for the proof of fire behaviour according to DIN 4102-1

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PÜZ-Stelle (LBO): BRA09

Reference: FLT 3623817 (Translation of the German Prüfzeugnis - no guarantee for translation of technical terms)

Sponsor: Neschen Coating GmbH
Hans-Neschen-Straße 1
D - 31675 Bückeburg

Order: 2017-04-24 **Arrived:** 2017-04-26

Description of samples: Self-adhesive plastic films for one-sided use on glass surfaces, named
"**solvoprint glass deco frosted**",
"**solvoprint glass deco dusted**",
"**solvoprint glass deco mint**" und
"**solvoprint glass deco rose**".
(for details see page 2)

Delivered: 2017-04-26

Content of request: Proof of flammability to classify building materials to class B1 "schwerentflammbar" according to DIN 4102-1

Assessment: The examined self-adhesive plastic film bonded to glass surfaces on one side meet the requirements of class B1 for "schwerentflammbare" (not easily flammable) building materials according to DIN 4102-1.
(for details see page 5)

Validity: 2022-05-31

Sampling: The samples were sent to the laboratory by the sponsor.

Remark: If the above-mentioned building material is not used as product according to MBO § 2, there is no need for a general building supervisory test certificate.
This test certificate is not valid if the examined building material is used as product in the meaning of state building prescriptions (MBO § 17).

This test certificate does not replace an eventually necessary proof of applicability concerning building supervisory or building laws in the meaning of state building prescriptions. This has to be verified by:

- "allgemeine bauaufsichtliche Zulassung" (general building inspectorate approval) or by
- "allgemeines bauaufsichtliches Prüfzeugnis" (general building inspectorate certificate) or by
- "Zustimmung im Einzelfall" (exceptional approval).

This test certificate can serve as a basis for building supervisory procedures for:

- regulated building products for the pre scribed proofs of conformity
- non-regulated building products for the needed proofs of applicability.

TEST CERTIFICATE

This test certificate comprises 5 pages and 6 appendices.

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1 Description of test material

1.1 Test material (according to the sponsor)

The materials delivered are self-adhesive plastic films consisting of a pvc-soft foil of 80 µm thickness with the designation "frosted", "dusted", "mint" and "rose", a polyacrylate adhesive on the rear side and a polyethylene coated silicone paper liner covering the self-adhesive surface. The are self-adhesive films are intended to be used inside of buildings, bonded onto glass surfaces and were named with the trade names “solvoprint glass deco frosted”, “solvoprint glass deco dusted”, “solvoprint glass deco mint” and “solvoprint glass deco rose”.

1.2 Description of the delivered samples

For the tests the laboratory received 4 sample rolls of self-adhesive plastic films with a white paper liner on the rear side. The samples were marked with the trade name, dimensions and batch and were delivered as follows:

Trade name “solvoprint glass deco …“	Colour	Colour name	Batch	Sample size	
				Length [m]	Width [m]
frosted	transpatent	light silver	595507	30	1,377
dusted		milky-white	598658	5	1,376
mint	minzgrün	pastel mint	598659		
rose	rosa	pastel pink	598661		

Characteristic values: see passage 4.1; photos: see enclosures 1-4
Further details are not known to the laboratory; a retain sample each has been deposited.

2 Preparation of samples

For the tests in the fire shaft (“Brandschacht”) 8 specimens were assembled. The samples (dimensions 1000 mm x 190 mm) for test specimens A, C, E and G were cut in longitudinal direction, the samples for test specimens B, D, F and H were cut in transverse direction of the films. The paper liner was removed and the films were bonded onto 3 mm thick single glass panes of the same size. For the small burner (“Brennkasten”) tests samples have been prepared for edge flame exposure (dimensions 190 mm x 90 mm) and surface flame exposure (dimensions 230 mm x 90 mm) in longitudinal and transversal direction of the material by using the same procedure. All samples were kept in a climate chamber acc. DIN 50014-23/50-2 until they reached constant weight before testing.

3 Arrangement of samples

The tests in the fire shaft (“Brandschacht”) have been performed acc. DIN 4102-1 and -16 (building materials class B1). The small burner tests (“Brennkastenprüfungen”) have been performed acc. DIN 4102-1, chapter 6.2.5 (building materials class B2). No additional substrate was arranged behind the material compound.
Period of testing: Mai 2017

4 Results

- section 4.1 Material characteristics, table 1
- section 4.2.1 Test results class B2, table 2.1 – 2.4
- section 4.2.2 Test results class B1, table 3

4.1 Material characteristics

Table 1

Trade name solvoprint glass deco …	Manufacturer's data		Measured values		
	Weight per unit area [g/m²]	Thickness [mm]	Weight per unit area [g/m²]	Thickness (m.v.) [mm]	[mm]
frosted	./.	./.	134	0,10	0,003
dusted			132	0,11	0,002
mint			128	0,10	0,002
rose			124	0,10	0,002
paper liner	ca. 170	ca. 0,135	148	0,18	./.

m.v. mean value
s standard deviation
./. not received/not measured

4.2 Results of the fire behaviour

4.2.1 Test results class B2 (Brennkasten)

All building materials class B1 must also meet the requirements of materials class B2 (flammable). The material, tested in "Brennkasten" acc. DIN 50 050 meets the requirements class B2; the material did not show burning particles/droplets during these tests.
(Results: see enclosure 5)

4.2.2 Test results class B1 ("Brandschacht")

Table 3

Test results "Brandschachtprüfung" (part 1)										
line no..		Test results								
		A	B	C	D	E	F	G	H	require-ments
1	Number of specimen arrangement acc. DIN 4102 –15 Table 1	1	1	1	1	1	1	1	1	
2	Maximal flame height above bottom edge ..... cm	40	50	50	50	40	40	40	40	*)
3	Time [1] ..... min	2	1	1	1	2	2	2	2	
4	Burning / melting through Time [1] ..... min	./.	./.	./.	./.	./.	./.	./.	./.	
	Back side of the specimens:									
5	Flames / glowing Time [1] ..... min:s	./.	./.	./.	./.	./.	./.	./.	./.	
6	Discolouring Time [1] ..... min:s	./.	./.	./.	./.	./.	./.	./.	./.	
	Falling of burning droplets	No	No	No	No	No	No	No	No	
7	Begin [1] ..... min									
	Extend:									
8	Sporadic falling of burning droplets									
9	Continuous falling of burning droplets									
	Falling of burning parts	No	No	No	No	No	No	No	No	
10	Begin [1] ..... min:s									
	Extend:									
11	Sporadic falling of burning parts									
12	Continuous falling of burning parts									
13	Afterflame time at the bottom of the sieve (max.) ..... min:s	./.	./.	./.	./.	./.	./.	./.	./.	
14	Impairment of the burner flames by dropping or falling Material Time [1] ..... min:s	./.	./.	./.	./.	./.	./.	./.	./.	
	Premature end of test									
15	Final occurrence of burning at the specimen [1] ..... min	10	10	10	10	10	10	10	10	
16	Time of eventually end of test [1] ..... min:s	./.	./.	./.	./.	./.	./.	./.	./.	

[1] Indication of time: from the beginning of testing procedure
- Not tested
. /. Not occurred
*) No cause for complaint

Test results "Brandschachtprüfung" (part 2)										
line no.		Test results								
		A	B	C	D	E	F	G	H	require-ments
17	Afterflame after end of test	No	No	No	No	No	No	No	No	
	Time ..... min:s									
18	Number of specimen									
19	Front side of specimen									
20	Back side of specimen									
21	Flame length .....cm									
	Afterglow after end of test	No	No	No	No	No	No	No	No	
22	Time ..... min:s									
23	Number of specimen									
	Place of appearance:									
24	Lower half of specimen									
25	Upper half of specimen									
26	Front side of specimen									
27	Back side of specimen									
	Smoke density									
28	≤ 400 % min	5,4	10,5	2,3	2,9	1,8	4,6	3,8	3,1	
29	≥ 400 % min (very strong smoke density)	./.	./.	./.	./.	./.	./.	./.	./.	
30	Diagram fig. no.	1	3	5	7	9	11	13	15	
	Residual length									
31	Individual value ..... cm	65	55	55	52	53	55	52	53	
		44	50	53	54	52	54	49	55	
		65	49	54	55	51	56	64	51	> 0
		48	52	52	62	53	58	56	63	
32	Average value ..... cm	**55**	**51**	**53**	**55**	**52**	**55**	**55**	**55**	≥ 15
33	Photo of the test specimen fig. no.	2	4	6	8	10	12	14	16	
	Flue gas temperature									
34	Maximum of average value.°C	107	111	110	112	108	108	115	112	≤ 200
35	Time [1] ..... min:s	9:56	9:48	10:00	9:48	9:48	10:00	10:00	9:58	
36	Diagram fig. no.	1	3	5	7	9	11	13	15	
37	Remarks: line 32: There were no additional tests proceeded because of the residual length of > 45 cm (DIN 4102-16, 5.2 b)).									

[1] indication of time: from the beginning of testing procedure
. /. not occurred
*) no cause for complaint

Test specimen	Test-no.	Trade name: solvoprint glass deco …	Direction of samples	Substrate
A	623817-001	frosted	longitudinal	pane glass
B	623817-002		transversely	
C	623817-003	dusted	longitudinal	
D	623817-004		transversely	
E	623817-005	mint	longitudinal	
F	623817-006		transversely	
G	623817-007	rose	longitudinal	
H	623817-008		transversely	

5 Assessment

According to the test results in section 4.2 the material, described in section 1 and 4.1, fulfils the requirements of a building material class B1 according to DIN 4102-1, if the materials are bonded on one side to single-pane glass, at a distance of the material compound of > 40 mm to the same or other plain materials.

The requirements of building materials class B2 are fulfilled also, no falling of burning parts or droplets occurred during these tests.

The verification

- for outdoor usage (ageing behavior by outdoor weathering)

has not been proved.

6 Special remarks

This certificate is only valid for the material as described under paragraph 1. In combination with other materials or with additional coatings or surfaces etc. the burning behaviour may differ.

This test certificate is not valid, as soon as the product is used as a building product in the sense of the "Landesbauordnungen" (state building requirements, MBO § 17).
This test certificate is no substitute for a General Building Inspectorate Certificate. This test certificate is granted without prejudice to the rights of third parties, or particular private proprietary rights.

In General Building Inspectorates procedures this test certificate can be based for

- regulated building materials for the required proof of accordance
- for non-regulated building materials for the required proof of applicability

The explanations given in DIN 4102-1 app. D, especially concerning an external production control has to be considered.

This test certificate is valid until 2022-05-31, provided that the test methods, the classification rules and the technology do not change during this period.

Borkheide, 1st of June 2017

PRÜFEN · ZERTIFIZIEREN · FIRE LABS · ÜBERWACHEN

Head of the test laboratory
(Dipl.-Ing. Uwe Kühnast)

This translation was issued 1st of June 2017, in a case of doubt the German version is valid solely.

Test specimen A

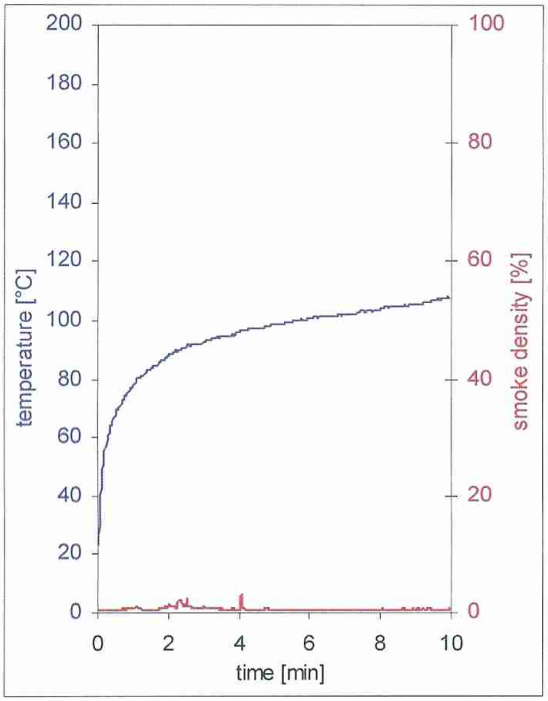

fig. 1
Graphs of the flue gas temperature and the smoke density

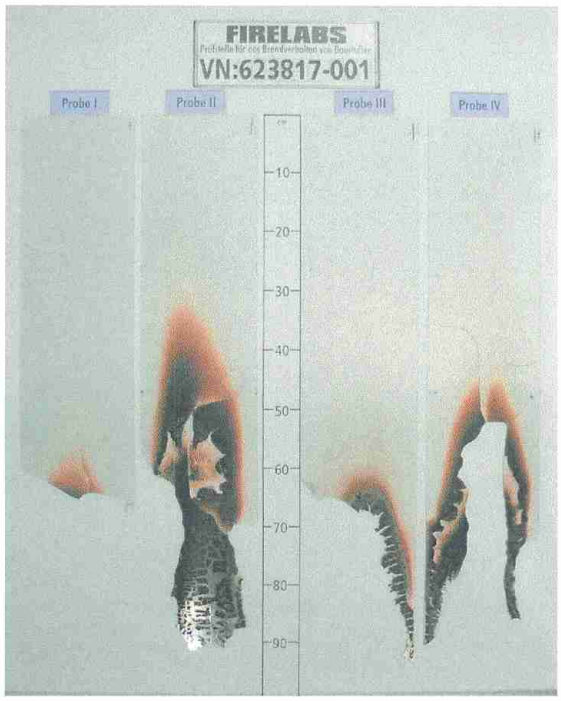

fig. 2
View of test specimen after the test

Test specimen B

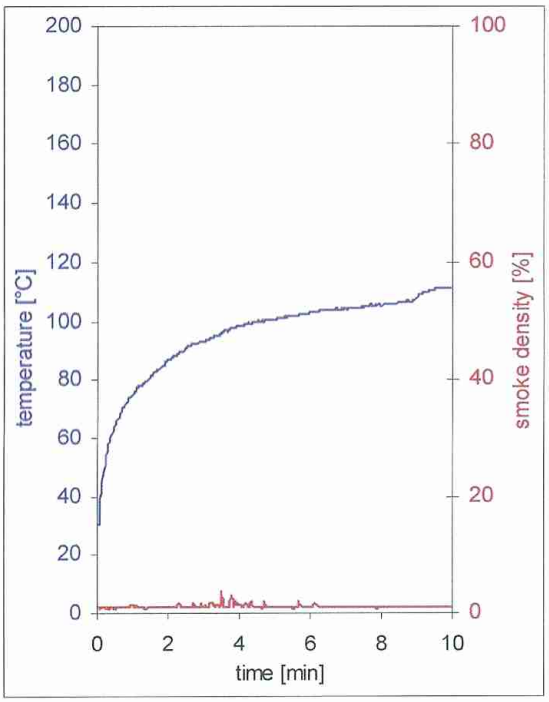

fig. 3
Graphs of the flue gas temperature and the smoke density

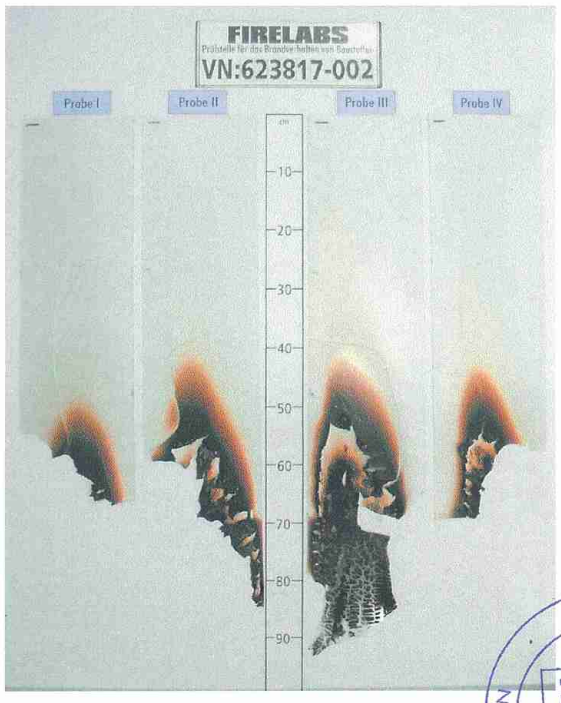

fig. 4
View of test specimen after the test

Test specimen C

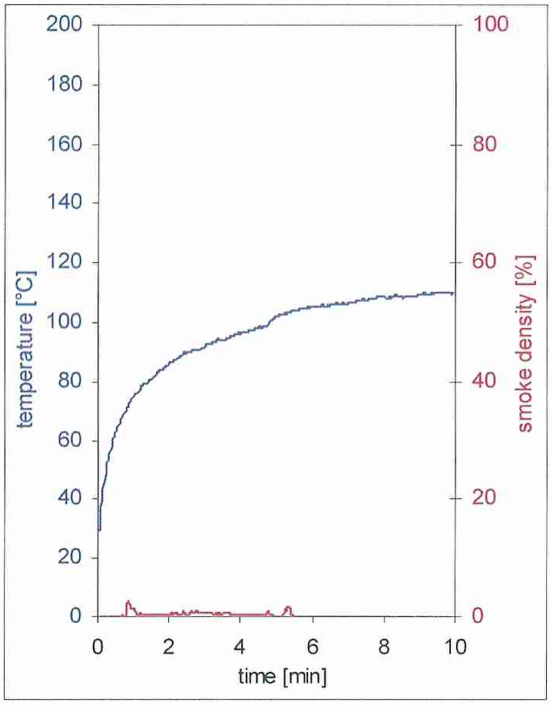

fig. 5
Graphs of the flue gas temperature and the smoke density

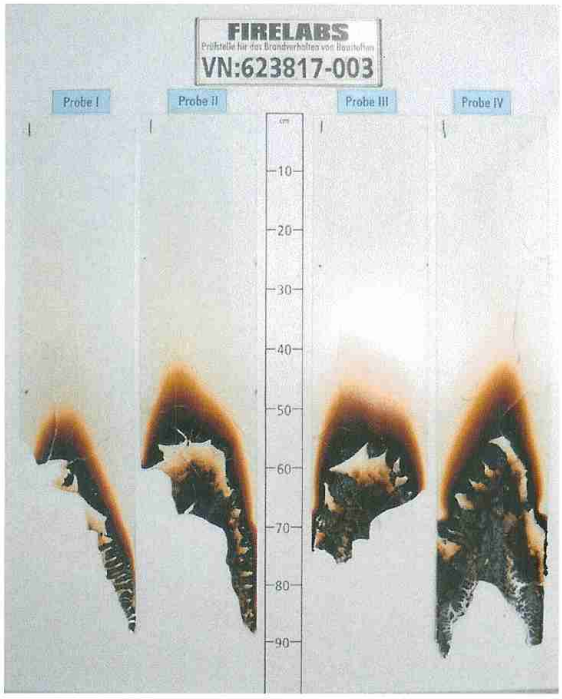

fig. 6
View of test specimen after the test

Test specimen D

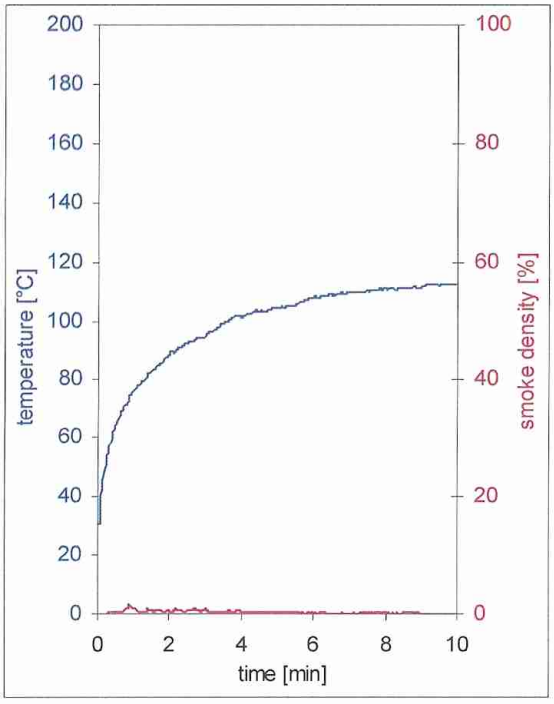

fig. 7
Graphs of the flue gas temperature and the smoke density

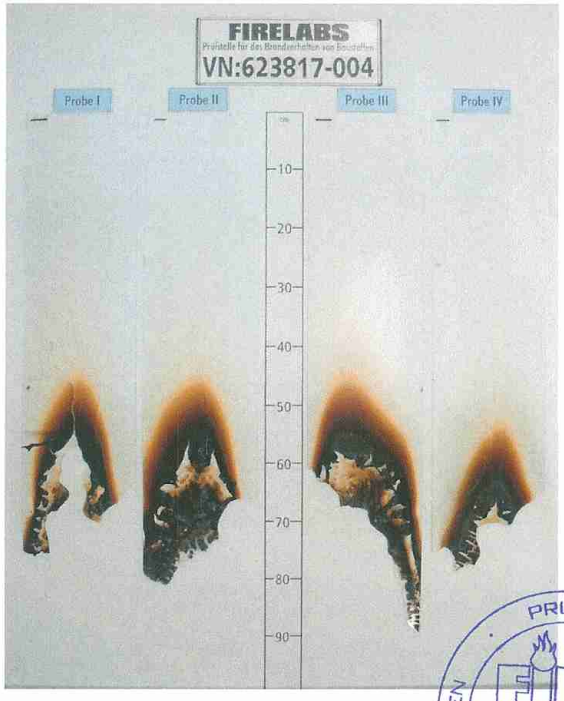

fig. 8
View of test specimen after the test

Test specimen E

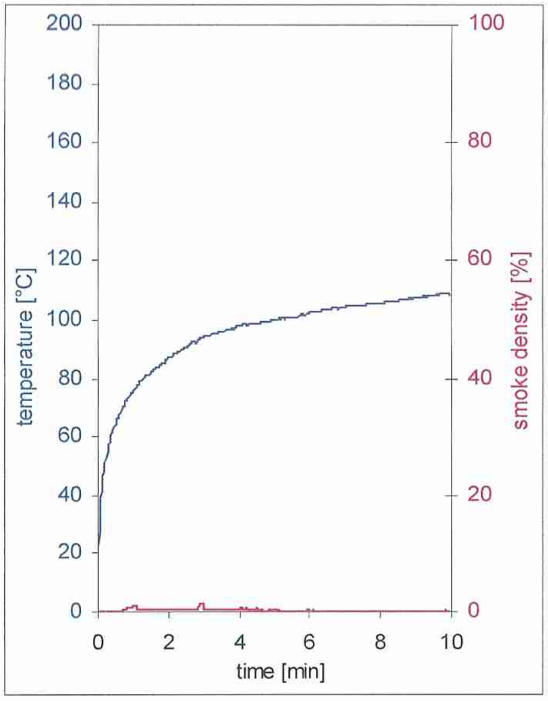

fig. 9
Graphs of the flue gas temperature and the smoke density

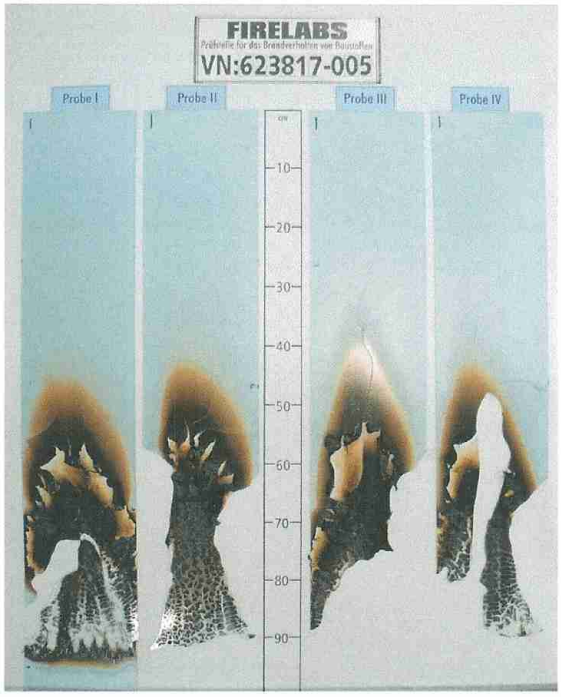

fig. 10
View of test specimen after the test

Test specimen F

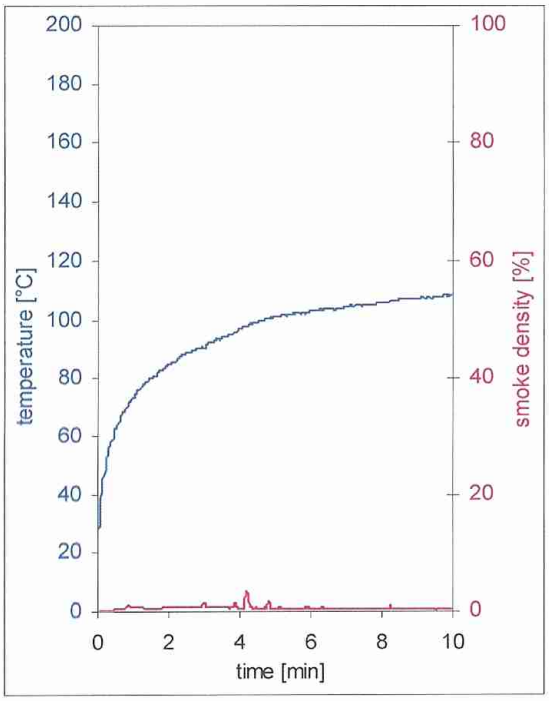

fig. 11
Graphs of the flue gas temperature and the smoke density

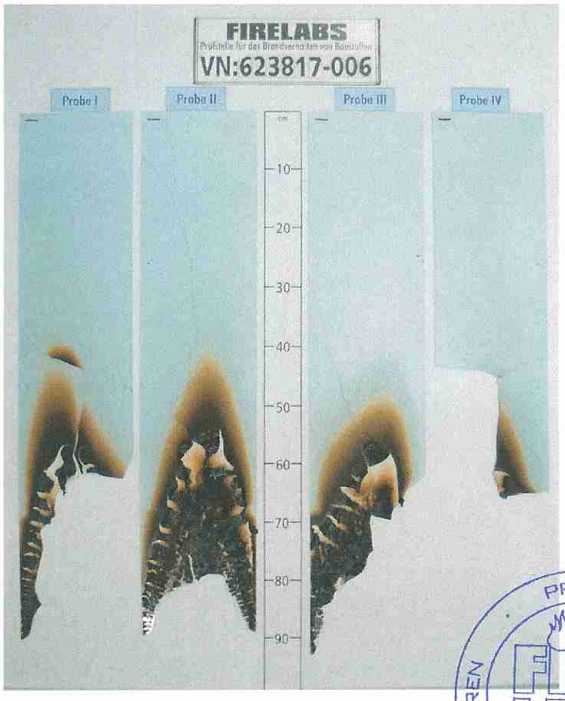

fig. 12
View of test specimen after the test

Test specimen G

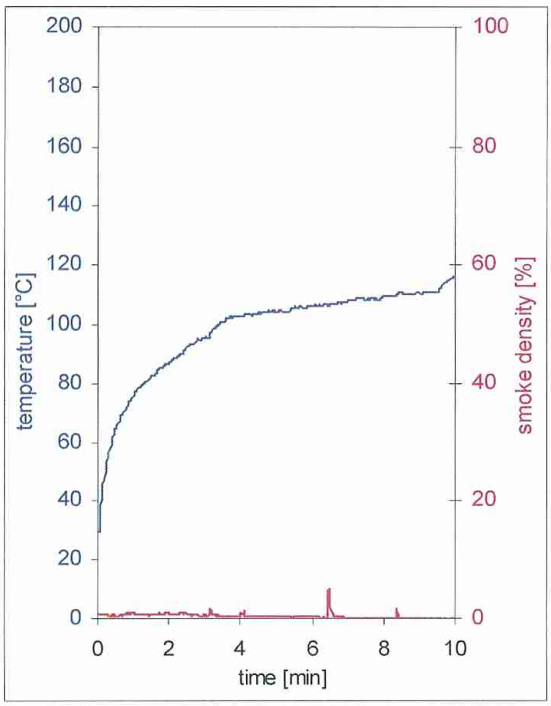

fig. 13
Graphs of the flue gas temperature and the smoke density

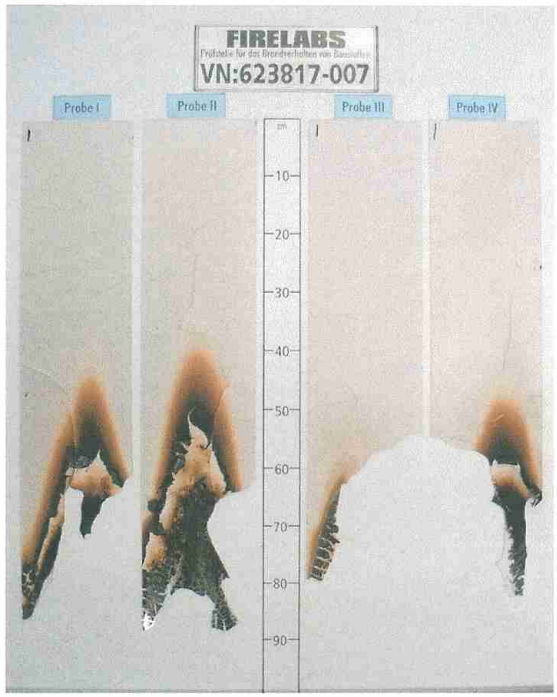

fig. 14
View of test specimen after the test

Test specimen H

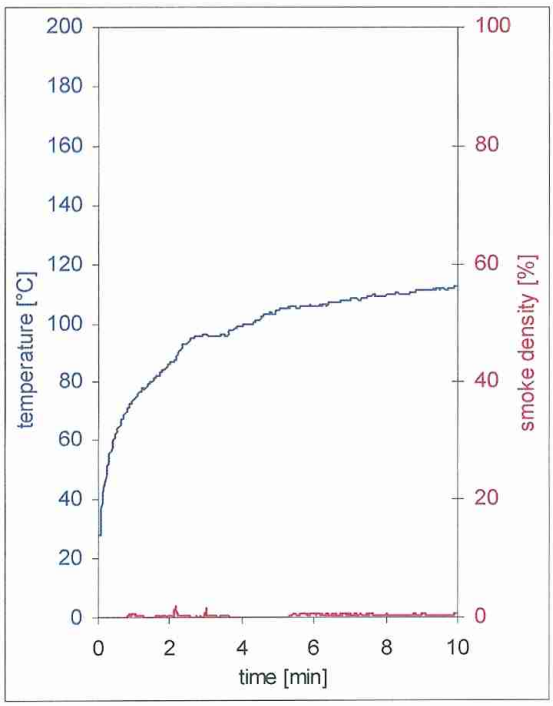

fig. 15
Graphs of the flue gas temperature and the smoke density

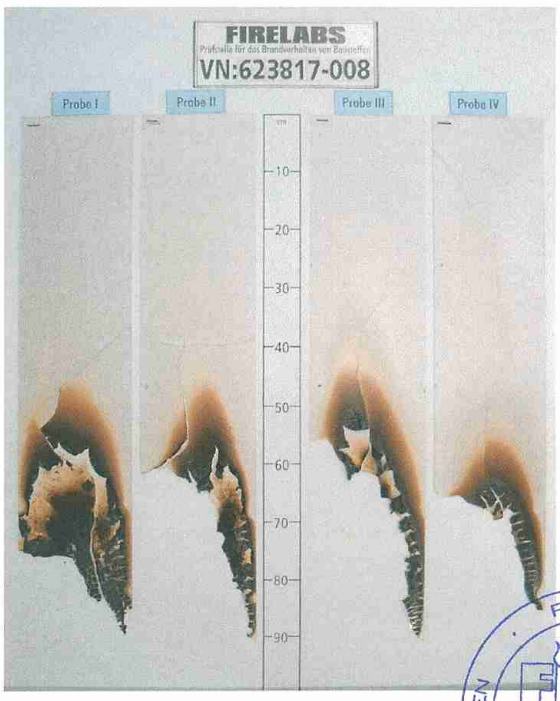

fig. 16
View of test specimen after the test

Test results small burner test

Table 2.1

solvoprint glass deco frosted	longitudinal							transverse							dim.	require-ments
Sample-No.	1	2	3	4	5	6	-	1	2	3	4	5	6	-	-	-
Ignition of the sample	1	1	2	2	1	./.	-	2	1	1	2	1	./.	-	s	-
Maximum flame height	1	1	1	1	1	./.	-	1	1	1	1	1	./.	-	cm	-
Time of the maximum	15	15	15	15	15	./.	-	15	15	15	15	15	./.	-	s	-
Flame tip reached the 150 mm mark	./.	./.	./.	./.	./.	./.	-	./.	./.	./.	./.	./.	./.	-	s	≥ 20
Flame has extinguished	16	16	16	16	16	./.	-	16	16	16	16	16	./.	-	s	-
Ignition of filter paper	./.	./.	./.	./.	./.	./.	-	./.	./.	./.	./.	./.	./.	-	s	[1]
Smoke density (visual)	very low							very low							-	-
Afterburning time	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	>9	s	-
Flames were extinguished after	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	s	-
View of the samples after the test (20 seconds after exposure the flame): The samples were destroyed in the area of the flame application point up to a maximum height of approx. 0,7 cm and a width approx. 1,5 cm and discoloured above about 10 mm.																

Samples 1-5: Edge flame impingement
Samples 6: Surface flame impingement

Table 2.2

solvoprint glass deco dusted	longitudinal							transverse							dim.	require-ments
Sample-No.	1	2	3	-	-	-	-	1	2	3	-	-	-	-	-	-
Ignition of the sample	1	2	./.	-	-	-	-	2	1	./.	-	-	-	-	s	-
Maximum flame height	1	1	./.	-	-	-	-	1	1	./.	-	-	-	-	cm	-
Time of the maximum	15	15	./.	-	-	-	-	15	15	./.	-	-	-	-	s	-
Flame tip reached the 150 mm mark	./.	./.	./.	-	-	-	-	./.	./.	./.	-	-	-	-	s	≥ 20
Flame has extinguished	16	16	./.	-	-	-	-	16	16	./.	-	-	-	-	s	-
Ignition of filter paper	./.	./.	./.	-	-	-	-	./.	./.	./.	-	-	-	-	s	[1]
Smoke density (visual)	very low							very low							-	-
Afterburning time	./.	./.	./.	./.	-	-	-	./.	./.	./.	./.	-	-	-	s	-
Flames were extinguished after	./.	./.	./.	./.	-	-	-	./.	./.	./.	./.	-	-	-	s	-
View of the samples after the test (20 seconds after exposure the flame): The samples were destroyed in the area of the flame application point up to a maximum height of approx. 0,5 cm and a width approx. 1,5 cm and discoloured above about 10 mm.																

Samples 1, 2: Edge flame impingement
Samples 3: Surface flame impingement

[1] No ignition within 20 seconds
./. Not occurred
dim. Dimension
Indication of time: from the beginning of testing procedure
Indication of measurements: from reference line of the flame

Table 2.3

solvoprint glass deco mint	longitudinal							transverse							dim.	require-ments
Sample-No.	1	2	3	-	-	-	-	1	2	3	-	-	-	-	-	-
Ignition of the sample	1	2	./.	-	-	-	-	2	2	./.	-	-	-	-	s	-
Maximum flame height	1	1	./.	-	-	-	-	1	1	./.	-	-	-	-	cm	-
Time of the maximum	15	15	./.	-	-	-	-	15	15	./.	-	-	-	-	s	-
Flame tip reached the 150 mm mark	./.	./.	./.	-	-	-	-	./.	./.	./.	-	-	-	-	s	≥ 20
Flame has extinguished	16	16	./.	-	-	-	-	16	16	./.	-	-	-	-	s	-
Ignition of filter paper	./.	./.	./.	-	-	-	-	./.	./.	./.	-	-	-	-	s	1)
Smoke density (visual)	very low							very low							-	-
Afterburning time	./.	./.	./.	./.	-	-	-	./.	./.	./.	./.	-	-	-	s	-
Flames were extinguished after	./.	./.	./.	./.	-	-	-	./.	./.	./.	./.	-	-	-	s	-
View of the samples after the test (20 seconds after exposure the flame): The samples were destroyed in the area of the flame application point up to a maximum height of approx. 0,5 cm and a width approx. 1,5 cm and discoloured above about 10 mm.																

Samples 1, 2: Edge flame impingement
Samples 3: Surface flame impingement

Table 2.4

solvoprint glass deco rose	longitudinal							transverse							dim.	require-ments
Sample-No.	1	2	3	-	-	-	-	1	2	3	-	-	-	-	-	-
Ignition of the sample	1	1	./.	-	-	-	-	1	1	./.	-	-	-	-	s	-
Maximum flame height	1	1	./.	-	-	-	-	1	1	./.	-	-	-	-	cm	-
Time of the maximum	15	15	./.	-	-	-	-	15	15	./.	-	-	-	-	s	-
Flame tip reached the 150 mm mark	./.	./.	./.	-	-	-	-	./.	./.	./.	-	-	-	-	s	≥ 20
Flame has extinguished	16	16	./.	-	-	-	-	16	16	./.	-	-	-	-	s	-
Ignition of filter paper	./.	./.	./.	-	-	-	-	./.	./.	./.	-	-	-	-	s	1)
Smoke density (visual)	very low							very low							-	-
Afterburning time	./.	./.	./.	./.	-	-	-	./.	./.	./.	./.	-	-	-	s	-
Flames were extinguished after	./.	./.	./.	./.	-	-	-	./.	./.	./.	./.	-	-	-	s	-
View of the samples after the test (20 seconds after exposure the flame): The samples were destroyed in the area of the flame application point up to a maximum height of approx. 0,5 cm and a width approx. 1,5 cm and discoloured above about 10 mm.																

Samples 1, 2: Edge flame impingement
Samples 3: Surface flame impingement

1) No ignition within 20 seconds
./. Not occurred
dim. Dimension
Indication of time: from the beginning of testing procedure
Indication of measurements: from reference line of the flame