

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

Reference:	FLT 3731020	(Translation of the German Prüfzeugnis - no guarantee for translation of technical terms)
Sponsor:	KREA Technische Textilien GmbH Kuhleshütte 84 D - 47809 Krefeld	
Order:	2020-09-28	Arrived: 2020-10-02
Description of samples:	On one side coated polyester fabric, named " Royal Majestic ". (for details see page 2)	
Delivered:	2020-10-02	
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 in one layer, suspended freely or with distance of >40 mm to the same or other plain materials. (for details see page 5)	
Validity:	2025-10-31	
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 regarded as the sole proof if the tested building material is used as building product within 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 proof of conformity
- non-regulated building products for the needed proof 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This test certificate must not be published and copied preceding agreement of the test laboratory and if agreed, only during validity and unchanged concerning appearance and contents.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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PÜZ-Stelle (LBO): BRA09

TEST CERTIFICATE



1 Description of test material

1.1 Test material (according to the sponsor)

The material provided is a fabric made of polyester, coated on one side with flame retardant treated polyurethane and acrylic. The coated fabric is intended to be used as banner material or for decorative purposes and was designated with the trade name "Royal Majestic", article 1025-11 by the sponsor.

1.2 Description of the delivered samples

For the tests, a section of a one-sided plastic-coated fabric made of synthetic fibres with a length of approximately 2.1 m and a width of 3.20 m was submitted to the laboratory by the sponsor. The sample was marked with the trade name, article number, sample size and batch T8998023.

Colour: white.

Other specifications are not known to the laboratory, a retain sample is stored.

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

2 Preparation of samples

For the small burner ("Brennkasten") samples for edge flame exposure (dimensions 190 mm x 90 mm) and samples for surface flame exposure (dimensions 230 mm x 90 mm) were cut in warp and in weft orientation of the base fabric.

For the fire shaft ("Brandschacht") tests 4 specimens were assembled. The samples (dimensions 1000 mm x 190 mm) for the test specimens A and C were cut in warp orientation; the samples for the test specimens B and D were cut in weft orientation of the 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 ("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) without edge protection.

Arrangement of all samples: The tests have been carried out in single layer, freely suspended, both from the coated and uncoated surface.

Examination period: October 2020

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

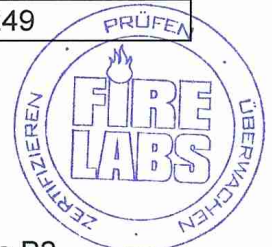
Table 1

Characteristics		Manufacturer's data	Measured values	
			m.v.	s
Total thickness	[mm]	0.37 ± 5 %	0.35	0.005
Weight per unit area	[g/m ²]	220 ± 5 %	249	

m.v. mean value (n=10)

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 3).

4.2.2 Test results class B1 (Brandschacht)

Table 3

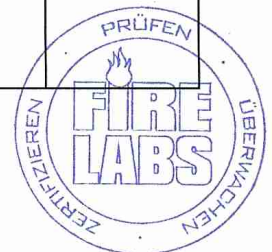
Test results (part 1)						
line no.		Specimen				requirements
		A	B	C	D	
1	<u>Number of specimen arrangement</u> acc. DIN 4102 –15 Table 1	1	1	1	1	
2	<u>Maximal flame height</u> above bottom edge cm	50	50	50	50	*)
3	Time ¹⁾ min	1	1	1	1	
4	<u>Burning / melting through</u> Time ¹⁾min	1	1	1	1	
5	<u>Back side of the specimens:</u> <u>Flames / glowing</u> Time ¹⁾ min	./.	./.	./.	./.	
6	<u>Discolouring</u> Time ¹⁾ min					
7	<u>Falling of burning droplets</u> Begin ¹⁾ min	No	No	No	Yes 1	
8	Extend: Sporadic falling of burning droplets				Yes	
9	Continuous falling of burning droplets				No	
10	<u>Falling of burning parts</u> Begin ¹⁾ min	No	No	No	No	
11	Extend: Sporadic falling of burning parts					
12	Continuous falling of burning parts					
13	<u>Afterflame time at the bottom of the sieve (max.)</u> min:s	./.	./.	./.	0:05	
14	<u>Impairment of the burner flames by dropping or falling Material</u> Time ¹⁾ min:s	./.	./.	./.	./.	
15	<u>Premature end of test</u> Final occurrence of burning at the specimen ¹⁾min	2	2	2	2	
16	Time of eventually end of test ¹⁾ min:s	./.	./.	./.	./.	

¹⁾ Indication of time: from the beginning of testing procedure

- Not tested

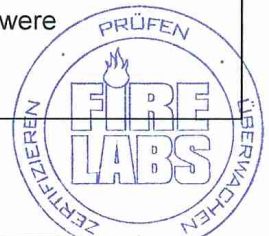
./. Not occurred

*) No cause for complaint



Test results (part 2)						
line no.		Specimen				requirements
		A	B	C	D	
17	<u>Afterflame after end of test</u> Timemin:s	No	No	No	No	
18	Number of specimen					
19	Front side of specimen					
20	Back side of specimen					
21	Flame lengthcm					
22	<u>Afterglow after end of test</u> Timemin: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	33.0	35.2	37.0	29.3	
29	≥ 400 % min (very strong smoke density)	./.	./.	./.	./.	
30	Diagram fig. no.	1	3	5	7	
31	<u>Residual length</u> Individual valuecm	49 54 52 54	49 44 61 47	50 48 52 53	43 48 48 47	> 0
32	Average valuecm	52	50	50	46	≥ 15
33	Photo of test specimen fig. no.	2	4	6	8	
34	<u>Flue gas temperature</u> Maximum of average value... °C	114	116	114	116	≤ 200
35	Time ¹⁾min:s	9:56	9:52	9:52	9:10	
36	Diagram fig. no.	1	3	5	7	
37	<p><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: Due to the residual length of > 45 cm no additional tests were proceed (DIN 4102-16, 5.2 b)). (Diagrams and photos see Appendixes 1, 2)</p>					

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



Specimen	Test-no.	Side of flame impingement	Direction of support fabric
A	731020-001	coated side	warp
B	731020-002	uncoated side	
C	731020-003	coated side	weft
D	731020-004	uncoated side	

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 by outdoor weathering)
- after washing or cleaning with chemicals

is not 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 regarded as the sole proof if the tested building material is used as a building product within the meaning of state building prescriptions (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 not 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 2025-10-31, provided that the test methods, the classification rules and the technology do not change during this period.

Borkheide, 1st of November 2020



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

This translation was issued the 1st of November 2020, in a case of doubt the German version is valid solely.

Test specimen A

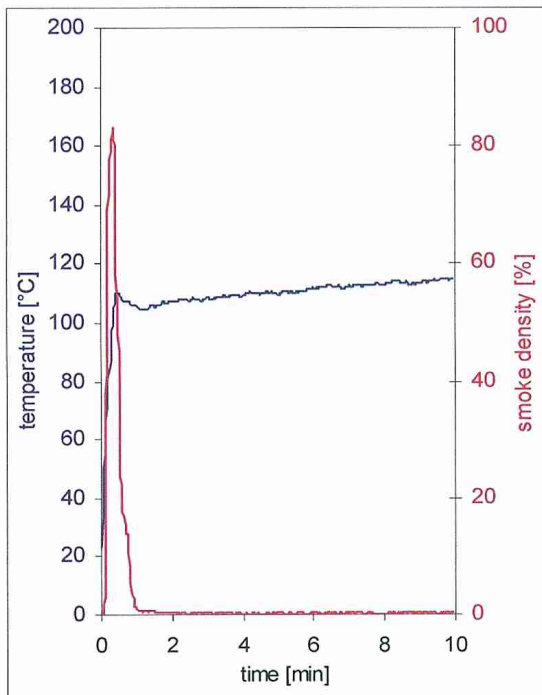


fig. 1
Graphs of the flue gas temperature and the smoke density

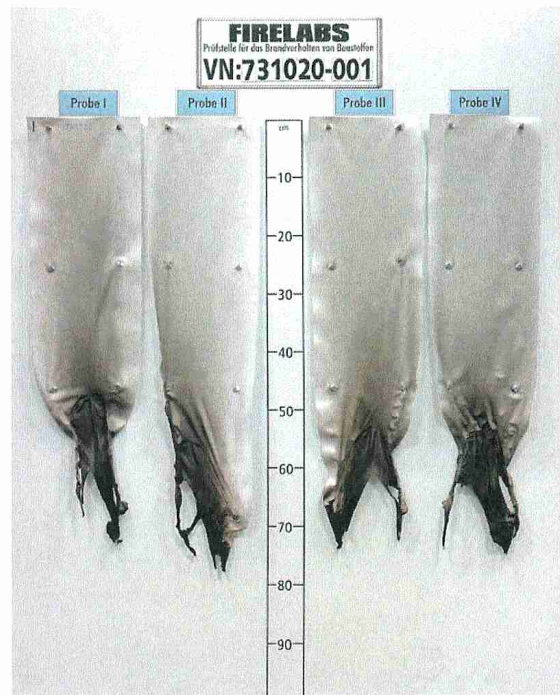


fig. 2
View of test specimen after the test

Test specimen B

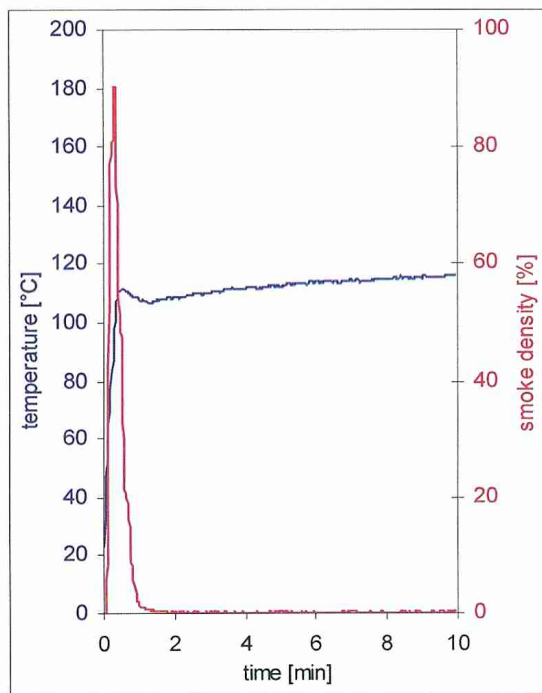


fig. 3
Graphs of the flue gas temperature and the smoke density



fig. 4
View of test specimen after the test

Test specimen C

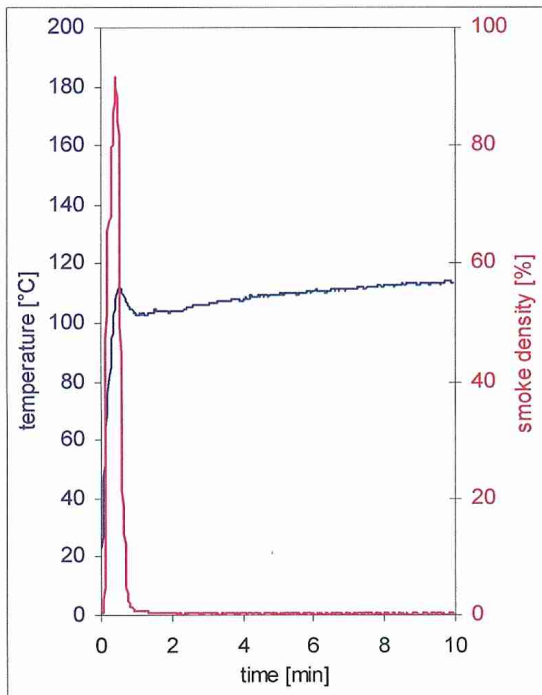


fig. 5
Graphs of the flue gas temperature and the smoke density

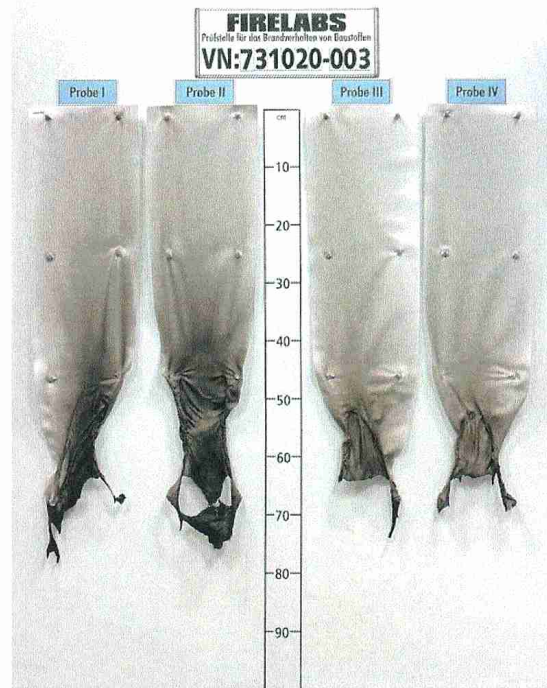


fig. 6
View of test specimen after the test

Test specimen D

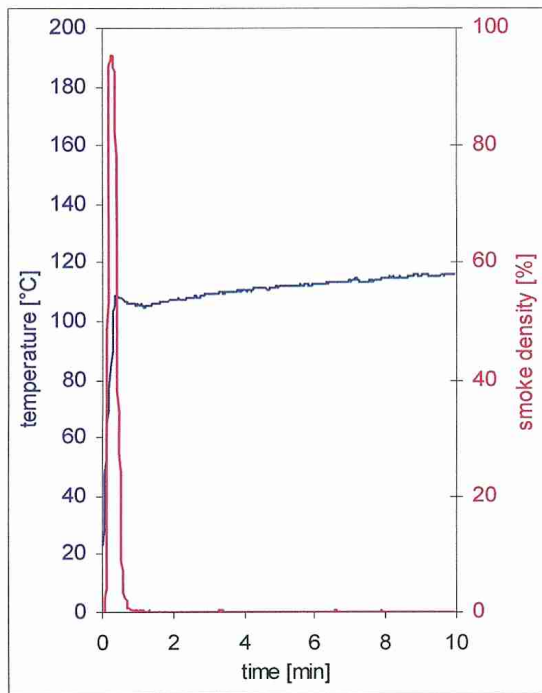


fig. 7
Graphs of the flue gas temperature and the smoke density



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

Test results small burner ("Brennkasten") tests

Table 2

Sample-No.	Warp direction							Weft direction							Dim.	Requirements
	1	2	3	4	5	6	7	1	2	3	4	5	6	7		
Ignition of the sample	1	1	1	1	1	3	3	1	1	1	1	1	3	3	s	-
Maximum flame height	5	8	5	7	6	5	8	9	7	8	9	6	7	6	cm	-
Time of the maximum	4	6	6	7	5	10	14	10	6	8	8	7	12	11	s	-
Flame tip reached the 150 mm mark	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	./.	s	≥ 20
Extinction of flames	5	7	7	8	6	16	16	11	6	13	10	8	14	16	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):

In the area of the impingement point the samples were destroyed up to a max. height of approx. 8 cm and approx. 2 cm in width, soot above until top edge of the sample.

Samples 1-5: Edge flame exposure

Samples 6: Surface flame exposure uncoated surface

Samples 7: Surface flame exposure 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

