Extent of burning (mm) : 400  
Critical flux at extinguishment (kW/m<sup>2</sup>) : 5.46  
HF-10 (kW/m<sup>2</sup>) : 6.08  
HF-20 (kW/m<sup>2</sup>) : Not calculated (test duration < 20 minutes)  
HF-30 (kW/m<sup>2</sup>) : Not calculated (test duration < 30 minutes)  
Flame spread at 10 minutes (mm) : 370  
Flame spread at 20 minutes (mm) : Not measured  
Flame spread at 30 minutes (mm) : Not measured  
Peak light attenuation (%) : 74.66  
Time to peak light attenuation : 5 minutes 25 seconds (325 s)  
Total integrated smoke (%.min) : 289.08

**Potential classification** : **C(0)**  
**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.

Report produced with the Fire Testing Technology FRPSoft software

page 2



Test name : Prod # 1  
 File name : D:\FRPFILES\21050013.CSV

### Rake Results

Position (mm)	Time (s)	Flux (kW/m <sup>2</sup> )	Qsb (MJ/m <sup>2</sup> )	Position (mm)	Time (s)	Flux (kW/m <sup>2</sup> )	Qsb (MJ/m <sup>2</sup> )
60	183	11.1	2.031	510	-	3.7	-
110	228	10.5	2.385	560	-	3.1	-
160	270	9.9	2.682	610	-	2.7	-
210	303	9.3	2.814	660	-	2.3	-
260	344	8.3	2.858	710	-	2.0	-
310	394	7.4	2.912	760	-	1.7	-
360	486	6.3	3.053	810	-	1.5	-
410	-	5.3	-	860	-	1.4	-
460	-	4.4	-	910	-	1.3	-

### 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.



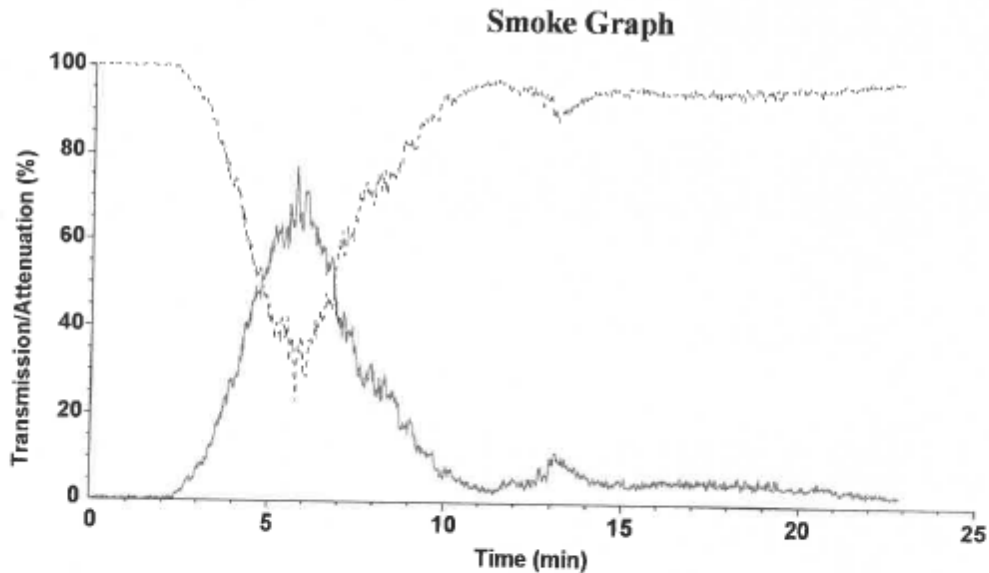
## Flooring Radiant Panel Single Specimen Report

Standard	: EN ISO 9239-1:2010
Laboratory	: TÜV Rheinland Nederland B.V.
Sponsor	: Forbo 89218788 MT 21-218788.09
Date of test	: May 04 2021
Specimen description	: Marmoleum Real 25 mm 39575-25
Test name	: Cross # 2
File name	: D:\FRPFILES\21050014.CSV
Test number in series	: 4
Flux calibration file name	: C:\FRPSOFT2.9A\CALIB\FLX21002.CSV
Thickness (mm)	: 20.7
Density (kg/m <sup>3</sup> )	: 723
Test duration	: 22 minutes 51 seconds (1371 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 (120 s)
Time to flameout	: 22 minutes 49 seconds (1369 s)
Extent of burning (mm)	: 410
Critical flux at extinguishment (kW/m <sup>2</sup> )	: 5.25
HF-10 (kW/m <sup>2</sup> )	: 6.50
HF-20 (kW/m <sup>2</sup> )	: 5.46
HF-30 (kW/m <sup>2</sup> )	: Not calculated (test duration < 30 minutes)
Flame spread at 10 minutes (mm)	: 350
Flame spread at 20 minutes (mm)	: 400
Flame spread at 30 minutes (mm)	: Not measured
Peak light attenuation (%)	: 77.05
Time to peak light attenuation	: 5 minutes 46 seconds (346 s)
Total integrated smoke (%.min)	: 314.32
<b>Potential classification</b>	<b>: C(II)</b>
<b>Smoke production classification</b>	<b>: s1</b>

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.



Test name : Cross # 2  
 File name : D:\FRPFILES\21050014.CSV

### Rake Results

Position (mm)	Time (s)	Flux (kW/m <sup>2</sup> )	Qsb (MJ/m <sup>2</sup> )	Position (mm)	Time (s)	Flux (kW/m <sup>2</sup> )	Qsb (MJ/m <sup>2</sup> )
60	185	11.1	2.053	510	-	3.7	-
110	226	10.5	2.364	560	-	3.1	-
160	262	9.9	2.603	610	-	2.7	-
210	314	9.3	2.916	660	-	2.3	-
260	346	8.3	2.875	710	-	2.0	-
310	404	7.4	2.986	760	-	1.7	-
360	632	6.3	3.970	810	-	1.5	-
410	1236	5.3	6.490	860	-	1.4	-
460	-	4.4	-	910	-	1.3	-

### 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.

## Flooring Radiant Panel Single Specimen Report

Standard	: EN ISO 9239-1:2010
Laboratory	: TÜV Rheinland Nederland B.V.
Sponsor	: Forbo 89218788 MT 21-218788.09
Date of test	: May 04 2021
Specimen description	: Marmoleum Real 25 mm 39575-25
Test name	: Cross # 3
File name	: D:\FRPFILES\21050015.CSV
Test number in series	: 4
Flux calibration file name	: C:\FRPSOFT2.9A\CALIB\FLX21002.CSV
Thickness (mm)	: 20.7
Density (kg/m <sup>3</sup> )	: 723
Test duration	: 25 minutes 51 seconds (1551 s)
Substrate used?	: Yes
Substrate	: Particle board
Fixing method	: adhesive
Conditioned?	: Yes
Conditioning temp. (°C)	: 23
Conditioning RH (%)	: 50

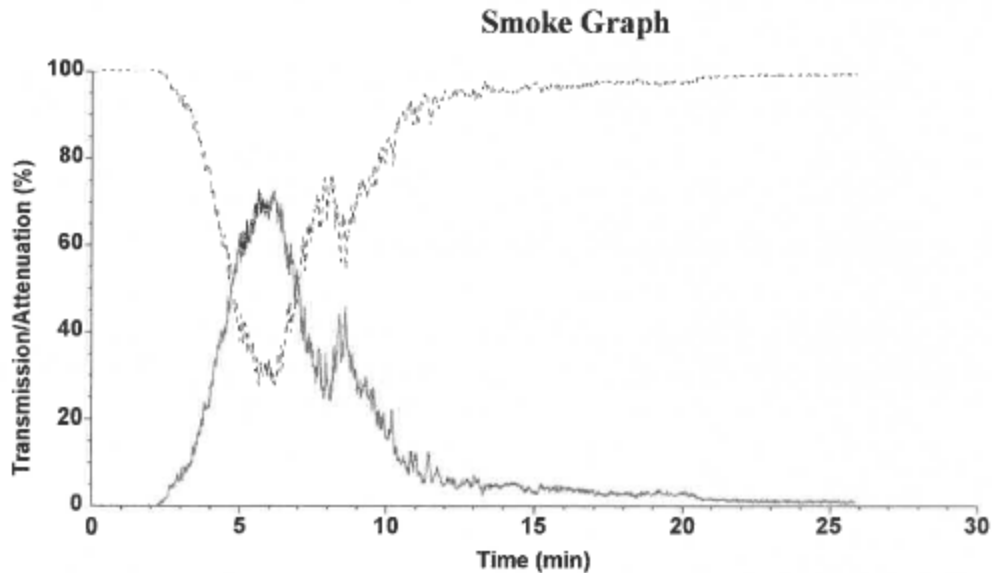
### Test Results

Time to ignition	: 2 minutes 03 seconds (123 s)
Time to flameout	: 25 minutes 48 seconds (1548 s)
Extent of burning (mm)	: 430
Critical flux at extinguishment (kW/m <sup>2</sup> )	: 4.92
HF-10 (kW/m <sup>2</sup> )	: 6.28
HF-20 (kW/m <sup>2</sup> )	: 4.92
HF-30 (kW/m <sup>2</sup> )	: Not calculated (test duration < 30 minutes)
Flame spread at 10 minutes (mm)	: 360
Flame spread at 20 minutes (mm)	: 430
Flame spread at 30 minutes (mm)	: Not measured
Peak light attenuation (%)	: 72.63
Time to peak light attenuation	: 5 minutes 38 seconds (338 s)
Total integrated smoke (%.min)	: 338.08
<b>Potential classification</b>	<b>: C(fl)</b>
<b>Smoke production classification</b>	<b>: s1</b>

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.

Report produced with the Fire Testing Technology FRPSoft software

page 2



Test name : Cross # 3  
File name : D:\FRPFILES\21050015.CSV

### Rake Results

Position (mm)	Time (s)	Flux (kW/m <sup>2</sup> )	Qsb (MJ/m <sup>2</sup> )	Position (mm)	Time (s)	Flux (kW/m <sup>2</sup> )	Qsb (MJ/m <sup>2</sup> )
60	194	11.1	2.153	510	-	3.7	-
110	275	10.5	2.877	560	-	3.1	-
160	277	9.9	2.752	610	-	2.7	-
210	290	9.3	2.693	660	-	2.3	-
260	329	8.3	2.734	710	-	2.0	-
310	389	7.4	2.875	760	-	1.7	-
360	572	6.3	3.593	810	-	1.5	-
410	774	5.3	4.064	860	-	1.4	-
460	-	4.4	-	910	-	1.3	-

### 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.

## Flooring Radiant Panel Single Specimen Report

Standard : EN ISO 9239-1:2010  
Laboratory : TÜV Rheinland Nederland B.V.  
Sponsor : Forbo 89218788 MT 21-218788.09  
Date of test : May 04 2021

Specimen description : Marmoleum Real 25 mm 39575-25  
Test name : Cross # 4  
File name : D:\FRPFILES\21050016.CSV  
Test number in series : 4

Flux calibration file name : C:\FRPSOFT2.9A\CALIB\FLX21002.CSV

Thickness (mm) : 20.7  
Density (kg/m<sup>3</sup>) : 723

Test duration : 16 minutes 06 seconds (966 s)  
Substrate used? : Yes  
Substrate : Particle board  
Fixing method : adhesive  
Conditioned? : Yes  
Conditioning temp. (°C) : 23  
Conditioning RH (%) : 50

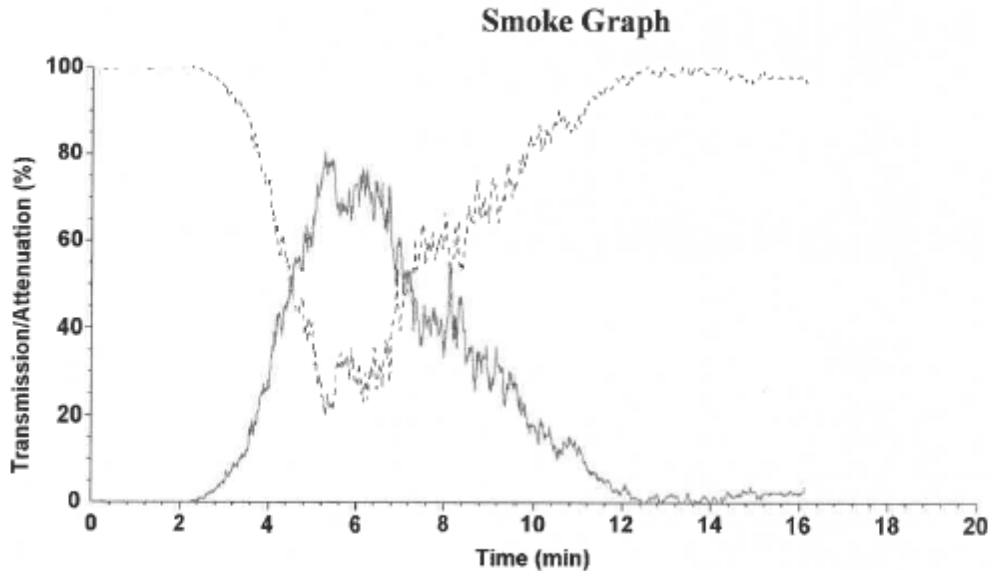
### Test Results

Time to ignition : 2 minutes 03 seconds (123 s)  
Time to flameout : 16 minutes 03 seconds (963 s)  
Extent of burning (mm) : 410  
Critical flux at extinguishment (kW/m<sup>2</sup>) : 5.25  
HF-10 (kW/m<sup>2</sup>) : 5.66  
HF-20 (kW/m<sup>2</sup>) : Not calculated (test duration < 20 minutes)  
HF-30 (kW/m<sup>2</sup>) : Not calculated (test duration < 30 minutes)  
Flame spread at 10 minutes (mm) : 390  
Flame spread at 20 minutes (mm) : Not measured  
Flame spread at 30 minutes (mm) : Not measured  
Peak light attenuation (%) : 80.35  
Time to peak light attenuation : 5 minutes 16 seconds (316 s)  
Total integrated smoke (%.min) : 336.31

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

Report produced with the Fire Testing Technology FRPSoft software

page 2



Test name : Cross # 4  
File name : D:\FRPFILES\21050016.CSV

### Rake Results

Position (mm)	Time (s)	Flux (kW/m <sup>2</sup> )	Qsb (MJ/m <sup>2</sup> )	Position (mm)	Time (s)	Flux (kW/m <sup>2</sup> )	Qsb (MJ/m <sup>2</sup> )
60	198	11.1	2.197	510	-	3.7	-
110	241	10.5	2.521	560	-	3.1	-
160	258	9.9	2.563	610	-	2.7	-
210	282	9.3	2.619	660	-	2.3	-
260	309	8.3	2.567	710	-	2.0	-
310	368	7.4	2.720	760	-	1.7	-
360	480	6.3	3.015	810	-	1.5	-
410	628	5.3	3.298	860	-	1.4	-
460	-	4.4	-	910	-	1.3	-

### 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.