

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



Prüfstelle für das
Brandverhalten
von Baustoffen
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PÜZ-Stelle (LBO): BRA09

Reference: FLT 3674318 (Translation of the German Prüfzeugnis - no guarantee for translation of technical terms)

Sponsor: REGULUS GmbH
Paul-Gossen-Str. 114
D - 91052 Erlangen

Order: 2018-11-22 **Arrived:** 2018-11-28

Description of samples: On both sides coated polyester film, named "SI 484".
(for details see page 2)

Delivered: 2018-11-28

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

Assessment: The examined product meets the requirements of class B1 for "schwerentflammbare" (not easily flammable) building materials according to DIN 4102-1, If used suspended freely or with distance of > 40 mm to the same or other plain materials.
(for details see page 5)

Validity of test certificate: 2023-12-31

Sampling: The sample was send to the testing laboratory by the client.

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.

This test certificate comprises 5 pages and 3 enclosures.

Approved testing, inspection and certification body

This test certificate must not be published and copied preceding agreement of the test laboratory and if agreed, only during validity and unchanged concerning appearance and contents. Agreement of the test laboratory has to be given in any case if norms on which the tests are based or other technical standards have changed.

CERTIFICATE
TEST



1 Test material

1.1 Description (according to the sponsor)

The delivered material is a film made of polyester with a one-sided, flame-retardant treated and printable coating (referred to as inkjet coating) and a flame-retardant treated coating on the rear side (referred to as grey lacquer coating). The coated film is intended to be used indoor as advertising medium or for decorative purposes and was named with the trade name "SI 484".

1.2 Description of the delivered samples

For the tests the laboratory was provided with a sample roll of a plastic film of length of approx. 20 m and a width of 0.91 m. The plastic film showed a white coated surface on the front and a light grey coated surface on the rear side and was labelled with batch E18052N01.

Colour of plastic film: white

Characteristic values: see passage 4.1; photos: see enclosures 1, 2.

Further details are not known to the laboratory; a retain sample has been deposited.

2 Preparation of samples

For the small burner ("Brennkasten") tests samples for edge flame exposure (dimensions 190 mm x 90 mm) and samples for surface flame exposure (dimensions 230 mm x 90 mm) have been cut in longitudinal and in transversal orientation of the material. For the fire shaft ("Brandschacht") tests 4 specimens were assembled. The samples (dimensions 1000 mm x 190 mm) for the test specimen A and C were cut in longitudinal and the samples for the test specimen B and D in transversal orientation of the film.

All samples were kept in a climate chamber acc. DIN 50014-23/50-2 until they reached constant weight.

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 ("Brennkasten") tests have been performed acc. DIN 4102-1, chapter 6.2.5 (building materials class B2).

All tests were carried out in single layer, freely suspended, both from the front and reverse side.

Period of testing: January 2019

4 Results

- section 4.1 Material characteristics
- section 4.2.1 Test results class B2 (Brennkasten)
- section 4.2.2 Test results class B1 (Brandschacht)

4.1 Material characteristics

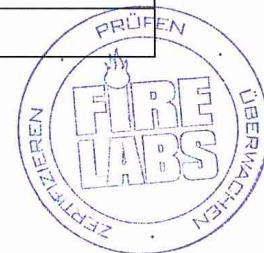
Table 1

Specifications			Manufacturer's data	Measured values	
				m.v.	s
Thickness	Support film	[mm]	0,10	./.	
	Total		0,175	0,17	0,003
Weight per unit area		[g/m ²]	250	259	

./.: not received / not measured

m.v.: mean value

s: standard deviation



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 3, table 2)

4.2.2 Test results class B1 (Brandschacht)

Table 3

Test results "Brandschachtprüfung" (part 1)						
line no.		Test results				requirements
		A	B	C	D	
1	<u>Number of specimen arrangement</u> acc. DIN 4102 –15 Table 1	1	1	1	1	
2	<u>Maximal flame height</u> above bottom edge cm	30	30	30	30	*)
3	Time ¹⁾ min	1	1	1	1	
4	<u>Burning / melting through</u> Time ¹⁾ min	./.	./.	./.	./.	
5	<u>Back side of the specimens:</u> <u>Flames / glowing</u> Time ¹⁾ min:s	No	No	No	No	
6	<u>Discolouring</u> Time ¹⁾ min:s	1	1	1	1	
7	<u>Falling of burning droplets</u> Begin ¹⁾ min	No	No	No	No	
8	Extend: Sporadic falling of burning droplets					
9	Continuous falling of burning droplets					
10	<u>Falling of burning parts</u> Begin ¹⁾ min	No	Yes 1	No	Yes 1	
11	Extend: Sporadic falling of burning parts		Yes		Yes	
12	Continuous falling of burning parts		No		No	
13	<u>Afterflame time at the bottom of the sieve (max.)</u> min:s	./.	0:02	./.	0:02	
14	<u>Impairment of the burner flames by dropping or falling Material</u> Time ¹⁾ min:s	No	No	No	No	
15	<u>Premature end of test</u> Final occurrence of burning at the specimen ¹⁾ min	3	3	3	4	
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



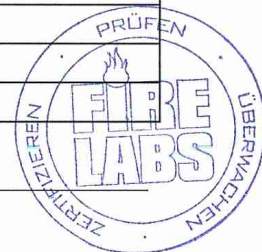
Test results "Brandschachtprüfung" (part 2)						
line no.		Test results				requirements
		A	B	C	D	
17	<u>Afterflame after end of test</u> Time min:s	No	No	No	No	
18	Number of specimen					
19	Front side of specimen					
20	Back side of specimen					
21	Flame length cm					
22	<u>Afterglow after end of test</u> Time min:s	No	No	No	No	
23	Number of specimen					
24	<u>Place of appearance:</u> Lower half of specimen					
25	Upper half of specimen					
26	Front side of specimen					
27	Back side of specimen					
28	<u>Smoke density</u> ≤ 400 % min	6,6	6,2	8,8	7,7	
29	≥ 400 % min (very strong smoke density)	./.	./.	./.	./.	
30	Diagram fig. no.	1	3	5	7	
31	<u>Residual length</u> Individual value cm	68 68 69 69	62 61 60 63	65 63 68 64	66 65 67 67	> 0
32	Average value cm	68	61	65	66	≥ 15
33	Photo of the test specimen fig. no.	2	4	6	8	
34	<u>Flue gas temperature</u> Maximum of average value...°C	108	104	108	108	≤ 200
35	Time ¹⁾ min:s	9:58	9:36	9:52	9:20	
36	Diagram fig. no.	1	3	5	7	
37	<u>Remarks:</u> line 13: Afterflame time at the bottom of the sieve < 20 sec. is not rated as "falling of burning parts or droplets" 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

./.

*) no cause for complaint

Specimen	Test-no.:	Direction of film	Tested surface
A	674318-001	longitudinal	grey
B	674318-002		white
C	674318-003	transversal	grey
D	674318-004		white



5 Assessment

According to the test results in section 4.2 the material, described in section 1 and 4.1, fulfils the requirements of building materials class B1 according to DIN 4102-1 if the material is used in one layer, suspended freely or with a distance of > 40 mm to the same or other plain materials. The requirements of building materials class B2 are also fulfilled. No falling of burning parts or droplets occurred during these tests.

The verification

- for outdoor usage (ageing behaviour 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 2023-12-31, provided that the test methods, the classification rules and the technology do not change during this period.

Borkheide, 18th of January 2019



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



This translation was issued on 18th of January 2019, in a case of doubt the German version is valid solely.

Test specimen A

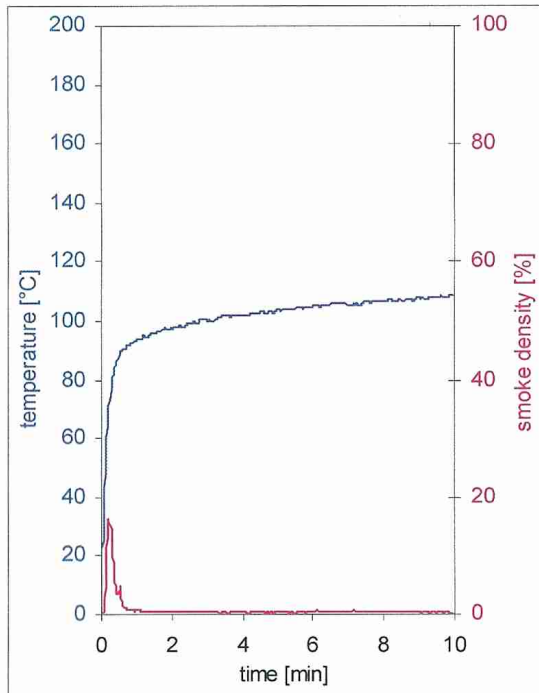


fig. 1
Graphs of the flue gas temperature and the smoke density



fig. 2
Photo of the test specimen after the test

Test specimen B

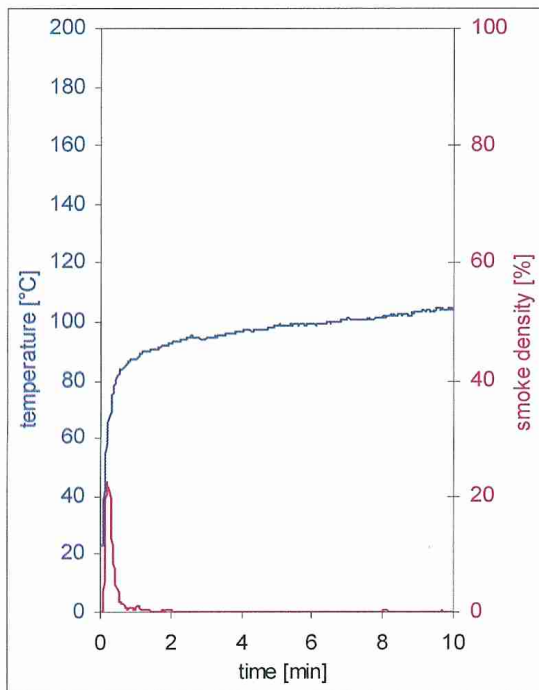


fig. 3
Graphs of the flue gas temperature and the smoke density

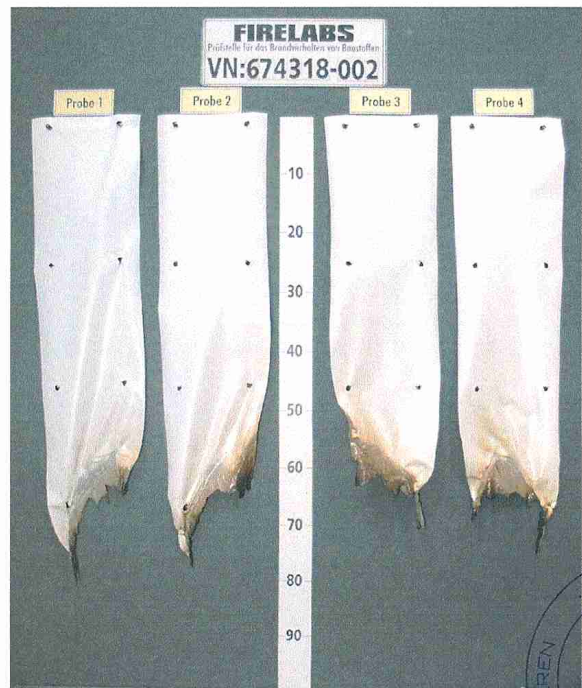


fig. 4
Photo of the test specimen after the test



Test specimen C

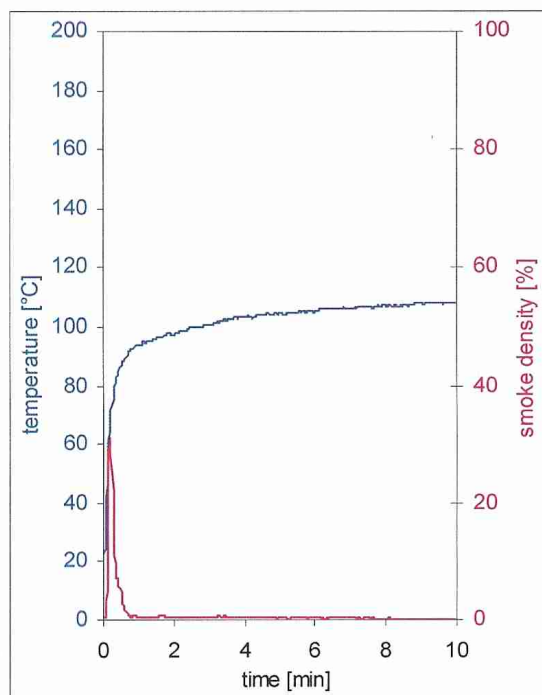


fig. 5
Graphs of the flue gas temperature and smoke density



fig. 6
View of test specimen after the test

Test specimen D

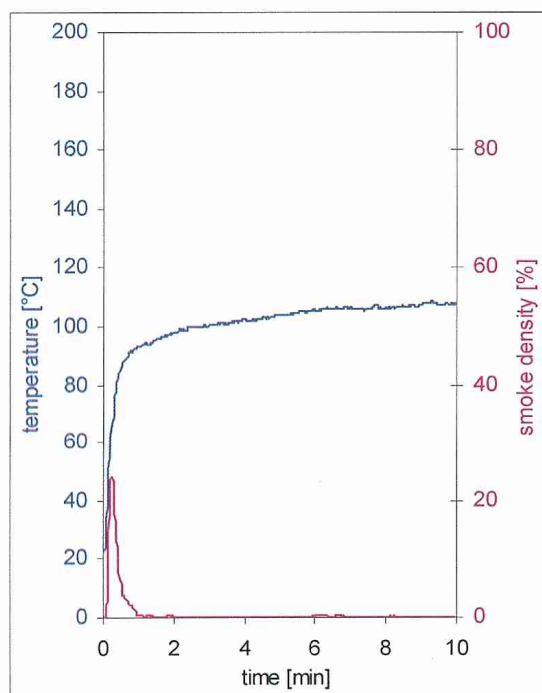


fig. 7
Graphs of the flue gas temperature and smoke density



fig. 8
Photo of the test specimen after the test (sample 4: rear side)

Test results small burner test (Brennkasten)

Table 2

	longitudinal direction							transversal direction							dim.	requirements
Sample-No.	1	2	3	4	5	6	7	1	2	3	4	5	6	7	-	-
Ignition of the sample	1	1	1	1	1	3	4	1	1	1	1	1	3	3	s	-
Maximum flame height	5	8	7	8	6	5	6	6	7	6	6	7	3	7	cm	< 15
Time of the maximum	6	8	8	8	7	7	8	6	6	6	7	7	8	7	s	-
Flame tip reached the 150 mm test mark	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	s	≥ 20
Flame has extinguished before reaching the test mark	7	9	8	9	8	16	13	7	6	7	7	8	12	9	s	-
Ignition of filter paper	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	s	1)
Smoke density (visual)	moderate							moderate							-	-
Afterburning time	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	-	-
Flames have been extinguished	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	-	-

View of the samples after the test (20 seconds after exposure the flame):

The samples were destroyed at flame impingement area: length max. 7 cm, destroyed width approx. 2 cm, soot slightly up to the top edge of the sample.

Samples 1-5: edge flame exposure

Samples 6: surface flame exposure of white coated surface

Samples 7: surface flame exposure of grey coated surface

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

