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

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PÜZ-Stelle (LBO): BRA09

Reference: FLT 3592016 (Translation of the German test report - no guarantee for translation of technical terms)

Sponsor: KREA Technische Textilien GmbH
Hochstrasse 84
D – 47228 Duisburg
(Germany)

Test order: 2015-11-09 **Arrived:** 2015-11-09

Description of samples: On one side coated polyester fabric, named "**Krea Speedy / 911-11**".
(for details see page 2)

Delivered: 2015-10-16

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 of test report: 2020-10-31

Sampling: The sample was sent to the laboratory by the manufacturer.

TEST REPORT

Remark: If the above-mentioned building material is not used as product according to MBO § 2, Abs. 9, Ziffer 1, there is no need for a general building supervisory test report.
This test report is not valid if the examined building material is used as product in the meaning of state building prescriptions (MBO § 17, Abs. 3).

This test report 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 report 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 report comprises 5 pages and 3 appendices.

1 Description of test material

1.1 Test material (according to the manufacturer)
The material provided is a fabric made of polyester, one side with a flame retarding coating made of polyurethane and acrylic. The material is intended to be used as banner material or for decorative purposes and was named by the sponsor with "Krea Speedy / 911-11".

1.2 Description of the delivered samples
For the tests the laboratory received by the manufacturer a fabric, plastic-coated on both sides, with a length of app. 5 m and a width of 1,5 mm. The test sample was labelled with the manufacturer's article-no. and was named "Krea Speedy / 911-11" by the sponsor.
Colour: white, unprinted
Characteristic values: see paragraph 4.1; Photos: see enclosure 1.
Further details are not known to the laboratory, information about the manufacturer and 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 single layer, freely suspended, both from the front and from the rear side
Period of testing: November 2015

4 Results

- section 4.1 Material characteristics
- section 4.2.1 Test results class B2
- section 4.2.2 Test results class B1

4.1 Material characteristics

Table 1

Specific values			Specifications by manufacturer	Measured values m.v.	s
total thickness		[mm]	0,30 (±5%)	0,25	<0,005
mass per unit area	uncoated fabric	[g/m²]	./.	./.	
	coated fabric	[g/m²]	165 (±5%)	194	

./. 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 of building materials class B2; the material did not show burning particles/droplets during these tests. Exposing the flame to the face or reverse side did not influence the fire behaviour.
(Results: see enclosure 2)

4.2.2 Test results class B1 (Brandschacht)

Table 3

Test results (part 1)						
line no.		Specimen				require-ments
		A	B	C	D	
1	Number of specimen arrangement acc. DIN 4102 –15 Table 1	1	1	1	1	
2	Maximal flame height above bottom edge ..... cm	30	30	30	30	
3	Time [1] ..... min	1	1	1	1	*)
4	Burning / melting through Time [1] .....min	1	1	1	1	
5	Back side of the specimens: Flames / glowing Time [1] ..... min	./.	./.	./.	./.	
6	Discolouring Time [1] ..... min					
7	Falling of burning droplets Begin 1)..... min	No	No	No	No	
8	Extend: Sporadic falling of burning droplets					
9	Continuous falling of burning droplets					
10	Falling of burning parts Begin [1]..... min	Yes 1	Yes 1	Yes 1	Yes 1	
11	Extend: Sporadic falling of burning parts	Yes	Yes	Yes	Yes	
12	Continuous falling of burning parts	No	No	No	No	
13	Afterflame time at the bottom of the sieve (max.). min:s	0:04	0:06	0:05	0:05	
14	Impairment of the burner flames by dropping or falling Material Time [1] ..... min:s	No	No	No	No	
15	Premature end of test Final occurrence of burning at the specimen [1].....min	3	3	3	3	
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 (part 2)						
line no.		Specimen				require-ments
		A	B	C	D	
	Afterflame after end of test	No	No	No	No	
17	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	
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	4,8	2,9	3,8	2,2	
29	≥ 400 % min (very strong smoke density)	./.	./.	./.	./.	
30	Diagram fig. no.	1	3	5	7	
	Residual length					
31	Individual value .....cm	62 71 63 68	68 63 63 63	68 67 62 65	68 68 69 69	> 0
32	Average value .....cm	**66**	**64**	**65**	**68**	≥ 15
33	Photo of test specimen fig. no.	2	4	6	8	
	Flue gas temperature					
34	Maximum of average value...°C	111	110	113	114	≤ 200
35	Time [1] .....min:s	9:52	8:10	9:58	9:50	
36	Diagram fig. no.	1	3	5	7	
37	Remarks: 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 farbric	Side of flame impingement
A	560515-001	warp	coated side
B	560515-002	weft	
C	560515-003	warp	uncoated side
D	560515-004	weft	

[1] 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 a building material 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)

is not been proved with this test report.

6 Special remarks

This report 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 report 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, par. 3).
This test report is no substitute for a General Building Inspectorate Certificate. This test report is granted without prejudice to the rights of third parties, or particular private proprietary rights.

This test report 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 report is valid until 2020-10-31, provided that the test methods, the classification rules and the technology do not change during this period.

Borkheide, 3rd of August 2016

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

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

This translation was issued the 3rd of August 2016, in a case of doubt the German version is valid solely.

Test specimen A

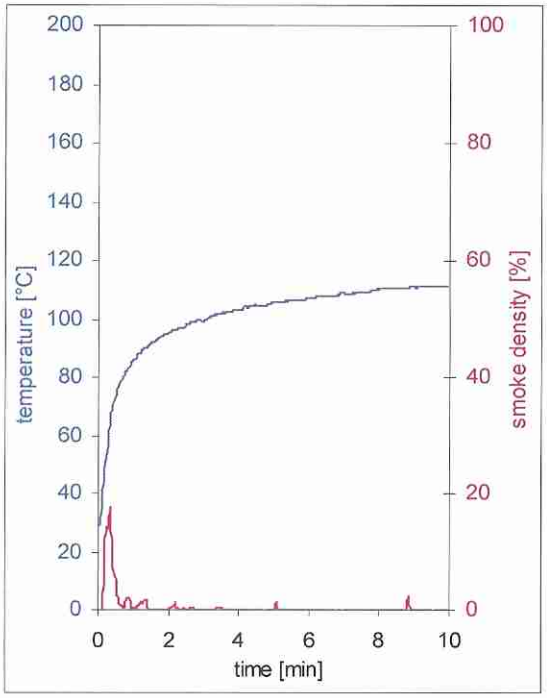

fig. 1
Graphs of the flue gas temperature and the smoke density

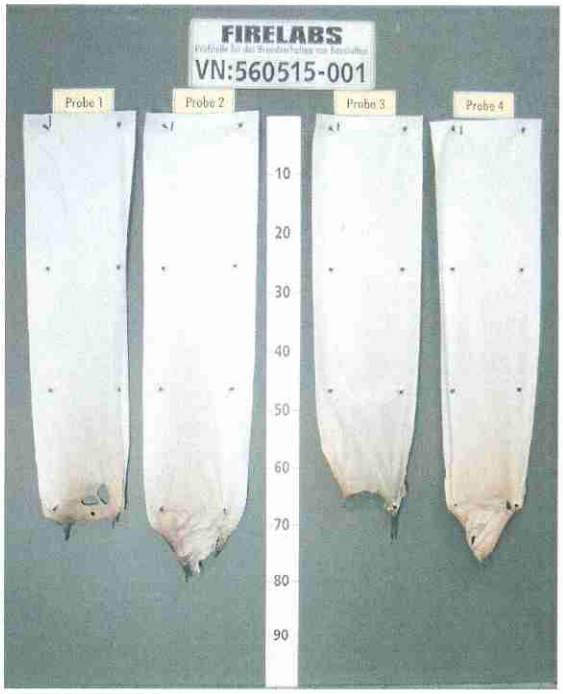

fig. 2
View of test specimen after the test

Test specimen B

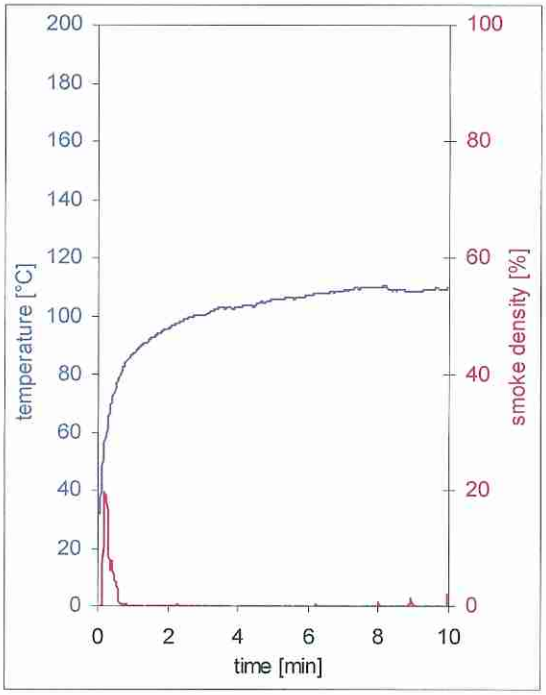

fig. 3
Graphs of the flue gas temperature and the smoke density

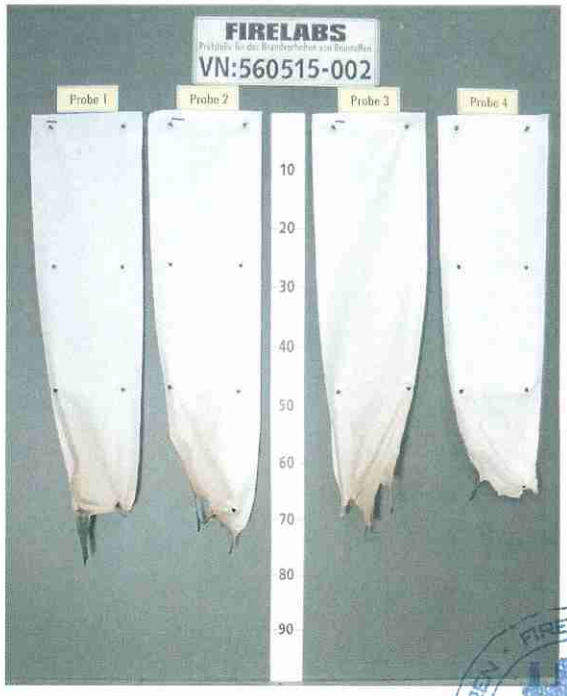

fig. 4
View of test specimen after the test (Sample 4: rear side)

Test specimen C

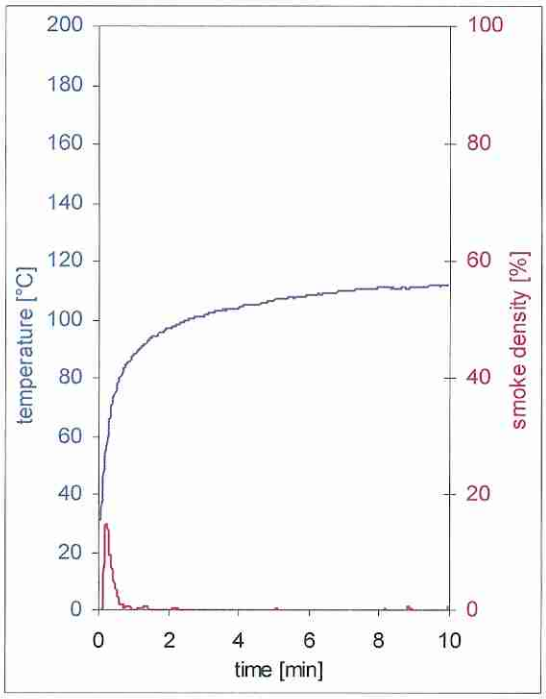

fig. 5
Graphs of the flue gas temperature and the smoke density

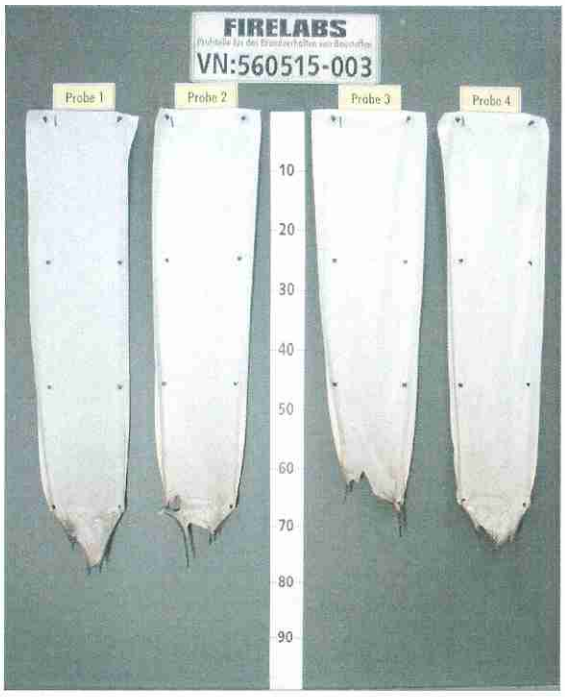

fig. 6
View of test specimen after the test

Test specimen D

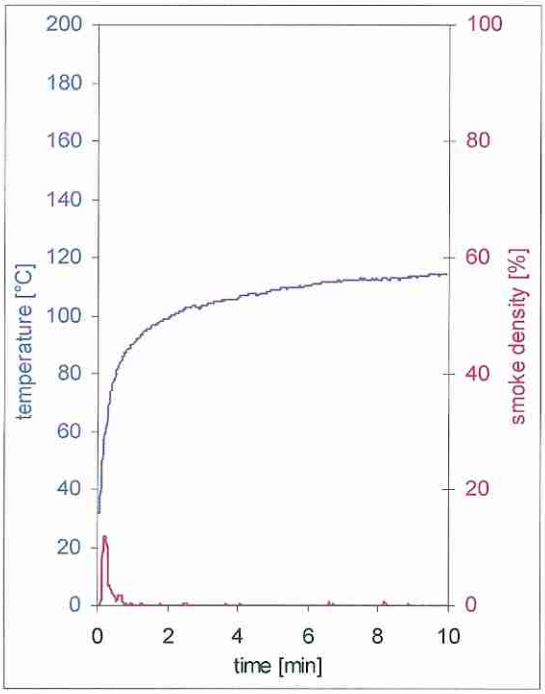

fig. 7
Graphs of the flue gas temperature and the smoke density

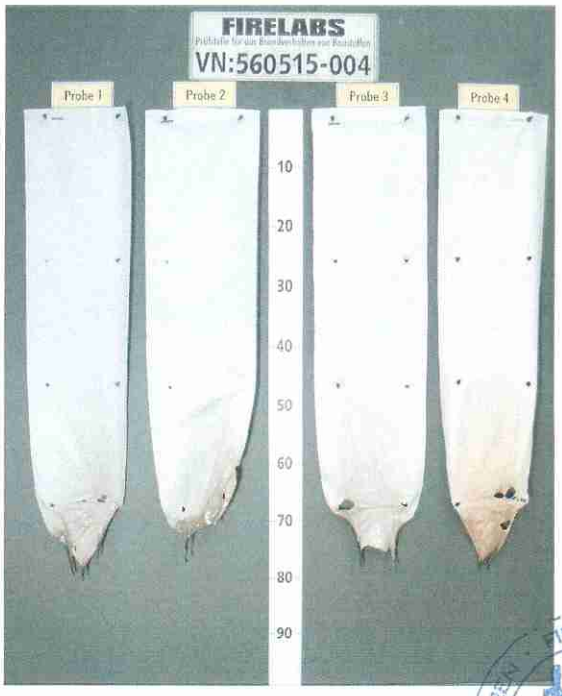

fig. 8
View of test specimen after the test (Sample 4: rear side)

Test results small burner test (Brennkasten)

Table 2

	warp direction*							weft direction*							dim.	require-ments
Sample-No.	1	2	3	4	5	6	7	1	2	3	4	5	6	7	-	-
Ignition of the sample	1	3	3	3	3	3	3	1	3	3	3	3	3	3	s	-
Maximum flame height	7	8	7	8	7	7	7	6	6	6	7	6	7	7	cm	-
Time of the maximum	15	44	6	9	8	10	10	7	8	12	7	9	8	8	s	-
Flame tip reached the 150 mm mark	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	s	≥ 20
Flames have extinguished before reaching mark	12	24	13	24	21	19	13	19	25	20	19	21	22	19	s	-
Ignition of filter paper	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	s	[1]
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): - Warp direction: destroyed or burned length max. 8-9 cm, destroyed width approx. 3-5 cm, sooted above until top edge of the samples - Weft direction: destroyed or burned length max. 8-9 cm, destroyed width approx. 3-5 cm, sooted above until top edge of the samples																

Samples 1: edge flame exposure
Samples 2-6: surface flame (coated side)
Samples 7: surface flame (uncoated side)

*) orientation of the support fabric
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