

Fire Resistance Performance of Building Products  
Dipl.-Ing. Andreas Hoch (University of Applied Science)  
Testing, Monitoring and Certification Body accredited by  
Construction Supervision Authority.

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## **Test Certificate**

### **PZ – Hoch – 131357**

**For the proof of fire behaviour according to DIN 4102, Part 1**

Applicant	MIG Material Innovative Gesellschaft mbH Am Grarock 3 D-33154 Salzkotten
Type of test material	white, solvent-free silicone resin exterior paint, applied on plaster board
Product Name	‘MIG-ESP’ – white
Sample provided by	the applicant
Purpose of test	proof of <b>non-combustibility</b> for the classification of building materials into Class A2 in accordance with DIN 4102, Part 1
Validity of test certificate	30.09.2018
Result	the tested product, which is spread on mineral substrates with a maximum application quantity of 400 g/m <sup>2</sup> , meets the requirements of Building Material Class A2 for not flammable materials in line with DIN 4102, part 1 (May 1998)

The test certificate consists of 7 pages and 3 appendices.

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Remarks: A general building supervisory test report is not required if the above-mentioned building material is not applied as product in accordance with MBO § 2, Paragraph 9, Class 1. This test certificate is not valid if the examined building material is used as product within the context of State Construction Code (MBO § 17, Paragraph 3).

This test certificate does not replace a necessary proof of usability concerning building supervisory laws according to State Construction Code. This has to be verified by:

- a general building approval or
- a general building inspectorate certificate or
- an individual-based approval

This test certificate may serve as a basis in a building supervisory procedure:

- for regulated building products which require proof of conformity
- for non-regulated building products which require proof of usability.

This test certificate may be published or duplicated only within the period of validity and only in its unaltered form and content without prior approval from the certification authority.

1. Description of test material in as-received condition  
 PN 17977: ‘MIG-ESP’  
 White solvent-free silicon resin exterior paint / 1 pail, 5 Litre packaging  
 Further information on the composition of the examined material is not presented to the certification authority. Samples are stored.
  
2. Preparation and pretreatment of sample  
 The exterior paint was applied wet in two stages, each with approximately 200/m<sup>2</sup> (total application quantity approximately 400 g/m<sup>2</sup>), onto a 12.5 mm thick plasterboard according to EN 520.  
 Working instructions were observed.  
 The sample was kept in a climate chamber at 23/50 °C until constant weight was reached.
  
3. Testing methods according to DIN 4102 Part 1, Part 15 and Part 16
  
4. Test date calendar week 41 to 43, 2013
  
5. Test results Determination of heat value and heat development  
 For the calculation of plasterboard construction plate according to DIN 4102 Part 1 Paragraph 5.2.4.5 (EN 520), the following values have been fixed:
  - thickness of the plasterboard construction plate: 12.5 mm
  - surface weight of the plasterboard construction plate: 9 kg/m<sup>2</sup>
  - surface weight of the upper cardboard layer: 300g/m<sup>2</sup>
  - calorific value  $H_{\text{D}}$  of the cardboard: 15,120 kJ/kg
  - calorific value  $H_{\text{D}}$  of the plaster core: 0 kJ/kg = 0 kJ/m<sup>2</sup>

Result: for the cardboard (2x): 4,536 kJ/m<sup>2</sup> x 2 = 9,072 kJ/m<sup>2</sup>  
 for plasterboard plate: 9,072 kJ/m<sup>2</sup> / 9kg/m<sup>2</sup> = 1,008 kJ/kg

Average value from 3 measurements of the calorific value of the coating  
 PN 17977 ‘MIG-ESP’ 5.709 kJ/kg

PN 17977: ‘MIG-ESP’		1	2	3	4
		Dimension	Coating	GKB	Total Column 2 * column 3
1	Calorific value $H_{\text{D}}$	kJ/kg	5,709	1,008	--
2	Surface weight	Kg/m <sup>2</sup>	0.255	4.5	Σ1 = 4.76
3	Amount of heat released line 1 * line 2	kJ/m <sup>2</sup>	1,456	4,536	Σ2 = 5,992
4	Calorific value of the composite Σ2/Σ1	kJ/kg	--	--	1,259

According to the above calculations, the calorific value of the product is 1,259 kJ/kg  
 The amount of heat released is 5,992 kJ/m

Preparation and pretreatment of samples

The calorific value tests were carried out with bomb calorimeter according to DIN 51900-2 procedures.

Three tests with the PN17977 were performed.

5.2 Fire shaft test

Sample arrangement:

- #4656: 'MIG-ESP' applied on plasterboard plate
- #4697: 'MIG-ESP' applied on plasterboard plate
- #4698: 'MIG-ESP' applied on plasterboard plate

Table 2: Fire shaft test

Line no.	Measurement value type	Measurement value of sample						Dimension
	Test no.	#4656	#4697	#4698	-	-	-	
1	<u>Number of specimen arrangement</u> Acc. to DIN 4102/T15, Table 1	7	7	7	-	-	-	
2	<u>Maximum flame height</u> above bottom edge	60	60	60	-	-	-	cm
3	Time 1)	1:10	1:18	1:55	./.	./.	./.	min:s
4	<u>Melting/burning</u> Time 1)	./.	./.	./.	./.	./.	./.	min:s
5	<u>Observations on the reverse side of the sample</u> Flames/glowing Time 1)	-	-	-	-	-	-	min:s
6	Discolouring Time 1)	./.	./.	./.	./.	./.	./.	min:s
7	<u>Burning droplets</u> Begin 1) Range	./.	./.	./.	./.	./.	./.	min:s
8	Sporadic dripping of burning droplets 2)	-	-	-	-	-	-	
9	Continues dripping of burning droplets 2)	-	-	-	-	-	-	

10	<u>Falling of burning parts</u> Begin Range	./.	./.	./.	./.	./.	./.	min:s
11	Sporadic falling of burning parts	-	-	-	-	-	-	
12	Continues falling of burning parts	-	-	-	-	-	-	
13	<u>Afterflame time at the bottom of the sieve (max.)</u>	./.	./.	./.	./.	./.	./.	min:s
14	<u>Impairment of the burner flames by dripping or falling material</u> Time	-	-	-	-	-	-	min:s
15	<u>Premature end of test</u> Final occurrence of burning	./.	./.	./.	./.	./.	./.	min:s
16	at the specimen 1) Time of termination of test if necessary 1)	./.	./.	./.	./.	./.	./.	min:s
17	<u>Afterflame after end of test</u> Duration 1)	./.	./.	./.	./.	./.	./.	min:s
18	Number of specimen	-	-	-	-	-	-	
19	Front side of specimen 2)	-	-	-	-	-	-	
20	Back side of specimen 2)	-	-	-	-	-	-	
21	Flame length	-	-	-	-	-	-	cm
22	<u>Afterglow after end of test</u> Duration 1)	./.	./.	./.	./.	./.	./.	min:s
23	Number of specimen	-	-	-	-	-	-	
24	<u>Place of occurrence</u> Lower half of specimen 2)	-	-	-	-	-	-	
25	Upper half of specimen 2)	-	-	-	-	-	-	
26	Front side of specimen 2)	-	-	-	-	-	-	
27	Back side of specimen 2)	-	-	-	-	-	-	
28	<u>Smoke density</u> ≤ 400% * min	4	3	3	-	-	-	%*min
29	> 400% * min 4)	-	-	-	-	-	-	%*min
30	Diagram in fig. no.	1	2	3	-	-	-	
31	<u>Residual length: individual values</u> 3) Specimen 1 Specimen 2 Specimen 3 Specimen 4	48 42 46 47	42 45 43 41	46 45 42 42	- - - -	- - - -	- - - -	cm cm cm cm
32	Average value 3)	46	43	44	-	-	-	cm
33	Photo of test specimen fig. no.	1	2	3	-	-	-	
34	<u>Flue gas temperature</u> Maximum of average value	112	106	106	-	-	-	°C
35	Time 1)	08:40	09:26	09:36	-	-	-	min:s
36	Diagram fig. no.	1	2	3	-	-	-	
37	Remarks: no							
38	Explanation for implementation of test: no							

1) Indication of time: from start of testing procedure

2) Tick where applicable

- 3) Separate information on carrier plate/foam layer concerning fire retardants  
4) Very strong smoke development

5.3 Smoke generation test on building materials – Decomposition under carbonisation conditions (DIN 4102, Part 1, Appendix A)

Preparation and pretreatment of samples:

Specimens of 270 mm \*5mm\* thickness according to DIN 4102-1 were cut out from the delivered material and tested.

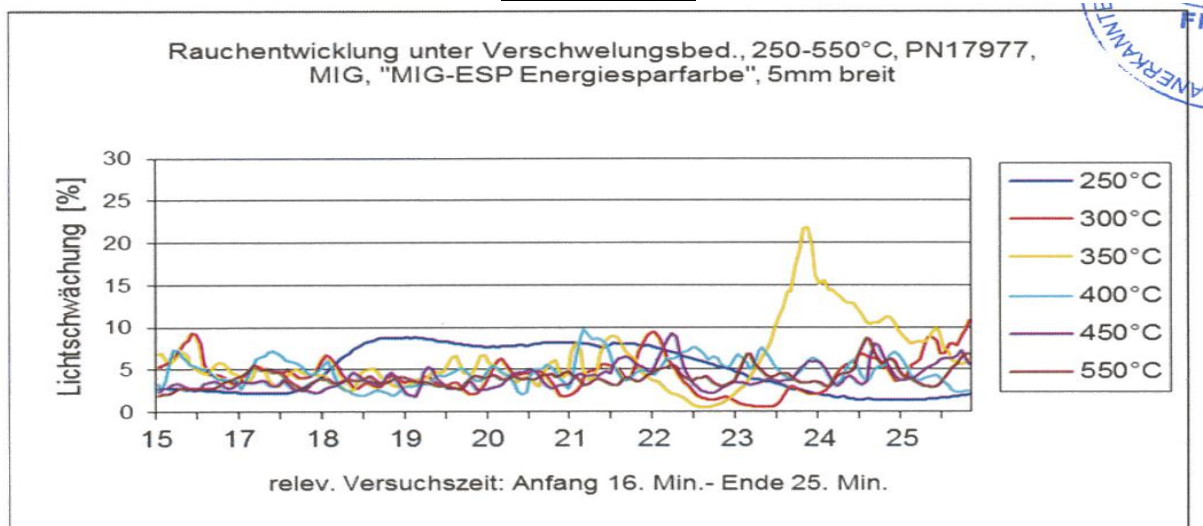
Table 3: Smoke generation test on building materials – decomposition under carbonisation conditions (DIN 4102, Part 1, Appendix A)

Test Temperature	Average smoke density in %						
	Test 1 5mm	Test 2 5mm	Test 3 5mm	Average value	Test 1	Test 2	Average value
250 °C	4.9	---	---	4.9	---	----	---
300 °C	4.3	3.2	---	3.75	---	---	---
350 °C	6.1	5.8	4.9	5.6	---	---	---
400 °C	4.8	4.0	---	4.4	---	---	---
450 °C	3.9	---	---	3.9	---	---	---
550 °C	4.0	---	---	4.0	---	---	---
600 °C	---	---	---	4.9	---	---	---

Remarks and explanations on implementation of test: no

Summary of test results:  
Maximum average light attenuation 5.6%  
at a reference temperature of 350 °C

Measured Data



5.4 Smoke generation test on building materials – burning upon exposure to flames (DIN 4102, Part 1, Appendix B)

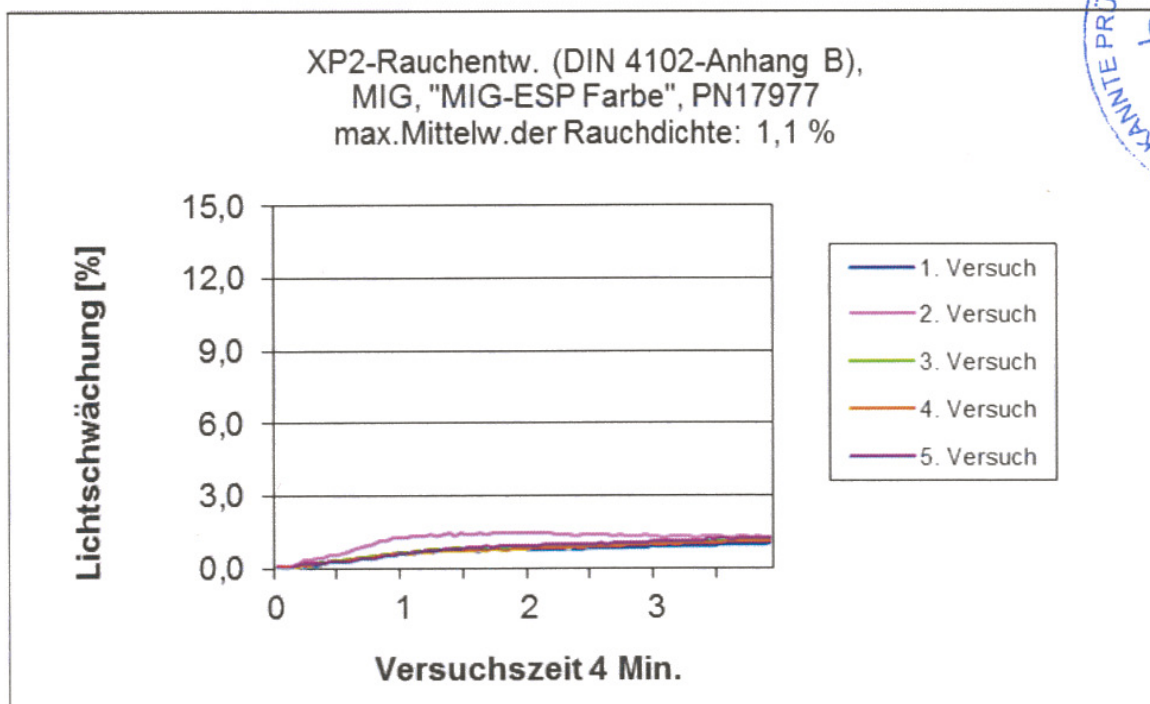
Preparation and pretreatment of samples:

Specimens were cut out from the delivered material (specimen size 30 mm \* 30 mm according to DIN 4102-1) to perform smoke generation tests for burning upon exposure to flames. Flame impinged on the painted side.

Table 4: Smoke generation test on building materials – burning upon exposure to flames (DIN 4102, Part 1, Appendix B)

Time (min : sec)	0:12	0:24	0:36	0:48	1:00	1:12	1:24	1:36	1:48	2:00
Average smoke density (%)	0.1	0.2	0.4	0.6	0.7	0.8	0.8	0.9	0.9	0.9
Time (min : sec)	2:12	2:24	2:36	2:48	3:00	3:12	3:24	3:36	3:48	4:00
Average smoke density (%)	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1
Average residual absorption after test ends: 0.7%										
Remarks and explanations on implementation of test: no										
Summary of test results:										
Maximum smoke density (%): 1.1%										
Time of occurrence (min): 3:36 minutes										

Measured Data



6. Explanations: no

7. Summary of test result

Serial No.	Test type	result		Limit value
1	Specific calorific value	Mass-related	1,259 kJ/kg	4,200 kJ/kg
	Releasable amount of heat	Area-related	5,992kJ/m <sup>2</sup>	16,800kJ/m <sup>2</sup>
2	Fire shaft test # 4656 Test 1	Residual length: Max. smoke temperature: Smoke density -integral	46 cm 112 °C 4% * min	> 35 cm < 125 °C ---
	Fire shaft test # 4697 Test 2	Residual length: Max. smoke temperature: Smoke density-integral	43 cm 106 °C 3% * min	>35 cm <125 °C ---
	Fire shaft test # 4698 Test 3	Residual length: Max. smoke temperature: Smoke density-integral:	44cm 106 °C 3% * min	>35 cm <125 °C ---
3	Fire generation during decomposition under carbonisation conditions	Average smoke density Reference temperature	5.6% 350 °C	30% ---
4	Smoke generation during burning upon exposure to flames	Max. smoke density Average residual absorption	1.1% 0.7%	15%
5	Toxicity	Not detected		

8. Summarised result

- a. Spread onto massive mineral substrates with a maximum application quantity of 400 g/m<sup>2</sup>, this tested product meets the requirements of the building material class A2 for non-combustible building materials according to DIN 4102, Part 1, Issue (Mai 1998).
- b. An inhalation toxicity test on the material has not been conducted.

9. Special remarks – no –

10. Period of validity

This test result is valid until the time indicated on page 1, in the event the test provisions and basis for evaluation following the state of the art do not change ahead of time.

Fladungen, 31 October 2013

Person in charge:



(State certified MBA Jens Rieger)

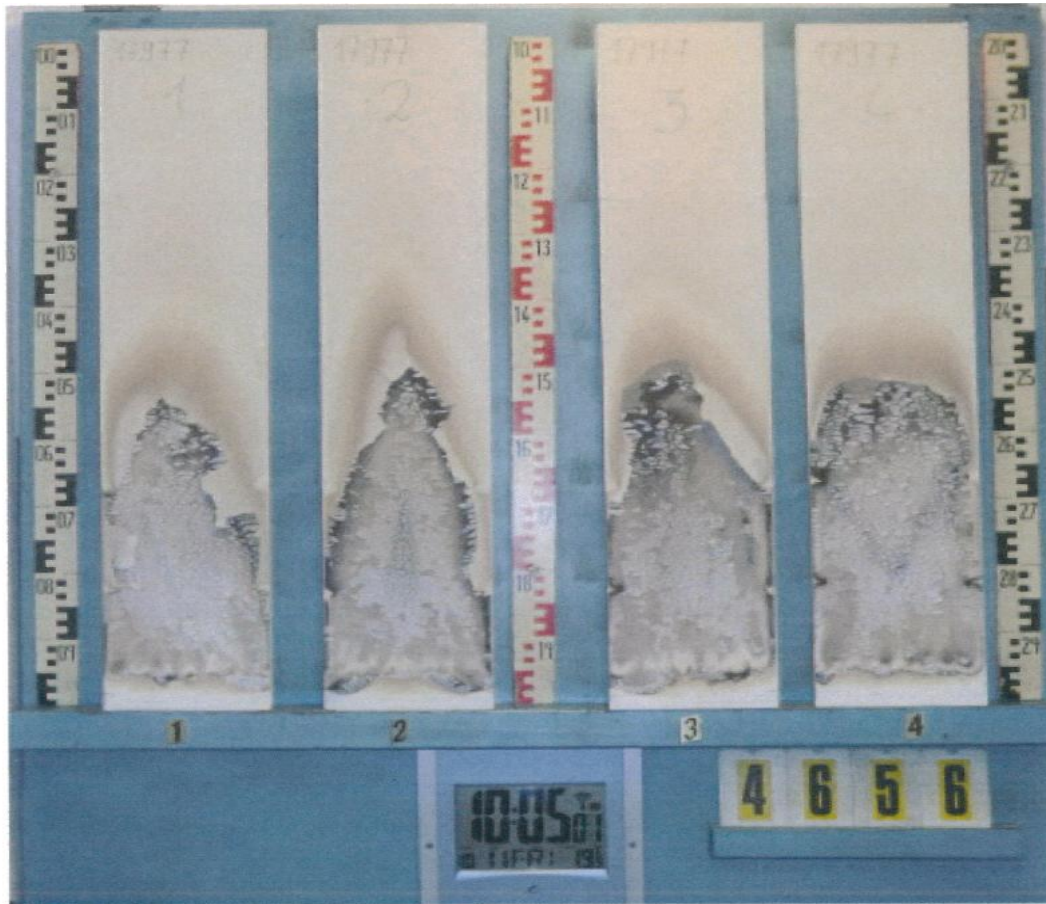
Head of the testing laboratory:



(Dipl.-Ing., University of Applied Science)  
Andreas Hoch



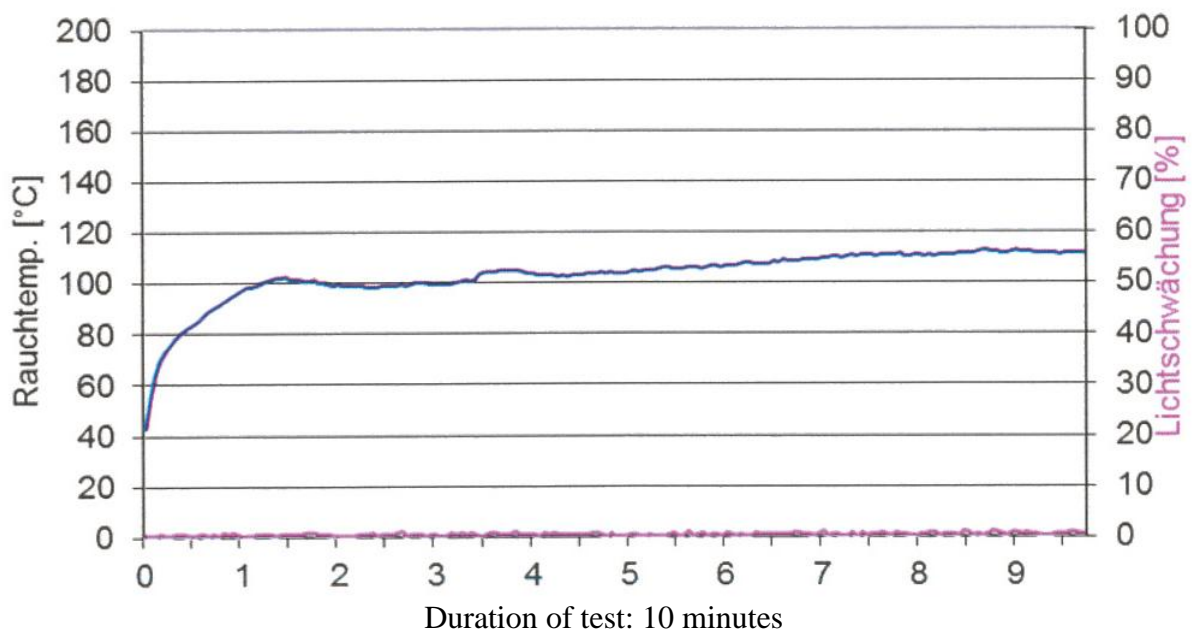
Fire shaft test #4656



Measured Data

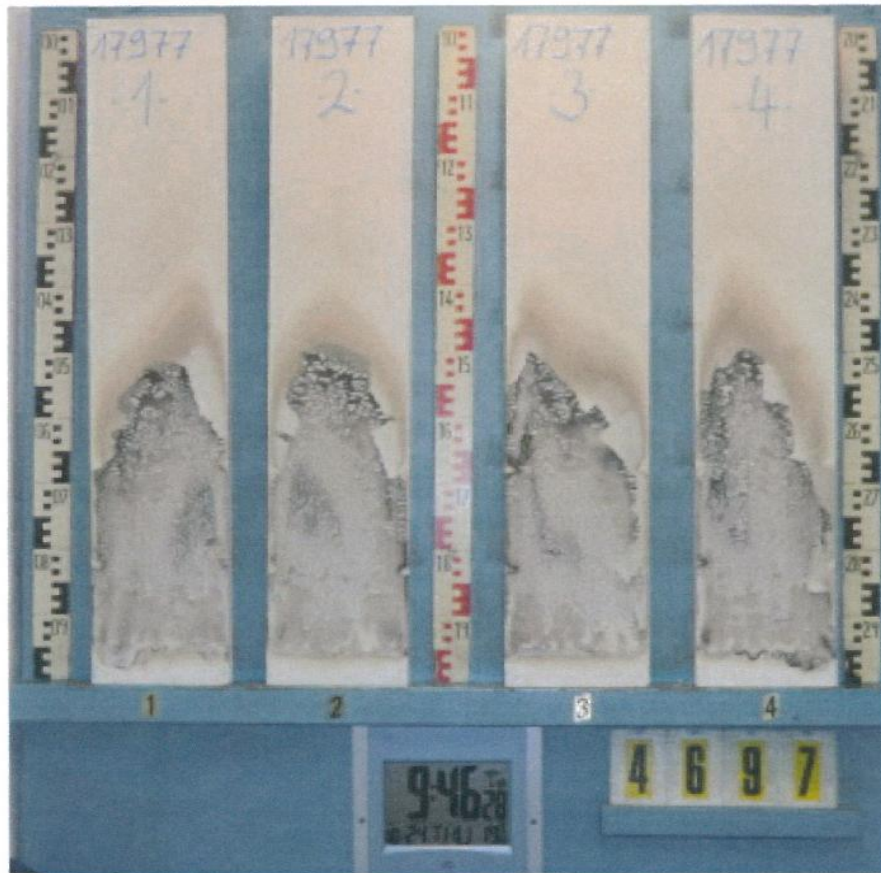
#4656, MIG, 'MIG-ESP' on plasterboard plate, PN17977

Residual length: 46cm, max. smoke temperature: 112°C, smoke-int: 4% min





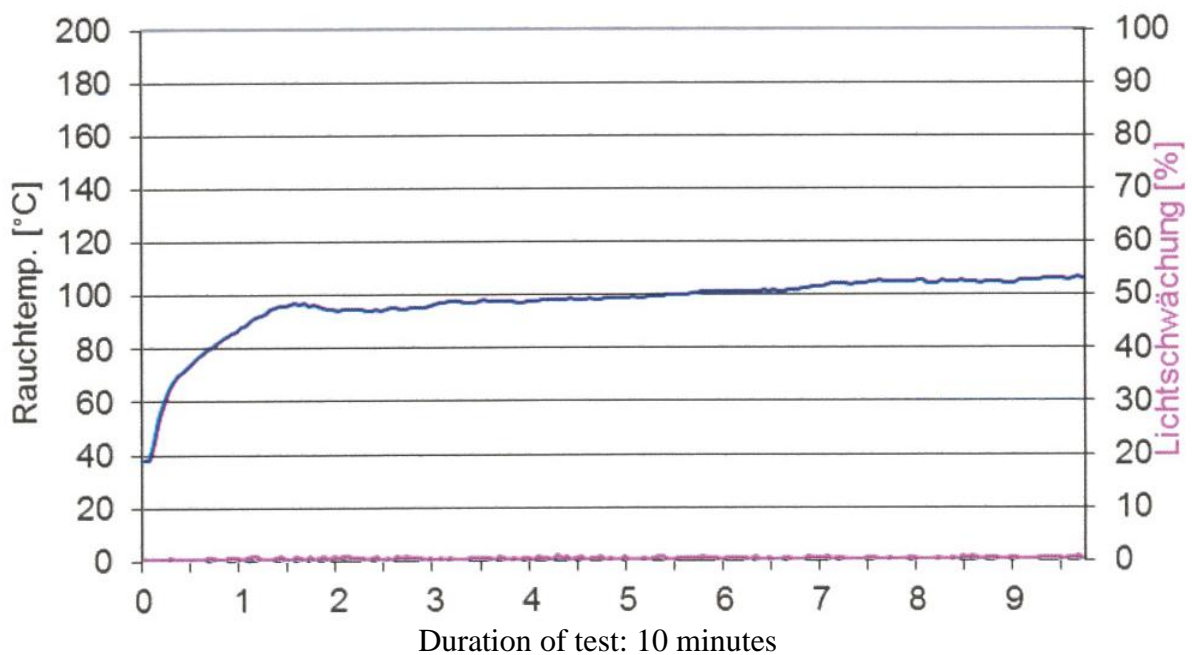
Fire shaft test #4697



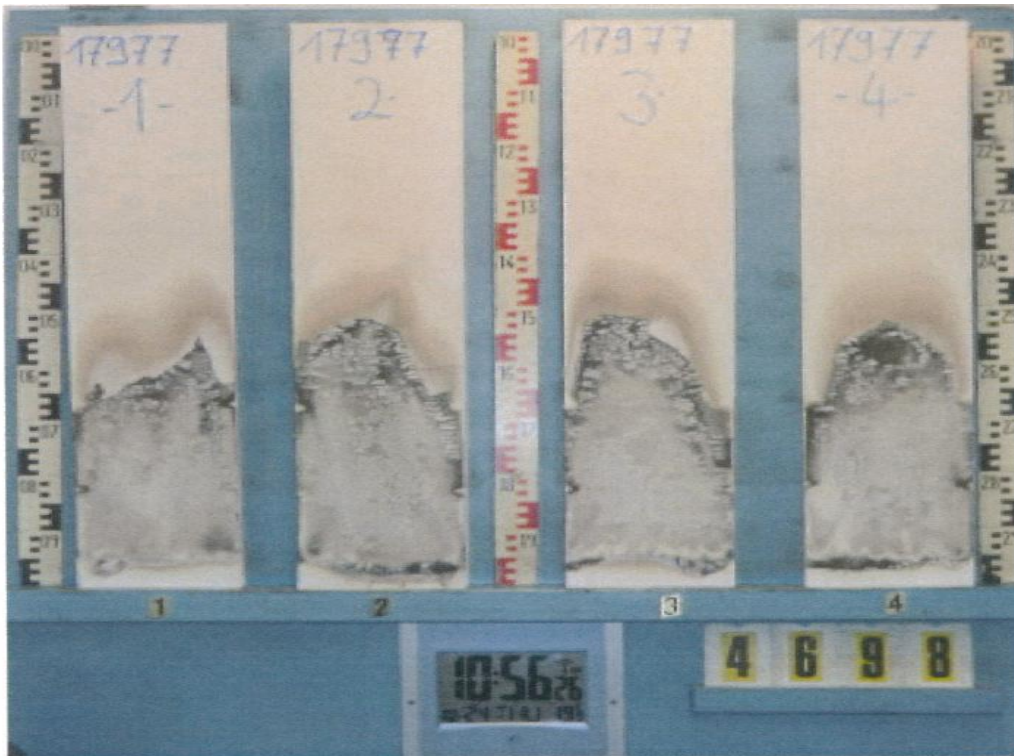
Measured Data

#4697, MIG, 'MIG-ESP' on plasterboard plate, PN17977

Residual length: 43cm, max. smoke temperature: 106°C, smoke-int: 3% min



Fire shaft test #4698



Measured Data

#4698, MIG, 'MIG-ESP' on plasterboard plate, PN17977

Residual length: 44cm, max. smoke temperature: 106°C, smoke-Int: 3%min

