

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

**Reference:** FLT 3604316 (Translation of the German test certificate - no guarantee for translation of technical terms)

**Sponsor:**

**Order:** 2016-11-18 **Arrived:** 2016-11-22

**Test material:** On one side coated polyester fabric, named  
(for details see page 2)

**Delivered:** 2016-11-22

**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 not easily flammable ("schwerentflammbare") building materials according to DIN 4102-1. If used in one layer, suspended freely or with distance of >40 mm to same or other plain materials.  
(for details see page 5)

**Validity:** 2022-01-31

**Sampling:** The sample was 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.

This test certificate comprises 5 pages and 3 appendices.

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This test certificate must not be published and copied preceding agreement of the test laboratory and if agreed, only during validity and unchanged concerning appearance and contents.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



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TEST CERTIFICATE



## 1 Description of test material

### 1.1 Test material (according to the sponsor)

The material provided is a fabric made of polyester with a flame retardant coating made of polyurethane and acrylic on one side. The material is intended to be used as banner material or for decorative purposes and was named [REDACTED]

### 1.2 Description of the delivered samples

For the tests 1 section of a fabric coated on one side has been provided to the laboratory. Dimensions were approx. 4,6 m in length and 1,38 m in width. The sample was labelled with article-no. "1029-16-100" and name "[REDACTED]" by the sponsor.

Colour: White fabric, white surface on the rear side

Characteristic values: see paragraph 4.1; Photos: see enclosure 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 warp and in weft orientation of the support fabric.

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 warp orientation; the samples for the test specimen B and D were cut in weft orientation of the support fabric.

Afterwards 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 test ("Brandschacht") have been performed acc. DIN 4102-1 and -16 (building materials class B1). The small burner tests ("Brennkasten") have been performed acc. DIN 4102-1, chapter 6.2.5 (building materials class B2).

The tests were carried out in a single layer, freely suspended, both from the front and from the rear side.

Period of testing: February 2017

## 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

Specific values			Specifications by manufacturer	Measured values m.v. s	
Total thickness		[mm]	0,26	0,27	0,007
Mass per unit area	uncoated fabric	[g/m <sup>2</sup> ]	./.	./.	
	coated fabric	[g/m <sup>2</sup> ]	270	241	

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 of building materials class B2; the material did not show burning particles/droplets during these tests.

(Results: see enclosure 3)



## 4.2.2 Test results class B1 (Brandschacht)

Table 3

Test results (part 1)						
line no.		Specimen				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	60	60	50	40	*)
3	Time <sup>1)</sup> ..... min	1	1	1	1	
4	<u>Burning / melting through</u> Time <sup>1)</sup> .....min	1	1	1	1	
5	<u>Back side of the specimens:</u> <u>Flames / glowing</u> Time <sup>1)</sup> ..... min	.f.	.f.	.f.	.f.	
6	<u>Discolouring</u> Time <sup>1)</sup> ..... min					
7	<u>Falling of burning droplets</u> Begin <sup>1)</sup> ..... 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 <sup>1)</sup> ..... min	Yes 1	Yes 1	Yes 1	No	
11	Extend: Sporadic falling of burning parts	Yes	Yes	Yes		
12	Continuous falling of burning parts	No	No	No		
13	<u>Afterflame time at the bottom of the sieve (max.)</u> ..... min:s	0:13	0:05	0:03	.f.	
14	<u>Impairment of the burner flames by dropping or falling Material</u> Time <sup>1)</sup> ..... min:s	.f.	.f.	.f.	.f.	
15	<u>Premature end of test</u> Final occurrence of burning at the specimen <sup>1)</sup> ..... min	4	4	4	4	
16	Time of eventually end of test <sup>1)</sup> ..... min:s	.f.	.f.	.f.	.f.	

<sup>1)</sup> Indication of time: from the beginning of testing procedure

- Not tested

.f. Not occurred

\*) No cause for complaint





Test results (part 2)						
line no.		Specimen				requirements
		A	B	C	D	
17	<u>Afterflame after end of test</u>	No	No	No	No	
18	Time ..... min:s					
19	Number of specimen					
20	Front side of specimen					
21	Back side of specimen					
22	Flame length ..... cm					
23	<u>Afterglow after end of test</u>	No	No	No	No	
24	Time ..... min:s					
25	Number of specimen					
26	<u>Place of appearance:</u>					
27	Lower half of specimen					
28	Upper half of specimen					
29	Front side of specimen					
30	Back side of specimen					
31	<u>Smoke density</u>					
32	≤ 400 % min	22,6	27,2	20,8	19,9	
33	≥ 400 % min (very strong smoke density)	./. 1	./. 3	./. 5	./. 7	
34	Diagram fig. no.					
35	<u>Residual length</u>					
36	Individual value ..... cm	41 44 60 44	62 43 62 50	47 65 64 62	68 56 64 51	> 0
37	Average value ..... cm	47	54	59	59	≥ 15
38	Photo of test specimen fig. no.	2	4	6	8	
39	<u>Flue gas temperature</u>					
40	Maximum of average value ...°C	115	109	116	111	≤ 200
41	Time <sup>1)</sup> ..... min:s	10:00	9:44	9:04	9:54	
42	Diagram fig. no.	1	3	5	7	
43	<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: 2015-09, 5.2 b)).					

Specimen	Test-no.:	Direction of support fabric	Side of flame impingement
A	604316-001	warp	fabric side
B	604316-002	weft	
C	604316-003	warp	coated side
D	604316-004	weft	

<sup>1)</sup> indication of time: from the beginning of testing procedure

- not tested

./. not occurred

\*) no cause for complaint



## 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 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 by outdoor weathering)
- after washing or cleaning with chemicals

is not been proved with this test certificate.

## 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 codes, 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.

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.

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

This test certificate is valid until 2022-01-31, provided that the test methods, the classification rules and the technology do not change during this period.

Borkheide, 9<sup>th</sup> of February 2017



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



In charge for testing  
(Dipl.-Ing. Manfred Sailer)

*This translation was issued 9<sup>th</sup> of February 2017, in a case of doubt the German version is valid solely.*

## Test specimen A

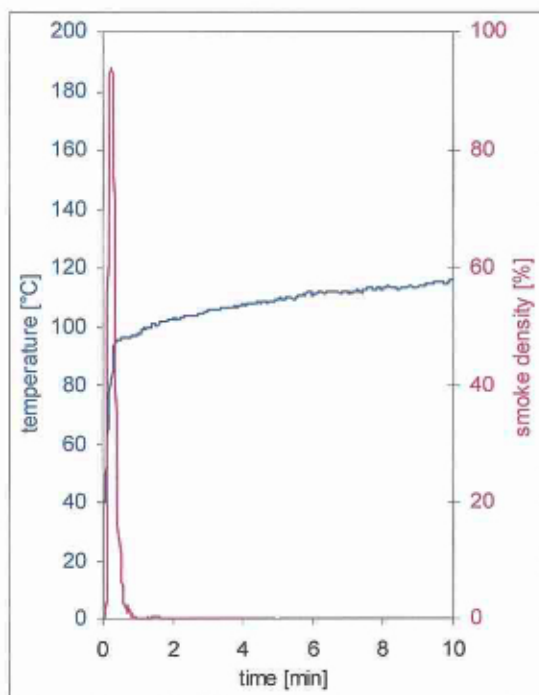


fig. 1  
Graphs of the flue gas temperature and smoke density



fig. 2  
View of test specimen after the test

## Test specimen B

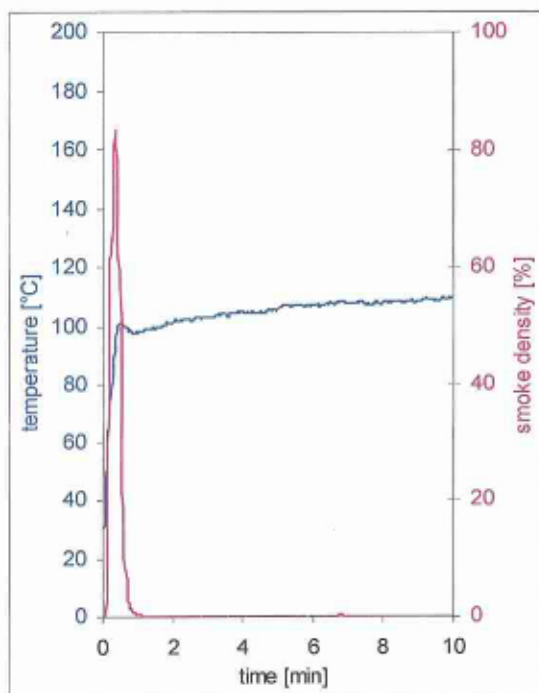


fig. 3  
Graphs of the flue gas temperature and smoke density



fig. 4  
View of test specimen after the test





## Test specimen C

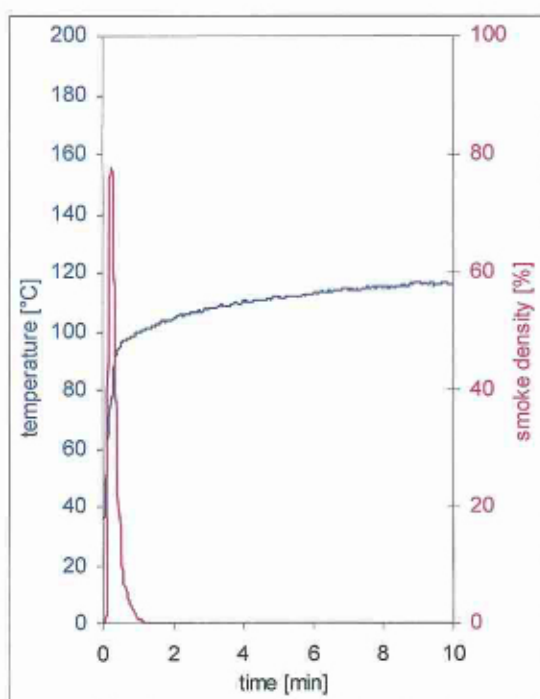


fig. 5  
Graphs of the flue gas temperature and smoke density

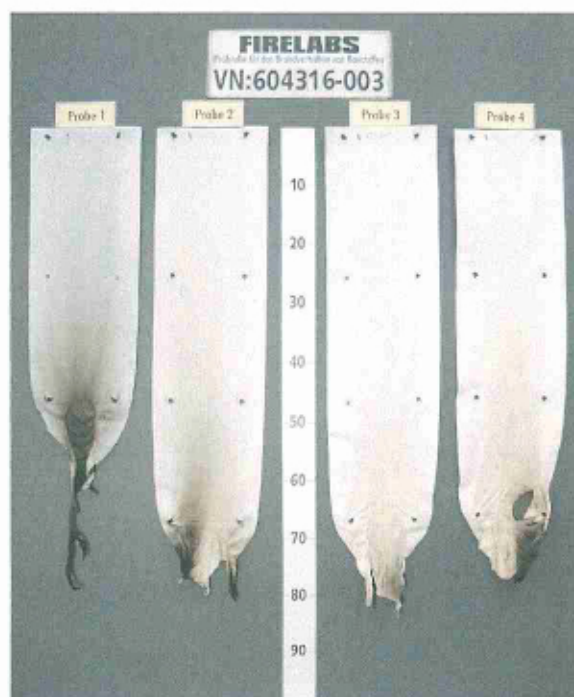


fig. 6  
View of test specimen after the test

## Test specimen D

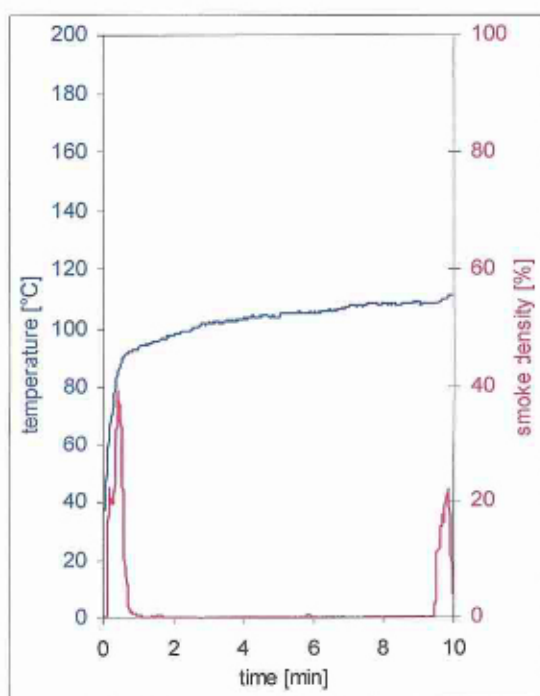


fig. 7  
Graphs of the flue gas temperature and smoke density



fig. 8  
View of test specimen after the test  
(Sample 4: reverse side)



Test results small burner test ("Brennkasten")

Table 2

	warp direction <sup>*)</sup>							weft direction <sup>*)</sup>							dim.	requirements
Sample-No.	1	2	3	4	5	6	7	1	2	3	4	5	6	7	-	-
Ignition of the sample	1	4	4	4	4	4	4	1	4	4	4	4	4	4	s	-
Maximum flame height	4	8	9	9	9	8	7	7	9	9	8	8	9	7	cm	-
Time of the maximum	4	13	12	13	12	13	10	6	11	13	13	12	13	12	s	-
Flame tip reached the 150 mm mark	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	s	≥ 20
Flames have extinguished before reaching mark	4	16	16	16	16	16	15	7	16	16	16	16	16	16	s	-
Ignition of filter paper	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	s	<sup>1)</sup>
Smoke density (visual)	moderate							moderate							-	-
Afterburning time	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	s	-
Flames were extinguished after	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	s	-

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

Samples have been destroyed at area of flame impingement up to a height of 4-10 cm and a width of app. 2 cm and were soot above until top edge of the samples.

Samples 1: edge flame exposure

Samples 2-6: surface flame (uncoated side)

Samples 7: surface flame (coated side)

<sup>\*)</sup> Orientation of the support fabric<sup>1)</sup> 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

