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Institut für Baustoffe, Massivbau und Brandschutz | Materialprüfanstalt für das Bauwesen

Test Certificate

- Translation -

Document No.:	(3728/336/11) – Het of 30/06/2011
Client:	KAPP-CHEMIE GmbH & Co. KG Industriestr. 2-4 56357 Miehlen
Order date:	06/04/2011
Order Ref.:	Dr Pesch
Subject:	Building material class DIN 4102-B1 classification tests (low flammability)
Specimen:	Flame retardant for textiles Product name: KAPPAFLAM CFP
Test basis:	DIN 4102-16 : 1998-05 DIN 4102-1 : 1998-05, section 6.1
Material received:	06/04/2011
Samples produced by:	MPA Braunschweig staff
Valid until:	30/06/2016

Note:

If the above-mentioned building material is not used as a construction product in accordance with master building code MBO clause 2, paragraph 9 (1), a General Building Code Test Certificate (abP) is not required. This Test Certificate shall not be applicable if the tested building material is used as a construction product within the meaning of Federal State Building Codes (MBO clause 17, para. 3). This Test Certificate does not replace an attestation that may be required under federal state building code/building law regulations.

In the building code procedure, this Test Certificate can be used as a basis

- for the required declaration of conformity (for construction products for which standards are available),
- for the required general type approval (for construction products for which no standards are available).

Special attention shall be given to the explanations in DIN 4102-1 : 1998-05, Annex D, in particular regarding external quality control (inspection).

This Test Certificate consists of 6 pages, including the cover sheet, and 5 annexes.

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IBAN: DE58250500000106020050

Notified body (0761-CPD)
MPA Braunschweig has been approved and notified as a civil engineering supervisory, inspection and certification body. MPA Braunschweig has been ISO/IEC17025 accredited as a testing and calibration laboratory and ISO/IEC17020 accredited as an inspection body.

Materialprüfanstalt f. d. Bauwesen MPA BS 3.1 Braunschweig

1 General

This Test Certificate evaluates the test results and defines the classification that is assigned to the product described below on the basis of the method specified in DIN 4102-1 : 1998-05.

2 Description of the material used in the test

Designation used by the client: Kappaflam CFP

The product is a cellulose-based fire retardant for textiles and non-woven materials. It is a white, crystalline powder consisting of different nitrogenous inorganic salts. The powder has a bulk weight of approx. 950 grams/litre.

Fabrics with a Kappaflam CFP finish are not fast to washing, but they are fast to dry cleaning.

3 Specimen preparation

The test material was delivered in plastic bottles with a volume of approx. 500 grams. For preparation of the specimens, the following cotton fabric served as material requiring protection. For preparation of the impregnation liquid, a batch of 150 grams of fire retardant was used for one litre of water (150 g/ltr).

Type of fabric	Weight per unit area (g/m^2)	Thickness (mm)	Dry absorption rate of the fire retardant (g/kg)
Cotton fabric (plain weave)	137	0.35	330
Cotton fabric (plain weave)	267	0.70	321

Before the test (after a constant weight had been reached), the fabrics with the fire retardant finish were stored in an air-conditioned room at a temperature of 21 °C ± 2 °C and a relative air humidity of 50 % ± 5 %.

4 Test procedure

The Brandschacht reaction-to-fire test was performed in accordance with DIN 4102-16 : 1998-05, section 7.19. The specimens were tested in the freely suspended state on 03/05/2011.

The small burner tests were performed on 03/05/2011 in compliance with the specifications in DIN 4102-1 : 1998-05, section 6.2. The specimens were tested in the freely suspended state with their edges and surfaces exposed to the flames.

5 Test results

5.1 Test results (cotton with a weight per unit area of 137 g/m²)

5.2.1 Results of Brandschacht reaction-to-fire test (DIN 4102-1 : 1998-05, section 6.1)

Number of test	Mean residual length (cm)	Max. temperature of the combustion gas (°C)	Smoke gas turbidity (%*min)
1	51 / 40 51 / 43 mean value: 46	102	10

Test record: see annexes 1 to 4

Photos of the specimen: see annex 5

5.1.2 Test results of burning cabinet test (DIN 4102-1 : 1998-05, section 6.2)

5.1.2.1 Flames applied to edges (freely suspended specimen)

Sam-ple	Direction	The material ignited after	Max. height of flame tip during the test (15s + 5s)	Measuring mark reached after	Flame died down after	Afterglow observed for	Burning droplets after	Ignition of filter paper	Smoke production
		s	cm	s	s	s	s		
1	Warp	2	3	--	13	--	--	No	Low
2	Warp	1	3	--	14	--	--	No	Low
3	Warp	2	3	--	17	--	--	No	Low
4	Weft	1	3	--	14	--	--	No	Low
5	Weft	1	3	--	11	--	--	No	Low
6	Weft	1	3	---	14	--	--	No	Low

Time specifications based on start of test

5.1.2.2 Flames applied to the surface (freely suspended specimen)

Sam-ple	Direction	The material ignited after	Max. height of flame tip during the test (15s + 5s)	Measuring mark reached after	Flame died down after	Afterglow observed for	Burning droplets after	Ignition of the filter paper	Smoke production
		s	cm	s	s	s	s		
1	Warp	7	4	--	15	--	--	No	Moderate
2	Warp	7	5	--	15	--	--	No	Moderate
3	Warp	7	4	--	15	--	--	No	Moderate
4	Weft	6	5	--	15	--	--	No	Moderate
5	Weft	7	5	--	15	--	--	No	Moderate
6	Weft	7	4	---	15	--	--	No	Moderate

Time specifications based on start of test

5.2 Test results (cotton with a weight per unit area of 267 g/m²)

5.2.1 Results of Brandschacht reaction-to-fire test (DIN 4102-1 : 1998-05, section 6.1)

Number of test	Mean residual length (cm)	Max. temperature of the combustion gas (°C)	Smoke gas turbidity (%*min)
1	32 / 37 37 / 34 mean value: 35	107	15
2	41 / 37 41 / 39 mean value: 40	105	18
3	38 / 38 37 / 39 mean value: 38	114	16

Test record: see annexes 1 to 4

Photos of the specimen: see annex 5

5.2.2 Test results of burning cabinet test (DIN 4102-1 : 1998-05, section 6.2)

5.2.2.1 Flames applied to edges (freely suspended specimen)

Sam-ple	Direction	The material ignited after	Max. height of flame tip during the test (15s + 5s)	Measuring mark reached after	Flame died down after	Afterglow observed for	Burning droplets after	Ignition of the filter paper	Smoke production
		s	cm	s	s	s	s		
1	Warp	1	3	--	15	--	--	No	Low
2	Warp	1	3	--	15	--	--	No	Low
3	Warp	1	3	--	15	--	--	No	Low
4	Weft	1	3	--	15	--	--	No	Low
5	Weft	1	3	--	15	--	--	No	Low
6	Weft	1	3	--	15	--	--	No	Low

Time specifications based on start of test

5.2.2.2 Flames applied to the surface (freely suspended specimen)

Sam-ple	Direction	The material ignited after	Max. height of flame tip during the test (15s + 5s)	Measuring mark reached after	Flame died down after	Afterglow observed for	Burning droplets after	Ignition of the filter paper	Smoke production
		s	cm	s	s	s	s		
1	Warp	12	5	--	15	--	--	No	Low
2	Warp	13	4	--	15	--	--	No	Low
3	Warp	10	4	--	15	--	--	No	Low
4	Weft	10	5	--	15	--	--	No	Low
5	Weft	11	4	--	15	--	--	No	Low
6	Weft	11	4	---	15	--	--	No	Low

Time specifications based on start of test

6 Summarised assessment of the "KAPPAFLAM CFP" fire retardant for textiles

6.1 Assessment when applied to cotton fabric with a weight per unit area of 137 g/m²

Test details	Requirements (DIN 4102-1)	Test results
DIN 4102-1; section 6.1 (Brandschacht)	Residual length (mean value) > 15 cm Combustion-gas temperature ≤ 200 °C	46 cm 102 °C
DIN 4102-1, section 6.2 (small burner)	Flames applied to edges < 15 cm Burning droplets	3 cm No
	Flames applied to surface < 15 cm Burning droplets	5 cm No

The product conforms with the requirements that have to be met in accordance with DIN 4102-1, section 6.1, for building material class B1 classification.

6.2 Assessment when applied to cotton fabric with a weight per unit area of 267 g/m²

Test details	Requirements (DIN 4102-1)	Test results
DIN 4102-1; section 6.1 (Brandschacht)	Resid. length (mean value) > 15 cm Combustion-gas temp. ≤ 200 °C	35 cm / 40 cm / 38 cm 107 °C / 105 °C / 114 °C
DIN 4102-1, section 6.2 (small burner)	Flames applied to edges < 15 cm Burning droplets	3 cm No
	Flames applied to surface < 15 cm Burning droplets	5 cm No

The product conforms with the requirements that have to be met in accordance with DIN 4102-1, section 6.1, for building material class B1 classification.

7 Classification

When applied to cellulose fabric, the "KAPPAFLAM CFP" flame retardant has to be classified under the

DIN 4102 – B1

building material class in accordance with DIN 4102-1 : 1998-05

The classification applies to the following product parameters (in accordance with the regulations in DIN 4102-16, section 7.16.2):

Component	Product parameter	The classification applies to
"KAPPAFLAM CFP" flame retardant	Application rate	≥ 150 g/l
	Dry absorption rate per unit weight of the fabric	≥ 320 g/kg
	Bulk density of the powder	approx. 1000 kg/m³
Fabric	Type of fabric	Cellulose
	Weight per unit area	≥ 50 g/m²
Substrate	Distance from other two-dimensional building products	≥ 40 mm

The flame retardant finish is not fast to washing. Proof of the reaction to fire after dry cleaning has not been furnished.

8 Special notes

8.1 The results achieved in the fire test only apply to the product as described in section 2 above. When other kinds of textiles are used, or in connection with a lower dry absorption rate, the reaction to fire may be adversely affected so that the classification in section 7 will no longer apply. The reaction to fire of the product when two-dimensionally bonded to other materials shall be separately demonstrated in compliance with DIN 4102-1 : 1998-05.

8.2 The validity of the Test Certificate (3728/336/11)-Het – dated 30 June 2011 expires on 30 June 2016.

8.3 The validity period may be extended only when based on the future building code requirements.

This document is the translated version of Test Certificate 3728/336/11 – Het dated 30/06/2011. The legally binding text is the aforementioned German Test Certificate.

ORR Dr. -Ing. G. Blume
Head of Testing Laboratory

Materialprüfanstalt f. d. Bauwesen MPA BS 3.1 Braunschweig

i.A.
Tech.- Ang. K. Feustel-Prause
Engineer/official in charge

Braunschweig, 30 June 2011

iBMB MPA TU BRAUNSCHWEIG

Ergebnisse der Brandschachtprüfung

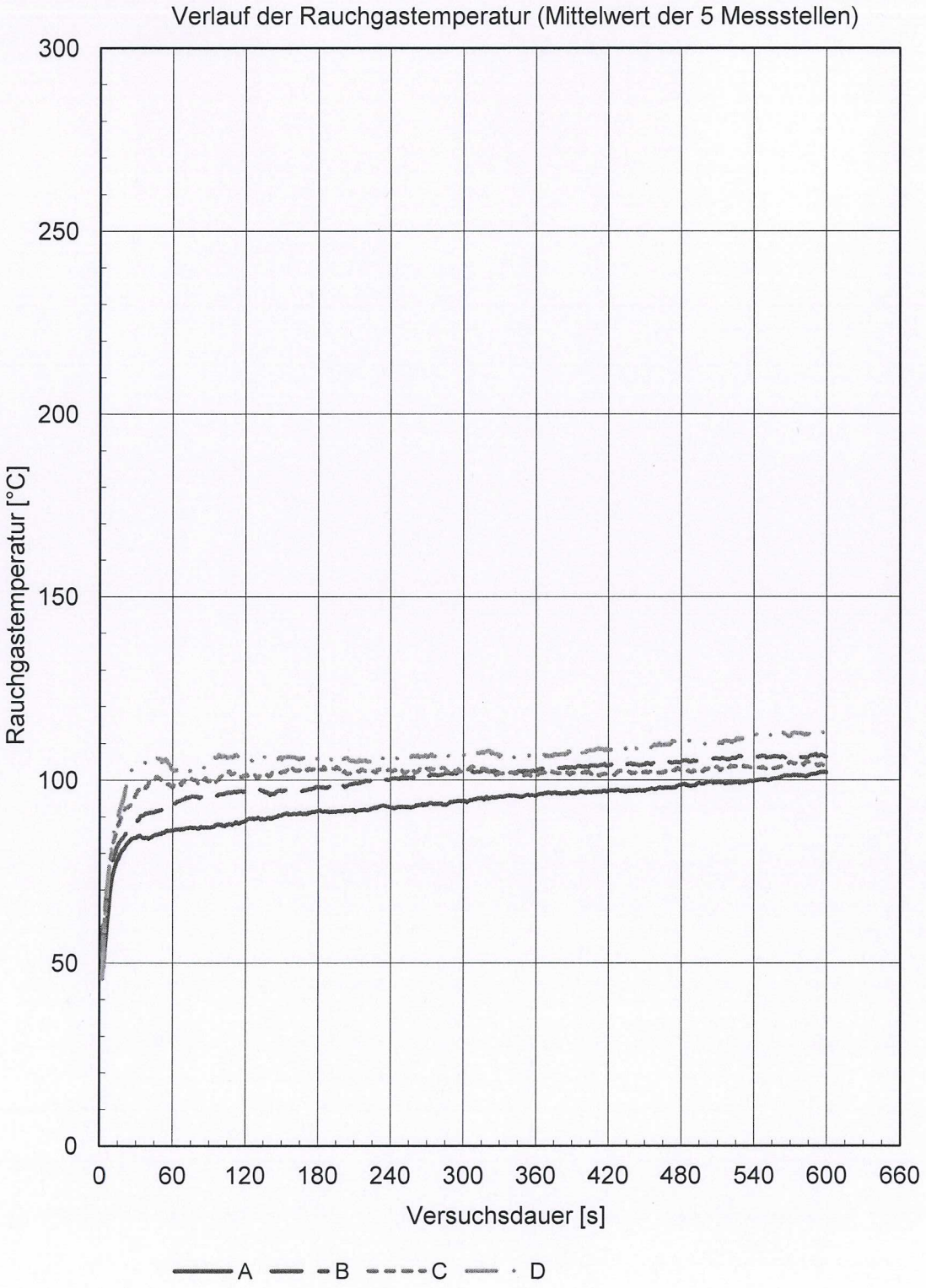
Prüfdatum: 27.06.2011

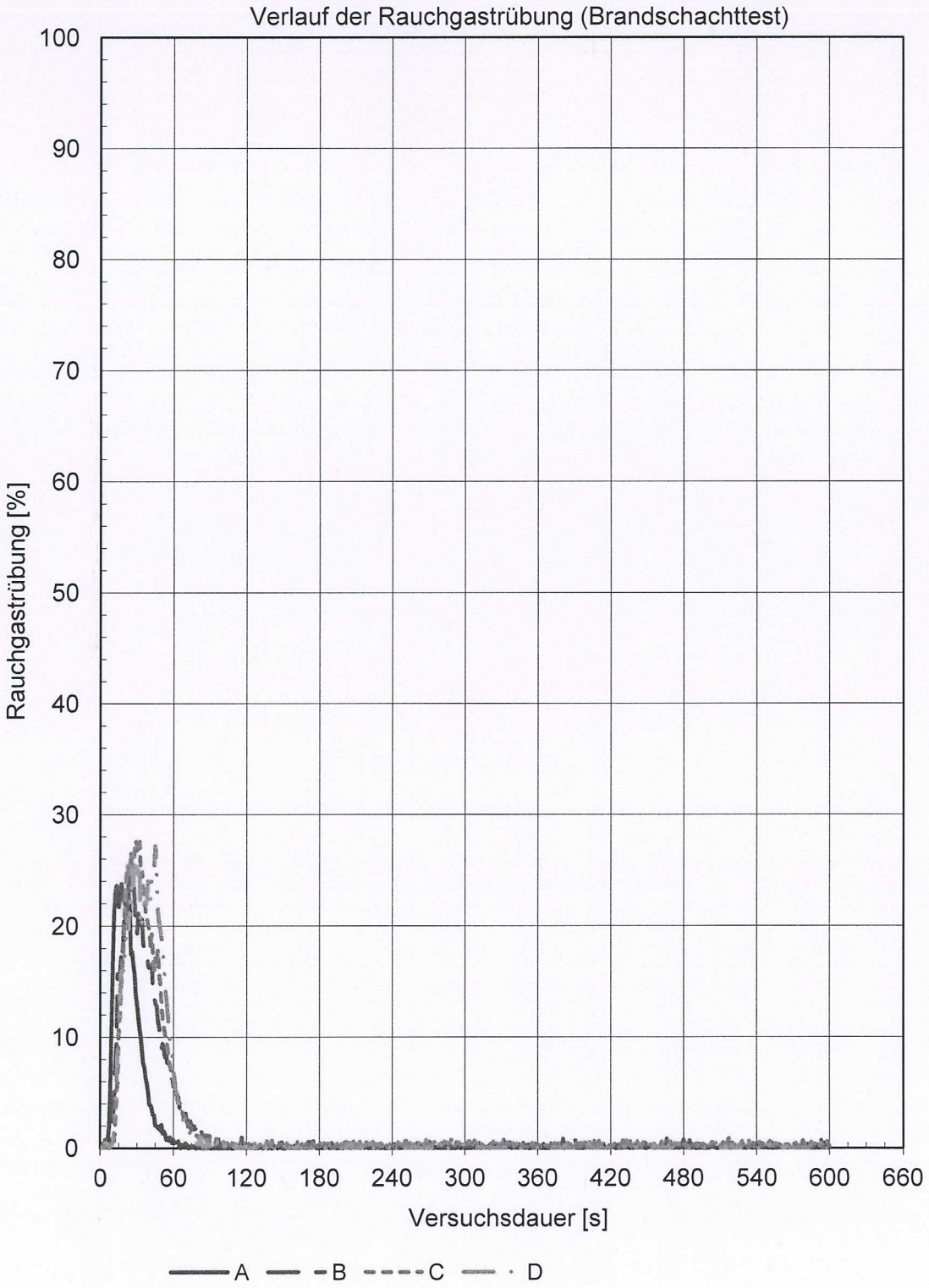
Probekörper A : Baumwolle 137g/m², getränkt mit Flammschutzmittel KAPPAFLAM CFP.
Probekörper B, C und D : Baumwolle 267g/m², getränkt mit Flammschutmittel KAPPAFLAM CFP.
Das Material wurde freihängend geprüft.

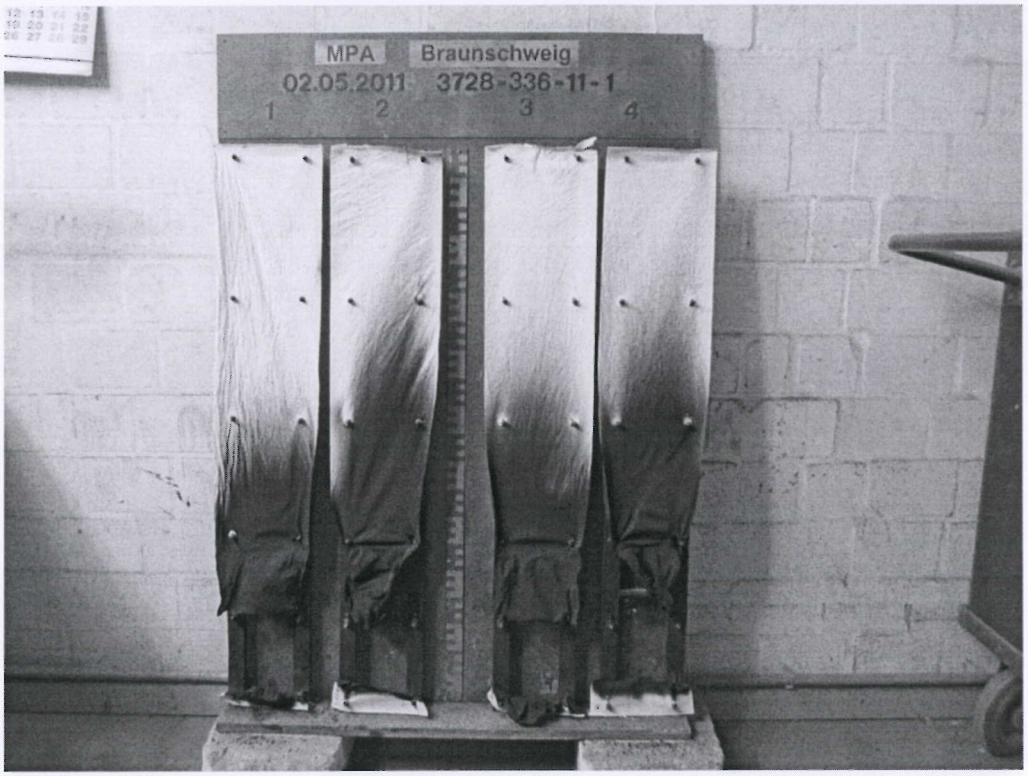
Ergebnisse der Brandschachtprüfung (Teil 1)						
Zeilen-Nr			Messwerte/Probekörper			
			A	B	C	D
1	Nr. der Probenanordnung gemäß DIN 4102-15 : 1998-05, Tabelle 1		1	1	1	1
2	Max. Flammenhöhe über Probenunterkante	[cm]	50	50	60	60
3	Zeitpunkt *)	[min]	0-1	0-2	0-1	0-1
	Durchschmelzen / Durchbrennen					
4	Zeitpunkt *)	[min:s]	00:26	05:00	01:07	00:45
	Feststellungen an der Probenrückseite					
5	Flammen / Glimmen, Zeitpunkt *)	[min:s]	00:17	00:52	00:36	00:22
6	Verfärbungen, Zeitpunkt *)	[min:s]	00:05	00:07	00:06	00:05
	Brennendes Abtropfen					
7	Beginn *)	[min:s]	--	--	--	--
	Umfang:					
8	vereinzelnd abtropfendes Probenmaterial		--	--	--	--
9	stetig abtropfendes Probenmaterial		--	--	--	--
	Brennend abfallende Probenteile					
10	Beginn *)	[min,s]	--	--	--	--
	Umfang:					
11	vereinzelnd abfallende Probenteile		--	--	Ja	Ja
12	stetig abfallende Probenteile		--	--	--	--
13	Dauer des Weiterbrennens auf		--	--	--	--
	dem Siebboden (max)	[min:s]	--	--	--	--
	Beeinträchtigung der Brennerflamme durch abtropfendes / abfallendes Material					
14	Zeitpunkt ab*)	[min:s]	00:37	03:47	01:50	01:38

*) Zeitangaben gelten ab Versuchsbeginn

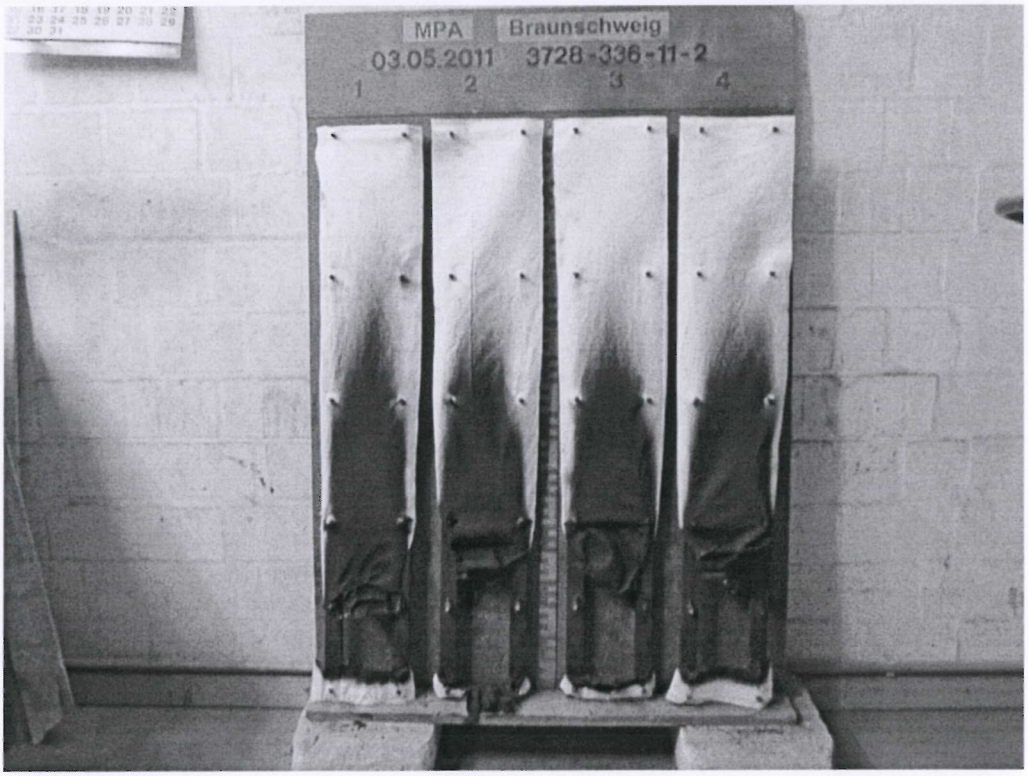
Ergebnisse der Brandschachtprüfung (Teil 2)						
Zeilen-Nr			Messwerte /Probekörper			
			A	B	C	D
15	Vorzeitiges Versuchsende Ende des Brandgeschehens an der Probe *)	[min:s]	--	--	--	--
16	Zeitpunkt eines ggf. erfolgten Abbruchs *)	[min:s]	--	--	--	--
	Nachbrennen nach Versuchsende					
17	Dauer	[min:s]	--	--	--	--
18	Anzahl der Proben		--	--	--	--
19	Probenvorderseite		--	--	--	--
20	Probenrückseite		--	--	--	--
21	maximale Flammenlänge	[cm]	--	--	--	--
	Nachglimmen nach Versuchsende					
22	Dauer	[min:s]	--	--	--	--
	Ort des Auftretens:					
23	Anzahl der Proben		--	--	--	--
24	untere Probenhälfte		--	--	--	--
25	obere Probenhälfte		--	--	--	--
26	Probenvorderseite		--	--	--	--
27	Probenrückseite		--	--	--	--
	Rauchdichte					
28	< 400	[%*min]	9,9	15,3	17,9	16,3
29	> 400 (sehr starke Rauchentwicklung)	[%*min]	--	--	--	--
30	Diagramm in Anlage Nr.		4	--	--	--
	Restlängen **)		51 40	32 37	41 37	38 38
31	Einzelwerte:	[cm]	51 43	37 34	41 39	37 39
32	Mittelwerte der Einzelversuche	[cm]	46	35	40	38
33	Foto des Probekörpers in Anlage Nr.		5	--	--	--
	Mittelwert aller Versuche	[cm]				
	Rauchgastemperatur					
34	Max. des Mittelwertes	[°C]	102,2	107,1	105,1	113,6
35	Zeitpunkt *)	[min:s]	09:55	09:51	09:44	09:52
36	Diagramm in Anlage Nr.		3			
37	Bemerkungen:					


Verlauf der Rauchgastemperatur (Mittelwert der 5 Messstellen)
Rauchgastemperatur [°C]
300
250
200
150
100
50
0
0
60
120
180
240
300
360
420
480
540
600
660
Versuchsdauer [s]
A
B
C
D


Verlauf der Rauchgastrübung (Brandschachttest)
Rauchgastrübung [%]
100
90
80
70
60
50
40
30
20
10
0
0
60
120
180
240
300
360
420
480
540
600
660
Versuchsdauer [s]
A
B
C
D



View of the specimens (cotton fabric with weight per unit area of 137 g/m², with "KAPPAFLAM CFP" fire retardant) after the "Brandschacht" reaction to fire test



View of the specimens (cotton fabric with weight per unit area of 137 g/m², with "KAPPAFLAM CFP" fire retardant) after the "Brandschacht" reaction to fire test