



Centre for Fire Research
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TNO report

2004-CVB-R0239(E)

Examination on the reaction to fire and smoke production according to EN ISO 11925-2: 2002 and EN ISO 9239-1: 2002 of Forbo Novilon Viva vinyl floor covering, glued on the standard fibre cement substrate.

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Product:

Forbo Novilon Viva vinyl floor covering, glued on standard fibre cement substrate.

Purpose of tests:

Determination of the ignitability according to EN ISO 11925-2: 2002 and the reaction to fire and smoke production of floor coverings according to EN ISO 9239-1: 2002.

Contractor/manufacturer:

Forbo Novilon B.V.
De Holwert 12
NL-7741 KC COEVORDEN
The Netherlands

Period of examinations:

June - July 2004.

Month of issue and number of the report:

August 2004; 2004-CVB-R0239(E)

Material:

Composition:

Novilon Viva is a heterogeneous PVC floor covering with an overall nominal thickness of 2.4 mm, provided with a 0.25 mm thick top layer and under the toplayer a wood imitation print.

The base of the product is an impregnated glass fleece web. The backing of the product consists of a white mechanical foam.

Dimensions and density (according to info and determined on samples):

Total product thickness: nominally 2.4 mm; determined: 2.4 – 2.5 mm.

Surface density: nominally: 1.75 kg/m²; determined 1.78 kg/m².

Sample:

Sampling:

Sampling was carried out by the contractor.

The received specimens were coded with the numbers 12350 – 8555.

Sample production period:

May 2004.

Date of receipt:

May 27, 2004.

Preparations:

Prior to the examinations on reaction to fire the floor covering samples were glued on standard non-combustible substrate as specified in ISO 390 and EN 13238: 2001 par. 5.1.2 (1800 ± 200 kg/m³ – 6 mm), with the aid of (Forbo 540) vinyl adhesive with an amount of 0.3 to 0.4 kg/m², and thereafter cured for approx. 4 weeks at conditions of 23 ± 2 °C and 50 ± 5 % R.H..

Method of examinations:

The examination on flammability was carried out according to the EN ISO 11925-2: 2002 and the reaction to fire tests - horizontal fire propagation and smoke production of floor coverings - according to the EN-ISO 9239-1: 2002.

With the flammability examination the surface and edge flame application tests were carried out with 15 seconds and 30 seconds.

With the reaction to fire examination on the product at first two tests were carried out in each direction of the product; one on a specimen cut in the production direction and one cut perpendicular to the production direction.

Based on the test result found the examination was continued in the direction with the less positive result with two additional tests.

Test results of EN-ISO 11925-2: 2002 and EN-ISO 9239-1: 2002 examination of 2.4 mm thick Forbo Novilon Viva vinyl floor covering, glued on standard fibre cement substrate.

A - Ignitability – EN-ISO 11925-2 - flame application times of 15 and 30 s.

Test	Reaching or passing the "150 mm limit" within 20 sec.	Max. afterburning after 15 s	Max. flame height at 15 s	Max. burnt / damaged surface (height x width)
	T ₁₅₀ [s]	[s]	mm	mm x mm
<i>Flame application time 15 seconds</i>				
Surface ignition 1 to 6	∞ (6x)	0 (6x)	80 to 90	[70 to 80] x 15
Average	No passing	0	90	80 x 15
Edge ignition 1 to 6	∞ (6x)	0 (6x)	70 to 75	[65 to 70] x 20
Average	No passing	0	75	70 x 20
<i>Flame application time 30 seconds (*)</i>				
Test	Reaching or passing the "150 mm limit" within 60 sec.	Max. afterburning after 30 s	Max. flame height at 30 s	Max. burnt / damaged surface (height x width)
	[s]	[s]	mm	mm x mm
Surface ignition 1 to 6	∞ (6x)	0; 5; 2; 5; 2; 2	110 to 120	[85 to 100] x 20
Average	No passing	0	120	100 x 20
Edge ignition 1 to 6	∞ (6x)	3; 2; 4; 3; 2; 2	90 to 105	[70 to 90] x 30
Average	No passing	0	105	90 x 30

(*) **Remark:** As within EN-ISO 11925-2: 2002 material is tested in a vertical position the "Edge ignition" is respected not to be relevant for floor coverings, when used in horizontal application(s). The "30 seconds" flame application examination was only carried out additionally. It is not a normative requirement within EN 13501-1: 2002.

thick Forbo Novilon Viva vinyl floor covering, glued on standard fibre cement substrate.**B – Horizontal surface flame spread – EN ISO 9239-1:2002.**

Product		Time of		Maximum flame		Critical heat K J/m ² /m	Smoke % m/min
		min	min.	mm	min.		
Cross	1	50	2¼	0.13	5	10.6	93
		100	2¾				
Production	2	50	2¼	0.265	4	7.9	112
		150	2¾				
	3	200	3	0.245	4	8.4	144
		250	3¼				
		50	2¼				
		100	2½				
	4	150	2¾	0.21	2¼	0.2	112
		50	2¼				
	4	100	2½	0.21	2¼	0.2	112
		200	3				
Average values		-	-	0.24	4	8.5	123

(*) Production = specimens cut in the production direction of the floor covering. The tests indicated with Cross, the specimens had been cut perpendicular to the production direction. Depending on the less positive result that was found in either the production direction or the cross direction the examination was carried out completely in the less

Observations during tests: In the first stage up to 3 and 3½ minutes of the tests slight blistering occurred in the flooring surface over the first 240 mm and also ripping of the max.360 mm.

Assessment:

nominal thickness of 2.4 mm and a nominal surface density of 1.75 kg/m², glued with Forbo vinyl adhesive on a non-combustible substrate, fulfils the criteria that have been given for **Euroclass B_{fl,s1}** (requirements: *Meet the flammability criteria of Euroclass B_{fl,s1} have* according to EN 13501-1: 2002.

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Remark 1:

The 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. They are only valid for the use on supports or sub floors which are comparable to the examined one or which are in specifications comparable to the standard fibre cement substrate (ISO 390 - $1800 \pm 200 \text{ kg/m}^3$ - 6 mm) according to § 5.1.2 of EN 13238: 2001.

Also they are not valid if the floor covering is used in combination with combustible supports or substrates.

Remark 2:

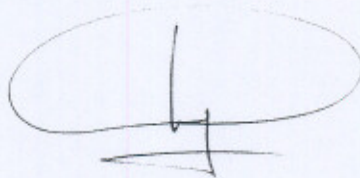
The followed test methods for determining of the "Reaction to fire performance of floorings" according to EN-ISO 11925-2: 2002 and EN-ISO 9239-1: 2002 are similar to the methods of:

A - The German **DIN 4102:1990, Teil 1 & 14**: "Brandverhalten von Baustoffen und Bauteilen; Bodenbeläge und Bodenbeschichtungen; Bestimmung der Flammenausbreitung bei Beanspruchung mit einem Wärmestrahler", by which the examined product met the criteria for Klasse B1, and

B - The Dutch standard **NEN 1775: 1991 + A1/1997**: "Determination of the contribution to fire propagation of floor surfaces - "*Brandvoortplanting van vloeroppervlakken*".

and for the EN-ISO 9239-1: 2002 to

C - The American **ASTM E 648-84/90**: "Standard test method for critical radiant flux of floor covering systems".



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dr. F. Paap

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Graph of the Critical Heat Flux (CHF) examination according to EN ISO 9239-1: 2002 and photograph of Forbo Novilon Viva – 2.4 mm - vinyl floor covering specimens, glued on standard substrate.

