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

Test certificate

Document number:	(3785/061/12)- Het from March 12th 2012
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Assignment date:	January 12th 2012
Assignment symbol:	Birdal
Assignment content:	Enforcement of tests for classifying the fire performance according to DIN 4102-B1: Building material class DIN 4102-B1 (non-flammable)
Test object:	Aluminium-cladding sheet with PE core (FR)
Test basics:	DIN 4102-16: 1998-05 DIN 4102-1 :1998-05, Section 6.1 DIN 4102-1 :1998-05, Section 6.2
Test entry:	January 12th 2012
Sampling:	by purchaser
Duration of validity:	March 01st 2017

This test certificate covers 5 pages including a cover sheet and 7 attachments.

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Material testing laboratory for the structural engineering
MPA BS 3.1
Braunschweig

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1 General Information

This test certificate evaluates the test results and defines the classification, which is attached to the shown process with the product in DIN 4102-1 : 1998-05.

2 Description of the test sample

The test sample is a cladding sheet, which is covered double-sided with Aluminium-Cover panels. The core of the cladding sheet is a plastic plane made of polyethylene with additions of flame retardants.

Product description	Thickness (mm)	Area density (kg/m^2)	Density (kg/m^3)
Cladding sheet with the following board structure:	4,2*	7,19*	-
- Aluminium-Cover panels (varnished)	0,5*	ca. 1,35	—
- PE-Insulating layer (FR)	3	ca. 4,49	ca. 1500
- Aluminium-Cover panels (varnished)	0,5	ca.1,35	-

'proofed with the measuring of the testing place

3 Manufacture of the test pieces

The following test pieces were delivered for the fire tests:

- Fire shaft test: 12 Panels with the measurements 100 cm x 19 cm
- Small burner test: 5 Panels with the measurements 23 cm x 9 cm

5 Panels with the measurements 19 cm x 9 cm

The test pieces are being stocked in a climatized room at a temperature of 22 °C ± 1 °C and a humidity of 50 % ± 5 % till the test.

4 Transaction of the test

The tests in the fire shaft were made according to DIN 4102-16 : 1998-05. The tests took part in April 14th 2011. The product was proofed with a cross mortise (horizontal mortise: 50 cm from the bottom edge of the panel, vertical panel: central).

The small burner tests were made according to DIN 4102-1 : 1998-05, Section 6.2. The tests took part in April 14th 2011. The tests were proofed at edges- and area burnings.

5. Test results

5.1. Results of the fire shaft test (DIN4102-1 : 1998-05, Section 6.1)

Test Number	Central rest length (cm)	Max. Flue gas temperature (°C)	Flue gas dulling (%*min)	Max. Flame height (cm)
1	33/37 37/34 Average value: 35	160	30	> 100 From the 8th minute
2	36/35 31/34 Average value: 34	154	28	> 100 From the 9th minute
3	36/35 35/41 Average value: 37	160	18	> 100 From the 9th minute

Test protocol: look at the attachments 1-4
Pictures of the test pieces: look at the attachments 5-6

5.2. Test results in saggar (DIN 4102-1 :1998-05, Section 6.2)

5.2.1. Results of the edges burning

Test	Inflaming of the Materials	Max. height of the Flame top during the test (15s + 5s)	Reference mark achieved after	Going out of the flame	Duration of the after glow	Burning drain after	Inflaming of the filter paper	Smoke development
	s	mm	s	s	s	s		
1	-	Torch flame	-	15	-	-	No	Very low
2	--	Torch flame	~	15	-	-	No	Very low
3	-	Torch flame	-	15	-	-	No	Very low
4	--	Torch flame	--	15	-	-	No	Very low
5	--	Torch flame	--	15	-	-	no	Very low

Time beginning with the test

5.2. Test results of the area burning

Test	Inflaming of the Materials	Max. height of the Flame top during the test (15s + 5s)	Reference mark achieved after	Going out of the flame	Duration of the after glow	Burning drain after	Inflaming of the filter paper	Smoke development
	s	mm	s	s	s	s		
1	1	Torch flame	-	15	-	-	No	Very low
2	1	Torch flame	~	15	-	-	No	Very low
3	1	Torch flame	-	15	-	-	No	Very low
4	1	Torch flame	--	15	-	-	No	Very low
5	1	Torch flame	--	15	-	-	no	Very low

Time beginning with the test

6 Summarized evaluation

Test	Requirements (DIN 4102-1)	Test results
DIN 4102-1; Section 6.1 (Fire shaft)	**Rest length (average) ≥ 15 cm** **Flue gas temperature ≤ 200 °C**	**35 cm / 34 cm / 37 cm 160 °C / 154 °C / 160 °C**
DIN 4102-1, Section 6.2 (Small burner)	**Edges burning < 15 cm Burning Drain**	**Torch flame no**
	Area burning < 15 cm Burning Drain	**Torch flame no**

The product fulfils the requirements, which are given according to DIN 4102-1, Section 6.1, for the Classification of the burning as building material class B1.

The product is not burning drain.

7 Classification

The Aluminium-Sandwich panel with the PE-Core (Nominal thickness: 4 mm) has to be enqueued to the following building material class according to DIN 4102-1 : 1998-05:

DIN 4102 – B1

The classification is valid for the following product parameter:

Components	Product parameter	Validity area of classification
Aluminium panel	Thickness	0,5 mm + 0,1 mm
PE-Insulation board (FR)	Plastic type	Polyethylene with addition of flame retardants
	Thickness	3,0 mm ± 0,1 mm
	Density	1500 kg/m^3 ± 50 kg/m^3
Underground		A distance of ≥ 40 mm to the other areal building materials

8. Special notes

8.1 The burning test result is just valid for the described product in section 2. The fire performance can be influenced so unpropitious in connection with other building materials or at other panel thicknesses, that the classification in section 7 is not valid. The fire performance of the product is to be proofed separate according to DIN 4102-1 : 1998-05 in connection with the other materials or at other plane thicknesses .

8.2 The validity of the test certificate (3785/061/12)-Het – of March 12th 2012 ends in March 01st 2017.

8.3 The duration of validity just can be extended in dependence of the requirements of the responsible persons.

ORR. Dr. Ing. A. Rohling <Stamp exists> Teeh. Ang. K. Feustel-Prause
Directorate of the testing place Official in charge
<Signature>

Results of the fire shaft test

Test date: February 15th 2012

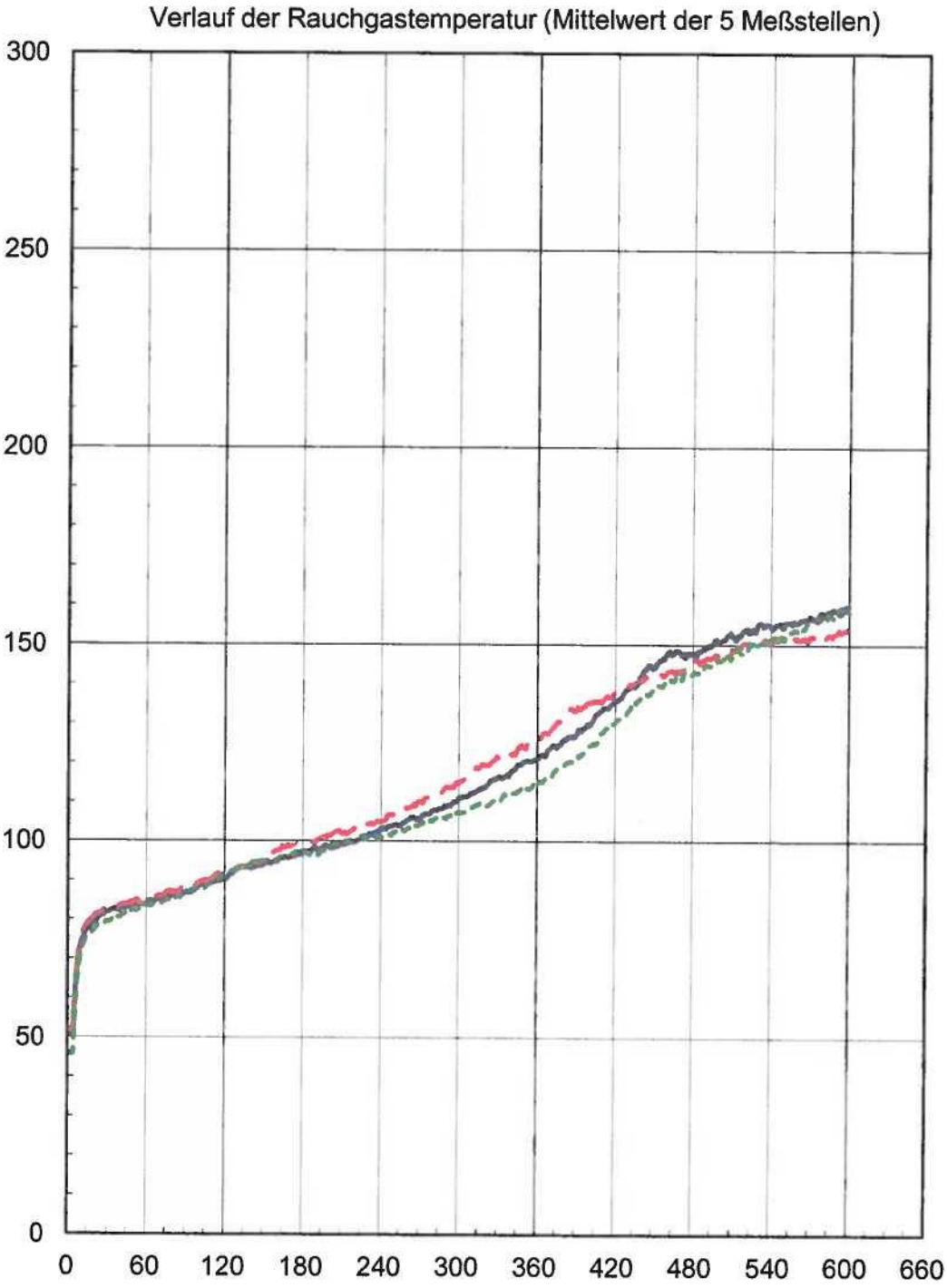
Test pieces A, B and C: Sandwich panel with PE-Core (FR) and Aluminium-top coat. The material was proofed.

Results of the fire shaft test (Part1)				
Line-Nr	**Measurement/Test pieces**			
	A	**B**	**C**	**D**
1 Nr. of the test instruction According DIN 4102-15 : 1998-05, table 1	**7**	**7**	**7**	
2 Max. flame height Over test bottom edge [cm]	**>100**	**>100**	**>100**	
3 Time *) [min]	**8-9**	**9-10**	**8-9**	-
Blowout / Burning Drain 4 Time *) [min:s]	-------	-------	-------	-------
Determination on the test back 5 Flames / Glow, Time *) [min:s]	-------	-------	-------	-------
6 Colourings, Time *) [min:s]	**5:18**	**4:17**	**5:08**	-
Burning drain 7 Beginning *) [min:s]	-------	-------	-------	-------
Size: 8 separate draining test material	-------	-------	-------	-------
9 continual draining test material	-------	-------	-------	-------
Falling off after burning test material 10 Beginning *) [min,s]	**10:42**	-------	-------	-------
Size: 11 separate falling off of test material	**yes**	-------	-------	-------
12 continual falling off of test material	-------	-------	-------	-------
13 Duration of the burning on the perforated plate (max) [min:s]	**0:19**	-------	-------	-------
Interference of the torch flame by draining material 14 time*) [min:s]	-------	-------	-------	-------

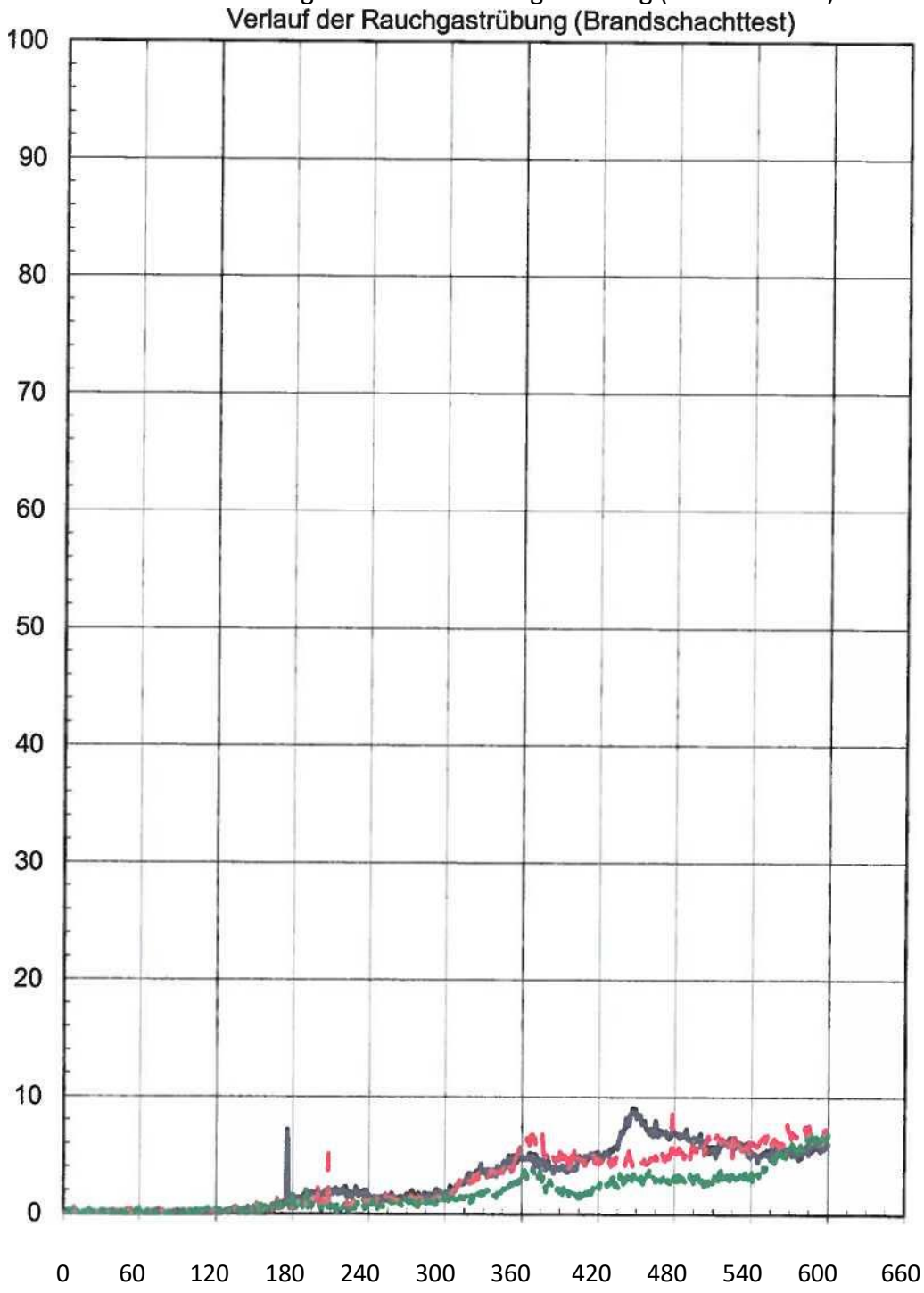
*) The time begins with the test beginning

Results of the fire shaft test (Part 2)						
Line-Nr			Measurement/Test pieces			
			A	B	C	D
15	Preterm test ending of the flame in the test *)	[min:s]	------	------	------	------
16	Time of an abort *)	[min:s]	------	------	------	------
	After burning after test ending					
17	Duration	[min:s]	3:29	7:05	1:30	------
18	Number of tests		4	4	4	------
19	Test front side		4	4	4	------
20	Test back side		------	------	------	------
21	Max. flame lenght	[cm]	40	40	20	------
	After glow after test ending					
22	Duration	[min:s]	------	------	------	------
	Place of occuring:					
23	Number of tests		------	------	------	------
24	Low test half		------	------	------	------
25	High test half		------	------	------	------
26	Test front side		------	------	------	------
27	Test back side		------	------	------	------
	Smoke density					
28	< 400	[%*min]	30	28	18	-
29	> 400 (very strong smoke development)	[%*min]	------	------	------	------
30	Diagram in Attachment Nr.		4	4	4	------
	Rest length **)		33 37	36 35	36 35	------
31	Separate values:	[cm]	37 34	31 34	35 41	------
32	Average of separate tests	[cm]	35	34	37	------
33	Photo of test piece in Attachment Nr.		5	6	7	------
	Average of all tests	[cm]				
	Flue gas temperature					
34	Max. of the average value	[°C]	160	154	160	------
35	Time *)	[min:s]	10:00	10:00	10:00	------
36	Diagram in Attachment Nr.		3	3	3	
37	Notes:					

Progression of the flue gas temperature (average value of the 5 measurements)



Progression of the flue gas dulling (Fire shaft test)



Top view of Sistem Metal – Test piece A after the fire shaft test (experiment 1)

Top view of Sistem Metal - Test piece A after the fire shaft test (experiment 1), cap plates were deleted in test piece 4

Top view of Sistem Metal - Test piece B after the fire shaft test (experiment 2)

Top view of Sistem Metal - Test piece B after the fire shaft test (experiment 2), cap plates were deleted in test piece 4

Top view of Sistem Metal – Test piece C after the fire shaft test (experiment 3)

Top view of Sistem Metal - Test piece C after the fire shaft test (experiment 3), cap plates were deleted in test piece 4