

Test laboratory for the fire behavior of building materials, Dipl.-Ing. (FH) Andreas Hoch
Testing, supervising and certifying body, authorized by the building supervision authority

TEST REPORT

PZ-Hoch-181243

For the proof of Fire behaviour according to DIN 4102, part 1

Translation of the German test report – no guarantee for translation of technical terms

Company	MIG mbH Material Innovative Gesellschaft mbH Am Gararock 3 D – 33154 Salzkotten
Description of samples	white silicone resin paint with mineral filler and colourless primer for hydrophobizing
Name of the material	„MIG DHMb® Lining System" composed of „MIG-ESP® Exterior" and „MIG-ESP® Primer“ on gypsum plasterboard
Sampling	by the company itself
Content of request	Proof of fire behaviour of building materials according to DIN 4102, part 1
Validity of the test report	30.11.2023
Result	The examined product meets with the requirements of class A2 for non-combustible building materials according to DIN 4102, part 1 (May 1998), with an applied quantity of the primer of 200 lm/m² and the silicone resin paint of twice 200 g/m² on massive mineral underground with a density ≥ 1500 kg/m³ and a thickness of ≥ 6mm massive mineral underground with a density ≥ 650 kg/m³ and a thickness ≥ 11mm non-combustible building board.

This test report includes 8 pages and 3 enclosures.

Remark: If the above mentioned building material is not used as product according to MBO § 2, Abs. 9, Ziffer1, 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 underlie building supervisory procedures

- for regular building products for the prescribed proofs of conformity
- for non-regular building products for the needed proofs of applicability.

This test report must not be published and copied without preceding agreement of the test laboratory and if agreed, only during validity and unchanged concerning appearance and contents.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 on which the tests are based or other technical standards have changed.

1. **Description of test material in condition as delivered:**

- PN 28158:** "MIG-ESP® Exterior"
white silicone resin paint with mineral filler
5 litre bucket
- PN 28195:** "MIG-ESP® Primer"
colourless primer for hydrophobizing
5 litre canister
- PN 28303:** "MIG DHMb® Lining System"
assembling of PN 28158, PN 28195 and a gypsum plasterboard, applied
from the Prüfinstitut Hoch according to manufacturer instruction
There is no difference between side A and side B.
characteristic values determined by the test laboratory:
area weight: about 917 g/m² thickness: about 12,81 mm

The testing laboratory is not provided with further details concerning the composition of the tested building materials. Samples are retained.

2. **Preparation of samples:**

The primer were applied with 200 ml/m² wet applied quantity and the silicone resin paint twice 200 g/m² wet applied quantity (total applied quantity 400 g/m²) on a 12,5 mm gypsum plasterboard according to EN520.

Samples have been prepared for tests in the fire shaft, for the smoke development when burned in flames as well as for determination of smoke development under smouldering conditions. The samples were kept in climate chamber 23/50 until they reached constant weight. The determinations of the calorific potential in the bomb calorimeter were carried out with the original materials.

3. **Testing procedure:** according to DIN 4102 part 1, part 15 and part 16.
4. **Date of test:** week 46 and 47 in 2018

5. Results:

5.1: determination of the calorific potential

Preparation of samples:

The calorific potential of the sample was determined by the method of the adiabatic shell in an oxygen atmosphere at 30 bar pressure according to DIN 51900-3.

There were carried out three tests of PN 28158 and PN 28195.

Determination for the calculation of the gypsum plasterboard according DIN 4102 part 1 clause 5.2.4.5 (EN 520):

- thickness of the gypsum plasterboard: 12,5mm
- area weight of the gypsum plasterboard: 9 kg/m²
- area weight of the upper carton layer: 300g/m²
- calorific potential H₀ of the cartons: 15.120 kJ/kg
- calorific potential H₀ of the gypsum core: 0 kJ/kg = 0 kJ/m²

the outcome of this is: for the carton (2x): 4.536 kJ/m² x 2 = 9.072 kJ/m²

for the gypsum plasterboard: 9.072 kJ/m² / 9kg/m² = 1.008 kJ/kg

table 1: determination of the calorific potential

PN number	calorific potential			average	heat release
PN 28158	4.652 kJ/kg	4.608 kJ/kg	4.657 kJ/kg	4.639 kJ/kg	1.856 kJ/m²
PN 28195	26.441 kJ/kg	26.397 kJ/kg	25.953kJ/kg	26.264 kJ/kg	4.728 kJ/m²

PN 28303: „MIG DHMb® Lining System“	1	2	3	4	5
	dimension	primer	coating	gypsum plasterboard	summation column 2 + column 3
1 calorific potential H ₀	kJ/kg	26.264	4.639	1.008	---
2 area weight	kg/m ²	0,180	0,400	4,5	∑ ₁ = 5,08
3 heat release row 1 * row 2	kJ/m ²	4.728	1.856	4.536	∑ ₂ = 11.120
4 calorific potential of the bond ∑ ₂ /∑ ₁	kJ/kg	---	---	---	2.189

5.2: fire shaft-test

- # 1851: PN 28303 (applied on gypsum plasterboard)
- # 1852: PN 28303 (applied on gypsum plasterboard)
- # 1853: PN 28303 (applied on gypsum plasterboard)

No	measurement	result with the tested specimen				dimension
		#1851	#1852	#1853	---	
	Test number					
1	<u>number of specimen arrangement acc. to. DIN 4102/T15, schedule 1</u>	7	7	7	---	
2	<u>maximum flame height</u>	50	50	50	---	cm
3	<u>above bottom edge of the specimen</u>	9:45	9:25	9:45	---	min:s
4	<u>burn through / melting</u>	./.	./.	./.	---	min:s
	<u>time¹⁾</u>					
5	<u>observations on the back side of the specimen</u>	---	---	---	---	
	<u>flames / glowing</u>	./.	./.	./.	---	min:s
	<u>time¹⁾</u>					
6	<u>change of colour</u>	---	---	---	---	
	<u>time¹⁾</u>	./.	./.	./.	---	min:s
7	<u>falling of burning droplets</u>	---	---	---	---	
	<u>start¹⁾</u>	./.	./.	./.	---	min:s
	<u>extent</u>	---	---	---	---	
8	<u>sporadic falling of burning droplets²⁾</u>	./.	./.	./.	---	min:s
9	<u>continuous falling of burning droplets²⁾</u>	./.	./.	./.	---	min:s
10	<u>falling of burning parts</u>	---	---	---	---	
	<u>start¹⁾</u>	./.	./.	./.	---	min:s
	<u>extent</u>	---	---	---	---	
11	<u>sporadic falling of burning parts²⁾</u>	---	---	---	---	
12	<u>continuous falling of burning parts²⁾</u>	---	---	---	---	
13	<u>after flame time at the bottom of the sieve (max.)</u>	./.	./.	./.	---	min:s
14	<u>impairment of the burner by dropping or falling material:</u>					
	<u>time¹⁾</u>	./.	./.	./.	---	min:s
15	<u>premature end of test</u>					
	<u>end of burning at the specimen¹⁾</u>	./.	./.	./.	---	min:s
16	<u>time of eventually end of test¹⁾</u>	./.	./.	./.	---	min:s
17	<u>after flame after end of test</u>					
	<u>time¹⁾</u>	./.	./.	./.	---	min:s
18	<u>number of specimen</u>	---	---	---	---	
19	<u>front side of specimen²⁾</u>	---	---	---	---	
20	<u>back side of specimen²⁾</u>	---	---	---	---	
21	<u>flame length</u>	---	---	---	---	cm
22	<u>afterglow after end of test</u>					
	<u>time¹⁾</u>	0:27	0:35	0:27	---	min:s
23	<u>number of specimen</u>	4	4	4	---	
	<u>place of appearance</u>					
24	<u>lower half of the specimen²⁾</u>	x	x	x	---	
25	<u>upper half of the specimen²⁾</u>	---	---	---	---	
26	<u>front side of specimen²⁾</u>	x	x	x	---	
27	<u>back side of specimen²⁾</u>	---	---	---	---	

No	measurement	result with the tested specimen				dimension u
		#1851	#1852	#1853	---	
	Test number					
28	<u>density of smoke</u> ≤ 400 % * min	1	2	1		% * min
29	> 400 % * min ⁴⁾	---	---	---	---	% * min
30	diagram: encl. no.	1	2	3		
31	<u>residual lengths: individual value³⁾</u> specimen 1	48	51	48	---	cm
	specimen 2	48	49	48	---	cm
	specimen 3	47	52	47	---	cm
	specimen 4	44	49	47	---	cm
32	<u>average value, individual test³⁾</u>	47	50	47	---	cm
33	<u>photo of specimen in enclosure no.</u>	1	2	3	---	
34	<u>flue gas temperature</u> maximum of average value	108	109	108	---	°C
	time ¹⁾	10:00	09:51	10:00	---	min:s
35						
36	diagram: encl. no.	1	2	3		
37	<u>remarks: -none-</u>					
38	<u>explanations to the tests: -none-</u>					

1) indication of times: from the begin of testing procedure

2) checked off if applicable

3) indication of carrier/foam layer separated in case of fire-proofing agents

4) very strong development of smoke

5.3: test for determination of smoke development of building materials - testing under smouldering conditions (DIN 4102 appendix A)

Preparation of samples:

Samples with a dimension of 270 mm x 5 mm x 2 mm according to DIN 4102-1 A.6 were cut out of the material.

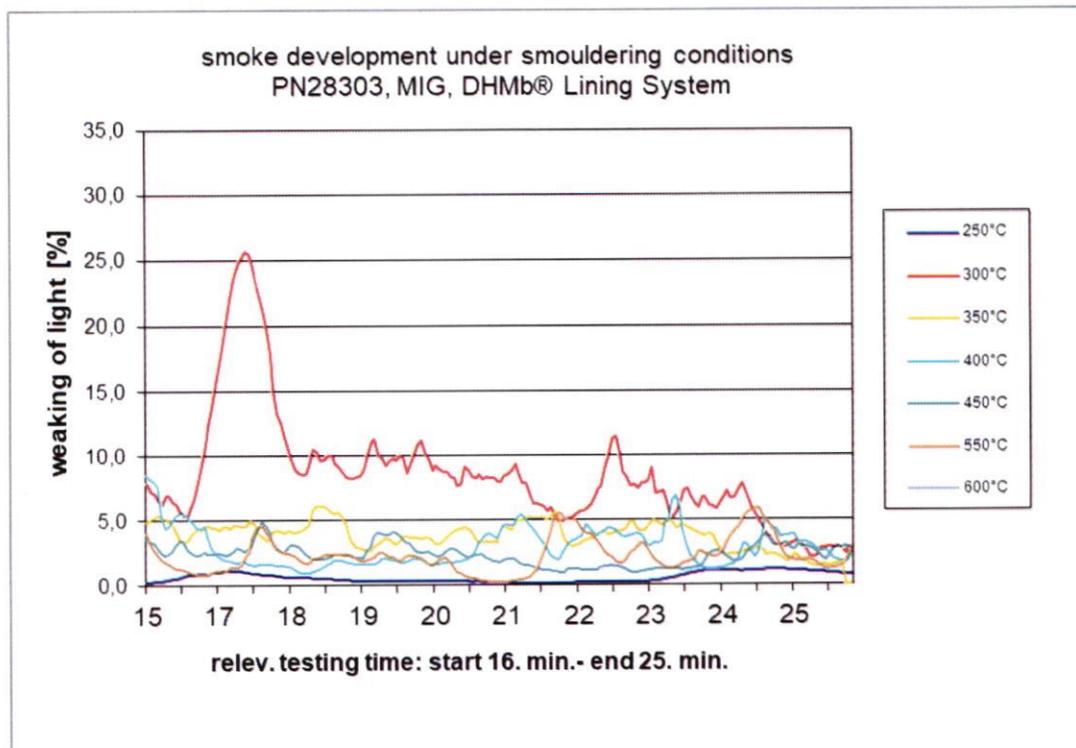
test temperature	average density of smoke in %				
	5 mm		2 mm		average
	test 1	test 2	test 1	test 2	
250 °C	0,6	---	---	---	0,6
300 °C	5,6	11,5	---	---	8,6
350 °C	4,8	2,8	---	---	3,8
400 °C	2,9	---	---	---	2,9
450 °C	2,3	---	---	---	2,3
550 °C	2,3	---	---	---	2,3
600 °C	---	---	---	---	---

Remarks and explanations concerning test procedure: Due to the minor results of the 5 mm tests, there were no more tests executed.

Summary of the results:

Maximum average value: 8,6 %
at a calibration body temperature of 300 °C

measurement data:



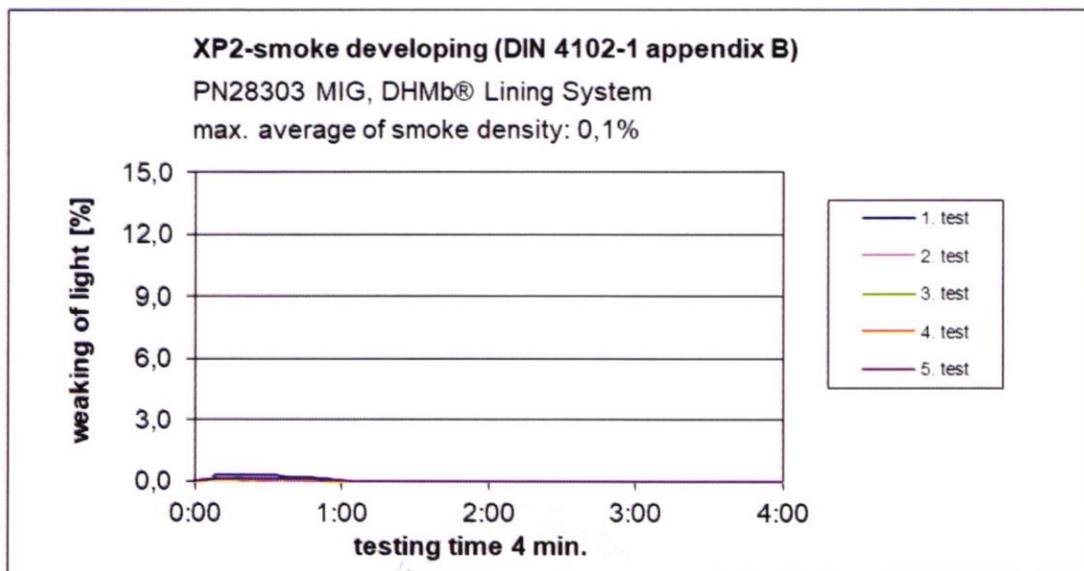
**5.4: test for determination of smoke development of building materials -
testing with direct flame contact (DIN 4102 appendix. B)**

Preparation of samples:

Samples were cut out of the material for the determination of smoke development under flame contact test (size of samples 30 mm x 30 mm x 15 mm acc. DIN 4102-1 B.3).

time [min : sek]	0:12	0:24	0:36	0:48	1:00	1:12	1:24	1:36	1:48	2:00
Average density of smoke [%]	0,1	0,1	0,1	0,1	0,0	0,0	0,0	0,0	0,0	0,0
time [min : sek]	2:12	2:24	2:36	2:48	3:00	3:12	3:24	3:36	3:48	4:00
Average density of smoke [%]	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
<u>Average residual light absorption after end of test:</u> 0,0 %										
<u>Remarks and explanations to the testing procedure:</u> - none -										
<u>Summary of results:</u>										
Max. density of smoke :										0,1 %
Time of appearance :										0:12 min

measurement data:



6. **Remarks:** - none -

7. **Summary of results:**

No	Measurement	result		Limit value
1	calorific potential H_0	mass	2,189 kJ/kg	4,200 kJ/kg
	heat release amount	areic	11,120 kJ/m ²	16,800 kJ/ m ²
2	fire shaft-test	# 1851	residual length max. smoke-temp smoke-int.	47 cm 108°C 1 %min >35cm <125°C
		# 1852	residual length max. smoke-temp smoke-int.	50 cm 109°C 2 %min >35cm <125°C
		# 1853	residual length max. smoke-temp smoke-int.	50 cm 107°C 1 %min >35cm <125°C
3	smoke development under smouldering conditions	average density of smoke at comparative body temperature of	8.6 % 350°C	30 % ---
4	smoke development with direct flame contact	max. density of smoke average residual light absorption	0.1 % 0.0 %	15 % ---
5	toxicity	has not been tested		

8. **Summary:**

The examined product meets freely suspended or with a distance of ≥ 40 mm to the same or to other plain materials the requirements of class A2 for non-combustible building materials according to DIN 4102, part 1 (May 1998).
The material has not been tested for inhalation toxicity.

9. **Special remarks:**

For legal interests only the German original version is relevant.

10. **Validity:**

This test report is valid until the mentioned date on page 1. The test report becomes invalid in case the standards on which the tests are based are changed.

Fladungen, 28 November 2018

clerk in charge:



(Silke Biendara)



Head of the test laboratory



(Dipl.-Ing. (FH) Andreas Hoch)

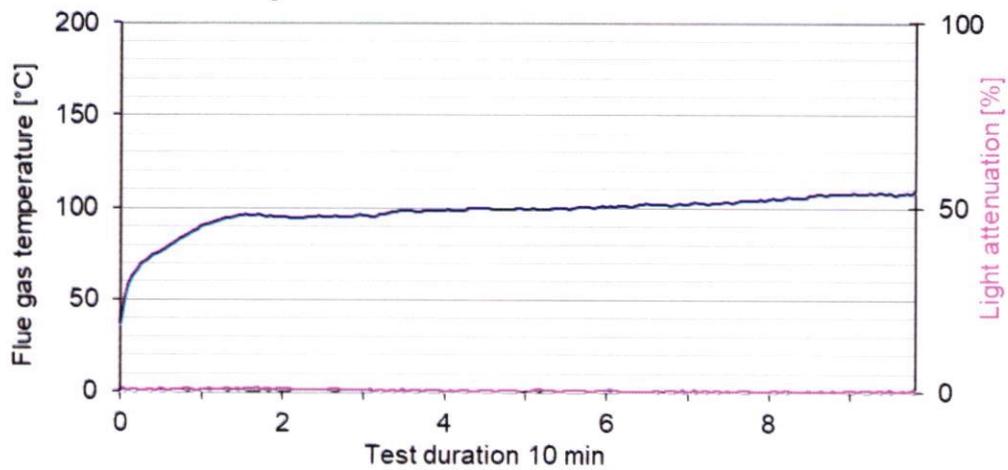


Measurement data

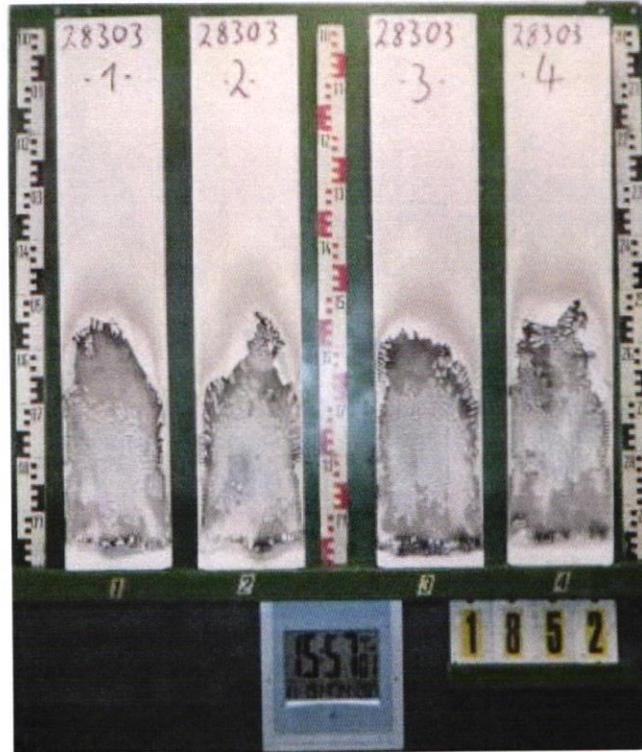
#1851, PN28303: DHMb® Lining System

Max. flue temperature: 108°C, Smoke density integral: 1%/min

Residual length: 47 cm



fire shaft-test #1852

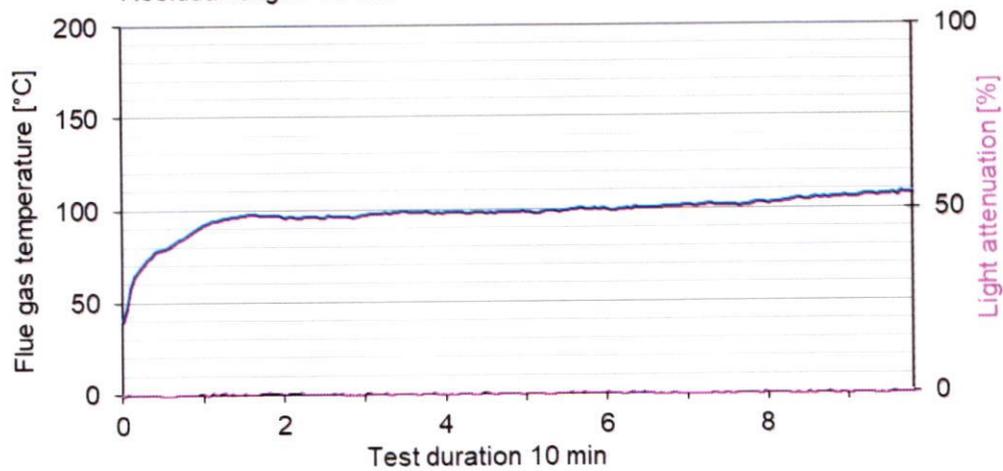


Measurement data

#1852, PN28303: DHMb® Lining System

Max. flue temperature: 109°C, Smoke density integral: 2%min

Residual length: 50 cm



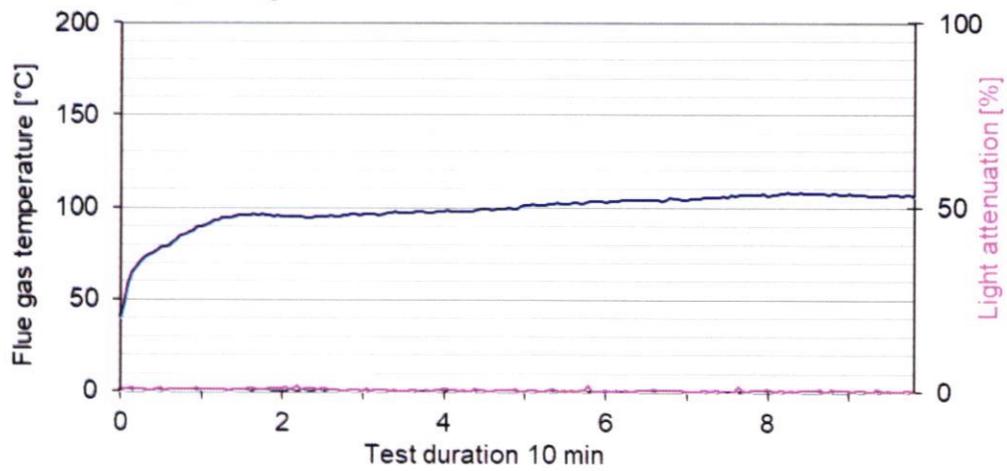


Measurement data

#1853, PN28303: DHMb® Lining System

Max. flue temperature: 107°C, Smoke density integral: 1%/min

Residual length: 50 cm



sample

Company	MIG mbH Material Innovative Gesellschaft mbH Am Grarock 3 D – 33154 Salzkotten
Description of samples	white silicone resin paint with mineral filler and colourless primer for hydrophobizing
Name of the material	„MIG DHMb® Lining System“ composed of „MIG-ESP® Exterior“ and „MIG-ESP® Primer“ on gypsum plasterboard