Forbo Flooring BV  
Att. Mr. K. Brocke  
Industrieweg 12  
NL – 1560 AA  
Krommenie  
The Netherlands

Report

Project number : 89204965  
Report number : 89204965.08br

Received:
A sample of floorcovering marked as: “Marmoleum Modular”
TÜV-reference MT14-38835.08
The samples have been received on 20-11-2014.

Product specifications received from the applicant:
Commercial name : Marmoleum Modular
Product type : Linoleum
Total thickness (mm) : 2.5
Total mass per unit area (g/m²) : 2900
Tile size (cm) : 50 x 50
Batch number : 40409
Used adhesive : Eurocol Eurostar Lino Plus 614
Date of fixation : 12-11-2014

Sampling procedure:
The samples are selected by the applicant.
The test house has had no influence on the sampling procedure.

Order:

Test method:
Ignitability : EN ISO 11925-2:2010
Reaction to fire (radiant panel) : EN ISO 9239-1:2010

Results:
See page two and three.

Appendix:
See page four up to and including nine.
TEST RESULTS

➢ Ignitability EN ISO 11925-2:2010

According EN 14041:2004 table 3, these floor coverings are classified as $E_{II}$ (classified without further testing).

Product information:
Floor covering type: Plain & decorative Linoleum, product standard EN 548
Total thickness (mm): 2.5*
Total mass per unit area (g/m²): 2900*
* Information received from the applicant.

➢ Radiant Panel Test EN ISO 9239-1:2010

Date of testing: 1-12-2014 and 9-12-2014
Conditioning time, climate: ≥ 7 days, 23 ± 2 °C and 50 ± 5 % R.H.
Description of substrate: Wooden substrate, received from applicant
Sampling procedure: By applicant
Description of cleaning used: None
Fixing method: Fixed by applicant with Eurocol Eurosafec Cork 530 on 12-11-2014

Note: The tiles are installed in the prescribed installation method therefore there is no orientation.

<table>
<thead>
<tr>
<th>Test specimen</th>
<th>Flame spread (cm)</th>
<th>CRF (kW/m²)</th>
<th>Peak light attenuation (%)</th>
<th>Smoke production (%min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,</td>
<td>32.0</td>
<td>6.9</td>
<td>60.3</td>
<td>366</td>
</tr>
<tr>
<td>2,</td>
<td>31.0</td>
<td>7.1</td>
<td>58.8</td>
<td>311</td>
</tr>
<tr>
<td>3,</td>
<td>33.0</td>
<td>6.7</td>
<td>52.2</td>
<td>336</td>
</tr>
<tr>
<td>Mean</td>
<td>32.0</td>
<td>6.9</td>
<td>57.1</td>
<td>338</td>
</tr>
</tbody>
</table>

Remarks: Flashing, transitory- or sustained flaming observed.
All three tested specimen extinguished naturally before the end of the test.
CONCLUSION

According to EN 13501-1:2007+ A1:2009 the tested sample of the aforementioned quality “Marmoleum Modular”, in relation to its reaction to fire behaviour is classified: C_b.
The additional classification in relation to smoke production is: s1.

The aforementioned quality meets the requirement of reaction to fire classification: C_b – s1

The classification is valid for the following end use applications:
- End use substrates of classes A1 and A2-s1,d0, for example fibre cement board.
- Any way of fixation.

Statements:
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 method might not be suitable if the product is exposed to much larger flames or heat radiant sources.

The validity of this report will expire five years after its issue or directly after alterations or modifications of the examined product (combination)(s) and/or the criteria. This report shall not be reproduced, except in full, without the written approval of the testing laboratory.

This document does not represent type approval or certification of the product.

Author: Mr. J. de Wolff

Review: Mr. R. Boerboom

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# Flooring Radiant Panel Single Specimen Report

## Standard
EN ISO 9239-1:2002

## Laboratory
TÜV Rheinland Nederland B.V.

## Specimen
Forbo Flooring 89207143

## Date of test
Dec. 01 2014

## Specimen description
Marmoleum Modular MT14-38835.68

## Test name
Prod/Cross #1

## File name
D:\FRP\FILES\14120008.CSV

## Test number in series
3

## Flux calibration file name
C:\FRPSOFTWARE\CALIB\FLX14018 CSV

## Thickness (mm)

## Density (kg/m³)

## Test duration
18 minutes 56 seconds (1136 s)

## Substrate used
Yes

## Substrate
Particle board

## Fixing method
none

## Conditioned
Yes

## Conditioning temp. (°C)
23

## Conditioning RH (%)
50

### Test Results

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to ignition</td>
<td>2 minutes 02 seconds (122 s)</td>
</tr>
<tr>
<td>Time to flameout</td>
<td>18 minutes 56 seconds (1136 s)</td>
</tr>
<tr>
<td>Extent of burning (mm)</td>
<td>320</td>
</tr>
<tr>
<td>Critical flux at extinguishment (kW/m²)</td>
<td>6.93</td>
</tr>
<tr>
<td>HF-10 (kW/m²)</td>
<td>7.13</td>
</tr>
<tr>
<td>HF-20 (kW/m²)</td>
<td>10.9</td>
</tr>
<tr>
<td>HF-30 (kW/m²)</td>
<td>10.9</td>
</tr>
<tr>
<td>Flame spread at 10 minutes (mm)</td>
<td>310</td>
</tr>
<tr>
<td>Flame spread at 20 minutes (mm)</td>
<td>1</td>
</tr>
<tr>
<td>Flame spread at 30 minutes (mm)</td>
<td>1</td>
</tr>
<tr>
<td>Peak light attenuation (%)</td>
<td>60.31</td>
</tr>
<tr>
<td>Time to peak light attenuation</td>
<td>7 minutes 39 seconds (459 s)</td>
</tr>
<tr>
<td>Total integrated smoke (% min)</td>
<td>366.2</td>
</tr>
<tr>
<td>Potential classification</td>
<td>C(II)</td>
</tr>
<tr>
<td>Smoke production classification</td>
<td>84</td>
</tr>
</tbody>
</table>

These results relate only to the behaviour of the specimen 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.
APPENDIX I: Flooring Radiant Panel Single Specimen Report

Smoke Graph

Test name: ProdCross #1
File name: D:\FRPFILES\14120098.CSV

Rake Results

<table>
<thead>
<tr>
<th>Position (mm)</th>
<th>Time (s)</th>
<th>Flux (kW/m²)</th>
<th>Q zł (MJ/m²)</th>
<th>Position (mm)</th>
<th>Time (s)</th>
<th>Flux (kW/m²)</th>
<th>Q zł (MJ/m²)</th>
</tr>
</thead>
<tbody>
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<td>60</td>
<td>239</td>
<td>13.3</td>
<td>2.513</td>
<td>510</td>
<td>-</td>
<td>-</td>
<td>3.6</td>
</tr>
<tr>
<td>110</td>
<td>259</td>
<td>10.5</td>
<td>2.950</td>
<td>560</td>
<td>-</td>
<td>-</td>
<td>3.0</td>
</tr>
<tr>
<td>160</td>
<td>345</td>
<td>9.9</td>
<td>3.139</td>
<td>610</td>
<td>-</td>
<td>-</td>
<td>2.5</td>
</tr>
<tr>
<td>210</td>
<td>435</td>
<td>9.1</td>
<td>3.517</td>
<td>660</td>
<td>-</td>
<td>-</td>
<td>2.1</td>
</tr>
<tr>
<td>260</td>
<td>499</td>
<td>8.1</td>
<td>3.560</td>
<td>710</td>
<td>-</td>
<td>-</td>
<td>1.8</td>
</tr>
<tr>
<td>310</td>
<td>569</td>
<td>7.1</td>
<td>3.486</td>
<td>760</td>
<td>-</td>
<td>-</td>
<td>1.5</td>
</tr>
<tr>
<td>360</td>
<td>-</td>
<td>6.1</td>
<td>-</td>
<td>810</td>
<td>-</td>
<td>-</td>
<td>1.3</td>
</tr>
<tr>
<td>410</td>
<td>-</td>
<td>5.2</td>
<td>-</td>
<td>860</td>
<td>-</td>
<td>-</td>
<td>1.2</td>
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<td>460</td>
<td>-</td>
<td>4.3</td>
<td>-</td>
<td>910</td>
<td>-</td>
<td>-</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Comments
Specimen was extinguished manually after end of test.

These results relate only to the behaviour of the specimen 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.
APPENDIX I: Flooring Radiant Panel Single Specimen Report

Flooring Radiant Panel Single Specimen Report

Standard : EN ISO 9239-1:2002
Laboratory : TÜV Rheinland Nederland B.V.
Sponsor : Forbo Floring 89207-143
Date of test : Dec 01 2014
Specimen description : Marmoleum Modular MT14-38835.08
Test name : Prod/Cross #2
File name : D:\FRPFILES\14120099.CSV
Test number in series : 3
Flux calibration file name : C:\FRPFILES\CALIB\FLX14018.CSV

Thickness (mm) : 
Density (kg/m³) :
Test duration : 18 minutes 28 seconds (1108 s)
Substrate used? : Yes
Substrate : Particle board
Fixing method : screw φ6 x 18 cm
Conditioned? : Yes
Conditioning temp. (°C) : 23
Conditioning RH (%): 50

Test Results
Time to ignition : 2 minutes 01 seconds (121 s)
Time to flameout : 18 minutes 26 seconds (1106 s)
Extent of burning (mm) : 310
Critical flux at extinguishment (kW/m²) : 7.13
HF-10 (kW/m²) : 7.13
HF-20 (kW/m²) :
HF-30 (kW/m²) :
Flame spread at 10 minutes (mm) : 310
Flame spread at 20 minutes (mm) :
Flame spread at 30 minutes (mm) :
Peak light attenuation (%) : 58.27
Time to peak light attenuation : 7 minutes 22 seconds (442 s)
Total integrated smoke (%,mm) : 310.92
Potential classification : C(II)
Smoke production classification : VI

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 sole criteria for assessing the potential fire hazards of the product as a whole.
APPENDIX I: Flooring Radiant Panel Single Specimen Report

Smoke Graph

Test name: Prod/Cross #2
File name: D:\FR\FILES\1412009.CSV

Rake Results

<table>
<thead>
<tr>
<th>Position (mm)</th>
<th>Time (s)</th>
<th>Flux (kW/m²)</th>
<th>Qah (MJ/m²)</th>
<th>Position (mm)</th>
<th>Time (s)</th>
<th>Flux (kW/m²)</th>
<th>Qah (MJ/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>237</td>
<td>11.3</td>
<td>2.402</td>
<td>510</td>
<td>-</td>
<td>3.6</td>
<td>-</td>
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<tr>
<td>110</td>
<td>281</td>
<td>10.5</td>
<td>2.772</td>
<td>560</td>
<td>-</td>
<td>3.0</td>
<td>-</td>
</tr>
<tr>
<td>160</td>
<td>321</td>
<td>9.9</td>
<td>2.920</td>
<td>610</td>
<td>-</td>
<td>2.5</td>
<td>-</td>
</tr>
<tr>
<td>210</td>
<td>388</td>
<td>9.1</td>
<td>3.117</td>
<td>660</td>
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<td>2.1</td>
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</tr>
<tr>
<td>260</td>
<td>440</td>
<td>8.1</td>
<td>3.19</td>
<td>710</td>
<td>-</td>
<td>1.8</td>
<td>-</td>
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<tr>
<td>310</td>
<td>499</td>
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<td>3.037</td>
<td>760</td>
<td>-</td>
<td>1.5</td>
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</tr>
<tr>
<td>360</td>
<td>-</td>
<td>6.1</td>
<td>-</td>
<td>810</td>
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<td>1.3</td>
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</tr>
<tr>
<td>410</td>
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<td>1.2</td>
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<td>460</td>
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<td>4.3</td>
<td>-</td>
<td>910</td>
<td>-</td>
<td>1.1</td>
<td>-</td>
</tr>
</tbody>
</table>

Comments
Specimen extinguished naturally.

These results relate only to the behaviour of the specimen of the product under the particular conditions of the test; they are not intended to be the sole criteria for assessing the potential fire hazards of the product in use.
APPENDIX I: Flooring Radiant Panel Single Specimen Report

Flooring Radiant Panel Single Specimen Report

Standard : EN ISO 9239-1:2002
Laboratory : TÜV Rheinland Nederland B.V.
Sponsor : Forbo Flooring 89207143
Date of test : Dec. 01 2014
Specimen description : Marmoleum Modular MT14-38835.68
Test name : CrossFlap #3
File name : DA4RFPLWEN1412001010.CSV
Test number in series : 3
Flux calibration file name : C:\\ARPSOFT\\CALIBFLX14018.CSV
Thickness (mm) :
Density (kg/m³) :
Test duration : 20 minutes 38 seconds (1238 s)
Substrate used? : Yes
Substrate : Particle board
Fixing method : none
Conditioned? : Yes
Conditioning temp. (°C) : 23
Conditioning RH (%) : 50

Test Results
Time to ignition : 2 minutes 01 seconds (121 s)
Time to flameout : 20 minutes 35 seconds (1235 s)
Extent of burning (mm) : 330
Critical flux at extinguishment (kW/m²) : 6.73
HF-10 (kW/m²) : 6.73
HF-20 (kW/m²) : 6.73
HF-30 (kW/m²) : 6.73
Flame spread at 10 minutes (mm) : 330
Flame spread at 20 minutes (mm) : 330
Flame spread at 30 minutes (mm) : 1
Peak light attenuation (%) : 52.19
Time to peak light attenuation : 5 minutes 17 seconds (317 s)
Total integrated smoke (%, mm) : 336.08
Potential classification : C(0)
Smoke production classification : 31

These results relate only to the behaviour of the specimen of the product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential for hazard of the product in use.
APPENDIX I: Flooring Radiant Panel Single Specimen Report

Smoke Graph

Test name : Cross Prod #3
File name : D:\FRFiles\14120010, CSV

Rake Results

<table>
<thead>
<tr>
<th>Position (mm)</th>
<th>Time (s)</th>
<th>Flux (kW/m²)</th>
<th>Qob (MJ/m²)</th>
<th>Position (mm)</th>
<th>Time (s)</th>
<th>Flux (kW/m²)</th>
<th>Qob (MJ/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
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<tr>
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<td></td>
<td>1.1</td>
<td>-</td>
</tr>
</tbody>
</table>

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 criteria for assessing the potential fire hazard of the product in use.