TÜV Rheinland Nederland B.V.

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Forbo Flooring Coral N.V.
Att.: Mr. R. Koomen
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1560 AA
KROMMENIE
The Netherlands

Report

Project number : 89202643
Report number : 89202643.04br

Received:
A sample of floor covering, entrance mat, marked as: **"Coral DuoFR"**;
TÜV sample reference: MT12-36545.04.

Request:
Classification of burning behaviour according to EN 13501-1:2007.

Test method:

Identification parameters	: EN 1307.
Ignitability (direct impingement of flame)	: EN ISO 11925-2.
Reaction to fire (radiant panel)	: EN ISO 9239-1.

Results:
See page two up to and including three.

Appendix:
See page four up to and including eleven.

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.

Date
14 December, 2012

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Report number
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Article
Coral Duo FR

Appendix
I : Flooring Radiant Panel Single Specimen Report – 8 pages

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TEST RESULTS

➢ *Identification parameters EN 1307:2008*

Type of manufacture	: Tufted
Type of pile	: Cut pile
Type of use surface	: Patterned effect
Type of secondary backing	: Latex backing (synthetic)*
Pile Fibre	: 100% PA*
Total mass per unit area g/m^2	: 2281
Effective pile mass, g/m^2	: 409
Total thickness, mm	: 8.9
Thickness of the pile, mm	: 5.4
Pile density, g/cm^3	: 0.075
Gauge (G), inch	: 3/16
Stitches/10 cm	: 25.0
Number of tufts/m^2	: 31,470

* = manufacturer's declaration

➢ *Ignitability EN-ISO 11925-2:2010*

Conditioning time, climate	: 6 days, 23 ± 2 °C and 50 ± 5 %
Date of testing	: 29-10-2012
Description of substrate	: 6 mm. Fibre cement board, 1800 kg/m^3.
Flame application	: Surface.
Application time	: 15 seconds.

Direction:	In production			Across production		
Total burning time[1](15 s)	15	15	15	15	15	15
Flame tip reaches 150 mm (s)	no	no	no	no	no	no
Extent of damaged area, length (mm)	75	81	80	80	84	75
Extent of damaged area, width (mm)	11	11	12	12	12	10
Material melts (yes/no)	yes	yes	yes	yes	yes	yes
Shrinks away[2] (yes/no)	no	no	no	no	no	no
Glowing[3](sec)	no	no	no	no	no	no
Flaming debris (yes/no)	no	no	no	no	no	no
Ignition of filter paper (yes/no)	no	no	no	no	no	no

1 Inclusive a flame application time of 15 or 30 seconds with surface or edge impingement
2 Shrinks away from flame without being ignited
3 The time at which it occurs and its duration

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TEST RESULTS – follow-up

➢ *Radiant Panel test ISO 9239-1:2010*

Date of testing	: 29-10-2012 (1+2) and 05-11-2012 (3+4)
Conditioning time, climate	: 4 days, 23 ± 2 °C and 50 ± 5 %
Description of substrate	: Fibre cement board, 8±2 mm ,1800±200 kg/m^3 conforming to EN 13238.
Sampling procedure	: By contractor.
Description of cleaning used	: None.
Fixing method	: None, loose laid.

Test specimen, orientation	Flame spread (cm)	CRF (kW/m^2)	Peak light attenuation (%)	Smoke production (%.min)
1, ⊥	6.0	10.7	1.2	4
2, ↑	11.0	10.2	1.8	4
3, ↑	15.0	9.6	2.1	5
4, ↑*	15.0	9.6	6.6	17
Mean	**13.7**	**9.8**	**3.5**	**9**

Remarks: No flashing, transitory- or sustained flaming,
All specimen extinguished naturally
Flame spreads faster in the 'path' of the coarse black yarn.

CONCLUSION

According to EN 13501-1:2007 the tested sample of the aforementioned quality **Coral Duo FR**, meets the requirements of **Class B_{fl} - s1**.

Author:
Mrs. I. Pierik

Review:
Mr. R. Boerboom

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APPENDIX I: Flooring Radiant Panel Single Specimen Report

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Flooring Radiant Panel Single Specimen Report

Standard	: EN ISO 9239-1:2002
Laboratory	: TÜV Rheinland Nederland B.V.
Sponsor	: Forbo - Coral Duo FR - 89202643 - ipk
Date of test	: Oct. 29 2012
Specimen description	: MT12-36545.04
Test name	: Across #1
File name	: D:\FRPFILES\12100045.CSV
Test number in series	: 4
Flux calibration file name	: C:\FRPSOFT\CALIB\FLX12012.CSV
Thickness (mm)	:
Density (kg/m³)	:
Test duration	: 12 minutes 20 seconds (740 s)
Substrate used?	: Yes
Substrate	: Calcium silicate
Fixing method	: none
Conditioned?	: Yes
Conditioning temp. (°C)	: 23
Conditioning RH (%)	: 50

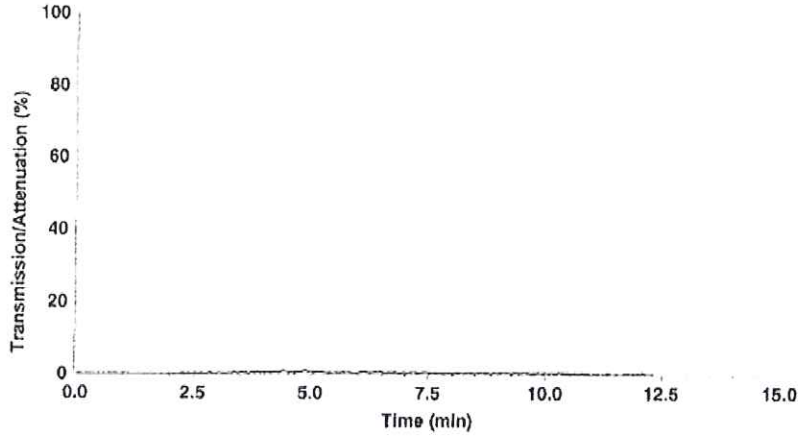
Test Results

Time to ignition	: 2 minutes 10 seconds (130 s)
Time to flameout	: 12 minutes 18 seconds (738 s)
Extent of burning (mm)	: 60
Critical flux at extinguishment (kW/m²)	: >= 10.9
HF-10 (kW/m²)	: 10.66
HF-20 (kW/m²)	: >= 10.9
HF-30 (kW/m²)	: >= 10.9
Flame spread at 10 minutes (mm)	: 60
Flame spread at 20 minutes (mm)	: -1
Flame spread at 30 minutes (mm)	: -1
Peak light attenuation (%)	: 1.2
Time to peak light attenuation	: 4 minutes 53 seconds (293 s)
Total integrated smoke (%.min)	: 4.49
Potential classification	**: A2(fl)/B(fl)**
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.

APPENDIX I: Flooring Radiant Panel Single Specimen Report

Smoke Graph



Test name : Across #1
File name : D:\FRPFILES\12100045.CSV

Rake Results

Position (mm)	Time (s)	Flux (kW/m²)	Qsb (MJ/m²)	Position (mm)	Time (s)	Flux (kW/m²)	Qsb (MJ/m²)
60	421	10.7	4.226	510	-	3.6	-
110	-	10.0	-	560	-	3.0	-
160	-	9.5	-	610	-	2.5	-
210	-	8.9	-	660	-	2.1	-
260	-	7.9	-	710	-	1.8	-
310	-	6.9	-	760	-	1.6	-
360	-	6.0	-	810	-	1.4	-
410	-	5.1	-	860	-	1.3	-
460	-	4.2	-	910	-	1.2	-

Comments

Specimen extinguished naturally.

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Flooring Radiant Panel Single Specimen Report

Standard	: EN ISO 9239-1:2002
Laboratory	: TÜV Rheinland Nederland B.V.
Sponsor	: Forbo - Coral Duo FR - 89202643 - ipk
Date of test	: Oct. 29 2012
Specimen description	: MT12-36545.04
Test name	: Prod #1
File name	: D:\FRPFILES\12100044.CSV
Test number in series	: 4
Flux calibration file name	: C:\FRPSOFT\CALIB\FLX12012.CSV
Thickness (mm)	:
Density (kg/m³)	:
Test duration	: 12 minutes 11 seconds (731 s)
Substrate used?	: Yes
Substrate	: Calcium silicate
Fixing method	: none
Conditioned?	: Yes
Conditioning temp. (°C)	: 23
Conditioning RH (%)	: 50

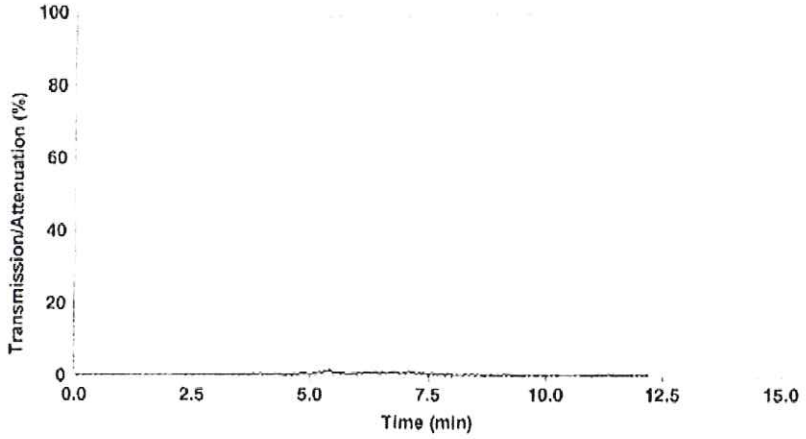
Test Results

Time to ignition	: 2 minutes 01 seconds (121 s)
Time to flameout	: 12 minutes 08 seconds (728 s)
Extent of burning (mm)	: 110
Critical flux at extinguishment (kW/m²)	: 10.04
HF-10 (kW/m²)	: 10.16
HF-20 (kW/m²)	: >= 10.9
HF-30 (kW/m²)	: >= 10.9
Flame spread at 10 minutes (mm)	: 100
Flame spread at 20 minutes (mm)	: -1
Flame spread at 30 minutes (mm)	: -1
Peak light attenuation (%)	: 1.79
Time to peak light attenuation	: 5 minutes 25 seconds (325 s)
Total integrated smoke (%.min)	: 4.16
Potential classification	**: A2(fl)/B(fl)**
Smoke production classification	**: s1**

These results relate only to the behaviour of the specimens of the product under the part cular 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 : Prod #1
File name : D:\FRPFILES\12100044.CSV

Rake Results

Position (mm)	Time (s)	Flux (kW/m²)	Qsb (MJ/m²)	Position (mm)	Time (s)	Flux (kW/m²)	Qsb (MJ/m²)
60	339	10.7	3.403	510	-	3.6	-
110	650	10.0	6.193	560	-	3.0	-
160	-	9.5	-	610	-	2.5	-
210	-	8.9	-	660	-	2.1	-
260	-	7.9	-	710	-	1.8	-
310	-	6.9	-	760	-	1.6	-
360	-	6.0	-	810	-	1.4	-
410	-	5.1	-	860	-	1.3	-
460	-	4.2	-	910	-	1.2	-

Comments

Specimen extinguished naturally.

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Flooring Radiant Panel Single Specimen Report

Standard	: EN ISO 9239-1:2002
Laboratory	: TÜV Rheinland Nederland B.V.
Sponsor	: Forbo - 89202643 - Coral Duo FR - IPK
Date of test	: Nov. 05 2012
Specimen description	: MT12-36545.04
Test name	: Prod #2
File name	: D:\FRPFILES\12110007.CSV
Test number in series	: 4
Flux calibration file name	: C:\FRPSOFT\CALIB\FLX12012.CSV
Thickness (mm)	:
Density (kg/m³)	:
Test duration	: 12 minutes 17 seconds (737 s)
Substrate used?	: Yes
Substrate	: Calcium silicate
Fixing method	: none
Conditioned?	: Yes
Conditioning temp. (°C)	: 23
Conditioning RH (%)	: 50

Test Results

Time to ignition	: 2 minutes 02 seconds (122 s)
Time to flameout	: 12 minutes 14 seconds (734 s)
Extent of burning (mm)	: 150
Critical flux at extinguishment (kW/m²)	: 9.63
HF-10 (kW/m²)	: 9.63
HF-20 (kW/m²)	: >= 10.9
HF-30 (kW/m²)	: >= 10.9
Flame spread at 10 minutes (mm)	: 150
Flame spread at 20 minutes (mm)	: -1
Flame spread at 30 minutes (mm)	: -1
Peak light attenuation (%)	: 2.12
Time to peak light attenuation	: 7 minutes 39 seconds (459 s)
Total integrated smoke (%.min)	: 5.25
Potential classification	**: A2(fl)/B(fl)**
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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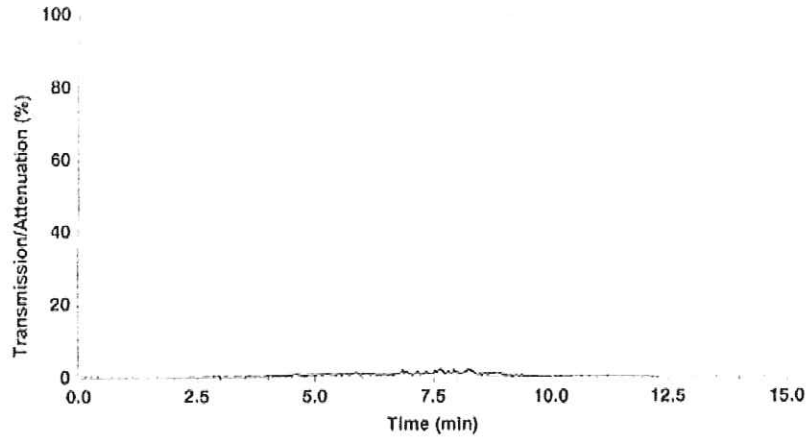
Smoke Graph



Test name : Prod #2
File name : D:\FRPFILES\12110007.CSV

Rake Results

Position (mm)	Time (s)	Flux (kW/m²)	Qsb (MJ/m²)	Position (mm)	Time (s)	Flux (kW/m²)	Qsb (MJ/m²)
60	323	10.7	3.242	510	-	3.6	-
110	391	10.0	3.725	560	-	3.0	-
160	-	9.5	-	610	-	2.5	-
210	-	8.9	-	660	-	2.1	-
260	-	7.9	-	710	-	1.8	-
310	-	6.9	-	760	-	1.6	-
360	-	6.0	-	810	-	1.4	-
410	-	5.1	-	860	-	1.3	-
460	-	4.2	-	910	-	1.2	-

Comments

Specimen extinguished naturally.

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Flooring Radiant Panel Single Specimen Report

Standard	: EN ISO 9239-1:2002
Laboratory	: TÜV Rheinland Nederland B.V.
Sponsor	: Forbo - 89202643 - Coral Duo FR - IPK
Date of test	: Nov. 05 2012
Specimen description	: MT12-36545.04
Test name	: Prod #3
File name	: D:\FRPFILES\12110008.CSV
Test number in series	: 4
Flux calibration file name	: C:\FRPSOFT\CALIB\FLX12012.CSV
Thickness (mm)	:
Density (kg/m³)	:
Test duration	: 12 minutes 19 seconds (739 s)
Substrate used?	: Yes
Substrate	: Calcium silicate
Fixing method	: none
Conditioned?	: Yes
Conditioning temp. (°C)	: 23
Conditioning RH (%)	: 50

Test Results

Time to ignition	: 2 minutes 05 seconds (125 s)
Time to flameout	: 12 minutes 17 seconds (737 s)
Extent of burning (mm)	: 150
Critical flux at extinguishment (kW/m²)	: 9.63
HF-10 (kW/m²)	: 9.73
HF-20 (kW/m²)	: >= 10.9
HF-30 (kW/m²)	: >= 10.9
Flame spread at 10 minutes (mm)	: 140
Flame spread at 20 minutes (mm)	: -1
Flame spread at 30 minutes (mm)	: -1
Peak light attenuation (%)	: 6.64
Time to peak light attenuation	: 8 minutes 10 seconds (490 s)
Total integrated smoke (%.min)	: 17.29
Potential classification	**: A2(fl)/B(fl)**
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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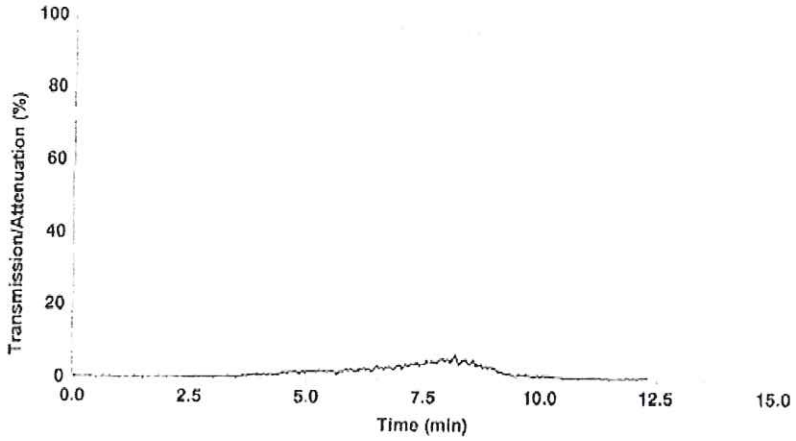
Smoke Graph



Test name : Prod #3
File name : D:\FRPFILES\12110008.CSV

Rake Results

Position (mm)	Time (s)	Flux (kW/m²)	Qsb (MJ/m²)	Position (mm)	Time (s)	Flux (kW/m²)	Qsb (MJ/m²)
60	280	10.7	2.811	510	-	3.6	-
110	415	10.0	3.954	560	-	3.0	-
160	-	9.5	-	610	-	2.5	-
210	-	8.9	-	660	-	2.1	-
260	-	7.9	-	710	-	1.8	-
310	-	6.9	-	760	-	1.6	-
360	-	6.0	-	810	-	1.4	-
410	-	5.1	-	860	-	1.3	-
460	-	4.2	-	910	-	1.2	-

Comments

Specimen extinguished naturally.