

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-200414

**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**

|                                    |  |
|------------------------------------|--|
| <b>Company</b>                     | <b>MIG mbH</b><br>Material Innovative Gesellschaft mbH<br>Am Grarock 3<br>D – 33154 Salzkotten   |
| <b>Description of samples</b>      | white internal coating and colourless primer for hydrophobizing  |
| <b>Name of the material</b>        | „MIG DHMb® Lining System“ composed of „MIG-ESP® Interior“ and „MIG-ESP® Primer“ on gypsum plasterboard   |
| <b>Sampling</b>                    | by the company itself  |
| <b>Content of request</b>          | Proof of fire behaviour of building materials according to DIN 4102, part 1  |
| <b>Validity of the test report</b> | 31.05.2025   |
| <b>Result</b>                      | <b>The examined product meets 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 g/m<sup>2</sup> and the coating of twice 230 g/m<sup>2</sup> on massive mineral underground with a density <math>\geq 1500</math> kg/m<sup>3</sup> and a thickness of <math>\geq 6</math>mm<br/>massive mineral underground with a density <math>\geq 650</math> kg/m<sup>3</sup> and a thickness <math>\geq 11</math>mm<br/>non-combustible building board.</b> |

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 31184:** “MIG-ESP® Interior“  
white internal coating  
5 litre bucket

**PN 31194:** “MIG-ESP® Primer“  
colourless primer for hydrophobizing  
5 litre canister

**PN 31245:** “MIG DHMb® Lining System“  
assembling of PN 31184, PN 31194 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/m<sup>2</sup>      thickness: about 13,09 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 g/m<sup>2</sup> wet applied quantity and the silicone resin paint twice 230 g/m<sup>2</sup> wet applied quantity (total applied quantity 460 g/m<sup>2</sup>) 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 18 to 20 in 2020

## 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/m<sup>2</sup>
- area weight of the upper carton layer: 300g/m<sup>2</sup>
- calorific potential H<sub>o</sub> of the cartons: 15.120 kJ/kg
- calorific potential H<sub>o</sub> of the gypsum core: 0 kJ/kg = 0 kJ/m<sup>2</sup>

the outcome of this is: for the carton (2x):  $4.536 \text{ kJ/m}^2 \times 2 = 9.072 \text{ kJ/m}^2$   
**for the gypsum plasterboard:  $9.072 \text{ kJ/m}^2 / 9 \text{ kg/m}^2 = 1.008 \text{ kJ/kg}$**

| determination of the calorific potential |                     |              |              |              |                         |
|--|---------------------|--------------|--------------|--------------|-------------------------|
| PN number                                | calorific potential |              |              | average      | heat release            |
| <b>PN 31184</b>                          | 4.613 kJ/kg         | 4.591 kJ/kg  | 4.598 kJ/kg  | 4.601 kJ/kg  | 2.116 kJ/m <sup>2</sup> |
| <b>PN 31194</b>                          | 28.425 kJ/kg        | 28.314 kJ/kg | 28.518 kJ/kg | 28.419 kJ/kg | 5.684 kJ/m <sup>2</sup> |

| <b>PN 31245:</b><br><b>„MIG DHMb® Lining System“</b>   | 1                 | 2      | 3       | 4                   | 5                             |
|--|-------------------|--------|---------|---------------------|-------------------------------|
|  | dimension         | primer | coating | gypsum plasterboard | summation column 2 + column 3 |
| 1 calorific potential H <sub>o</sub>                   | kJ/kg             | 28.419 | 4.601   | 1.008               | ---                           |
| 2 area weight  | kg/m <sup>2</sup> | 0,200  | 0,460   | 4,5                 | $\sum_1 = 5,16$               |
| 3 heat release<br>row 1 * row 2                        | kJ/m <sup>2</sup> | 5.684  | 2.116   | 4.536               | $\sum_2 = 12.336$             |
| 4 calorific potential of<br>the bond $\sum_2 / \sum_1$ | kJ/kg             | ---    | ---     | ---                 | 2.391                         |

The calorific potential of the product amount according to the calculation method above

**2.391 kJ/kg**

The heat release amount therefore

**12.336 kJ/m<sup>2</sup>**

5.2: fire shaft-test

# 3520: PN 28303 (applied on gypsum plasterboard)

# 3521: PN 28303 (applied on gypsum plasterboard)

# 3522: PN 28303 (applied on gypsum plasterboard)

| No | measurement   | result with the tested specimen |       |       |     | dimension |
|----|---|---------------------------------|-------|-------|-----|-----------|
|    |   | #3520                           | #3521 | #3522 | --- |           |
|    | Test number   |                                 |       |       |     |           |
| 1  | <u>number of specimen arrangement</u><br>acc. to. DIN 4102/T15, schedule 1                            | 7                               | 7     | 7     | --- |           |
| 2  | <u>maximum flame height</u><br>above bottom edge of the specimen                                      | 60                              | 60    | 60    | --- | cm        |
| 3  | time <sup>1)</sup>  | 0:20                            | 0:25  | 1:10  | --- | min:s     |
| 4  | <u>burn through / melting</u><br>time <sup>1)</sup>   | ./.                             | ./.   | ./.   | --- | min:s     |
| 5  | <u>observations on the back side of the specimen</u><br><u>flames / glowing</u><br>time <sup>1)</sup> | ---                             | ---   | ---   | --- | min:s     |
|    | <u>change of colour</u><br>time <sup>1)</sup>   | ./.                             | ./.   | ./.   | --- | min:s     |
| 7  | <u>falling of burning droplets</u><br>start <sup>1)</sup>   | ---                             | ---   | ---   | --- | min:s     |
|    | <u>extent</u>   | ./.                             | ./.   | ./.   | --- |           |
| 8  | sporadic falling of burning droplets <sup>2)</sup>  | ./.                             | ./.   | ./.   | --- |           |
| 9  | continuous falling of burning droplets <sup>2)</sup>  | ./.                             | ./.   | ./.   | --- | min:s     |
| 10 | <u>falling of burning parts</u><br>start <sup>1)</sup>  | ---                             | ---   | ---   | --- | min:s     |
|    | <u>extent</u>   | ./.                             | ./.   | ./.   | --- |           |
| 11 | sporadic falling of burning parts <sup>2)</sup>   | ---                             | ---   | ---   | --- |           |
| 12 | continuous falling of burning parts <sup>2)</sup>   | ---                             | ---   | ---   | --- |           |
| 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</u><br><u>material:</u><br>time <sup>1)</sup>      | ./.                             | ./.   | ./.   | --- | min:s     |
|    | <u>premature end of test</u>  |                                 |       |       |     |           |
| 15 | end of burning at the specimen <sup>1)</sup>  | ./.                             | ./.   | ./.   | --- | min:s     |
| 16 | time of eventually end of test <sup>1)</sup>  | ./.                             | ./.   | ./.   | --- | min:s     |
| 17 | <u>after flame after end of test</u><br>time <sup>1)</sup>  | ./.                             | ./.   | ./.   | --- | min:s     |
|    | number of specimen  | ---                             | ---   | ---   | --- |           |
| 18 | front side of specimen <sup>2)</sup>  | ---                             | ---   | ---   | --- |           |
| 19 | back side of specimen <sup>2)</sup>   | ---                             | ---   | ---   | --- |           |
| 20 | flame length  | ---                             | ---   | ---   | --- | cm        |
| 22 | <u>afterglow after end of test</u><br>time <sup>1)</sup>  | 1:02                            | 0:47  | 0:24  | --- | min:s     |
|    | number of specimen  | 4                               | 4     | 4     | --- |           |
| 24 | <u>place of appearance</u><br>lower half of the specimen <sup>2)</sup>                                | x                               | x     | x     | --- |           |
|    | upper half of the specimen <sup>2)</sup>  | ---                             | ---   | ---   | --- |           |
| 25 | front side of specimen <sup>2)</sup>  | x                               | x     | x     | --- |           |
| 26 | back side of specimen <sup>2)</sup>   | ---                             | ---   | ---   | --- |           |

| No | measurement   | result with the tested specimen |           |           |     | dimension |
|----|---|---------------------------------|-----------|-----------|-----|-----------|
|    |   | #3520                           | #3521     | #3522     | --- |           |
|    | Test number   |                                 |           |           |     |           |
|    | <u>density of smoke</u>                                 |                                 |           |           |     |           |
| 28 | ≤ 400 % * min   | 1                               | 1         | 1         |     | % * min   |
| 29 | > 400 % * min <sup>4)</sup>                             | ---                             | ---       | ---       | --- | % * min   |
| 30 | diagram: encl. no.                                      | 1                               | 2         | 3         |     |           |
| 31 | <u>residual lengths:</u> individual value <sup>3)</sup> |                                 |           |           |     |           |
|    | specimen 1  | 47                              | 45        | 46        | --- | cm        |
|    | specimen 2  | 49                              | 44        | 49        | --- | cm        |
|    | specimen 3  | 44                              | 48        | 44        | --- | cm        |
|    | specimen 4  | 43                              | 44        | 44        | --- | cm        |
| 32 | <u>average value, individual test</u> <sup>3)</sup>     | <b>46</b>                       | <b>45</b> | <b>46</b> | --- | cm        |
| 33 | <u>photo of specimen in enclosure no.</u>               | 1                               | 2         | 3         | --- |           |
|    | <u>flue gas temperature</u>                             |                                 |           |           |     |           |
| 34 | maximum of average value                                | 110                             | 109       | 111       | --- | °C        |
| 35 | time <sup>1)</sup>                                      | 01:07                           | 09:05     | 01:10     | --- | min:s     |
| 36 | diagram: encl. no.                                      | 1                               | 2         | 3         |     |           |
| 37 | remarks: -none-   |                                 |           |           |     |           |
| 38 | explanations to the tests: -none-                       |                                 |           |           |     |           |

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

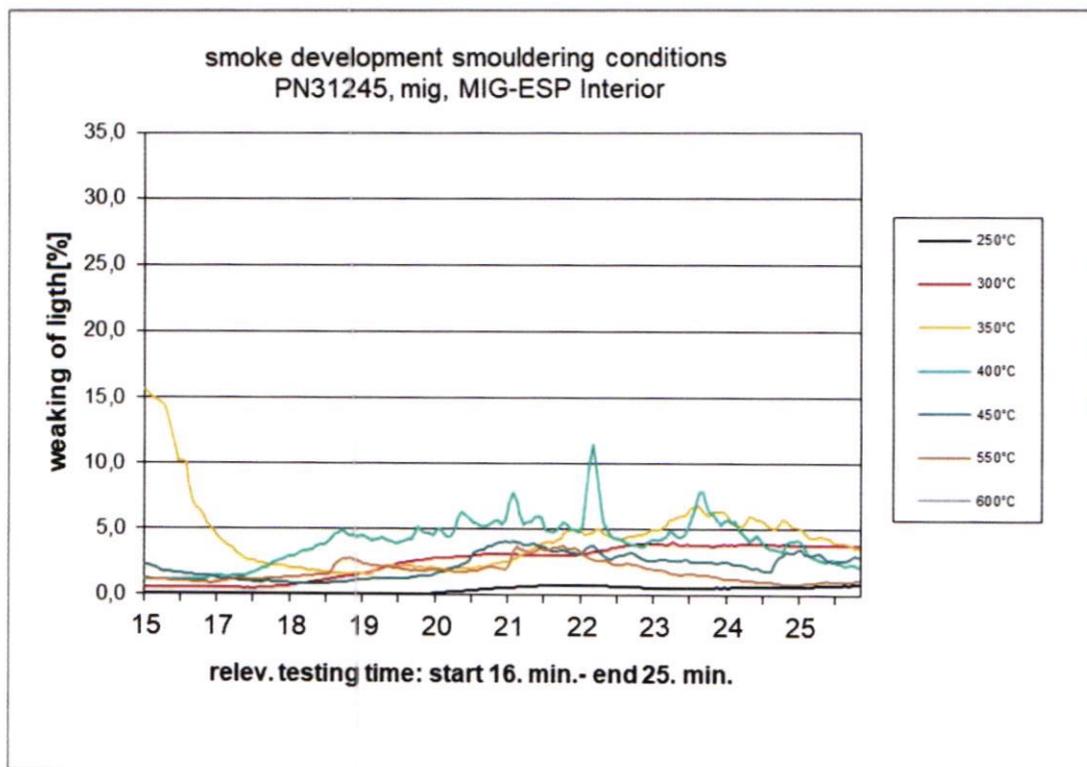
| test temperature | average density of smoke in % |        |        |        |            |
|------------------|-------------------------------|--------|--------|--------|------------|
|                  | 5 mm                          |        | 2 mm   |        | average    |
|                  | test 1                        | test 2 | test 1 | test 2 |            |
| 250 °C           | 0,4                           | ---    | ---    | ---    | <b>0,4</b> |
| 300 °C           | 5,0                           | ---    | 0,1    | ---    | <b>2,5</b> |
| 350 °C           | 4,3                           | ---    | ---    | ---    | <b>4,3</b> |
| 400 °C           | 4,0                           | ---    | ---    | ---    | <b>4,0</b> |
| 450 °C           | 2,2                           | ---    | ---    | ---    | <b>2,2</b> |
| 550 °C           | 1,8                           | ---    | ---    | ---    | <b>1,8</b> |
| 600 °C           | ---                           | ---    | ---    | ---    | ---        |

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

**Summary of the results:**

Maximum average value: 4,3 %  
 at a calibration body temperature of 350 °C

measurement data:



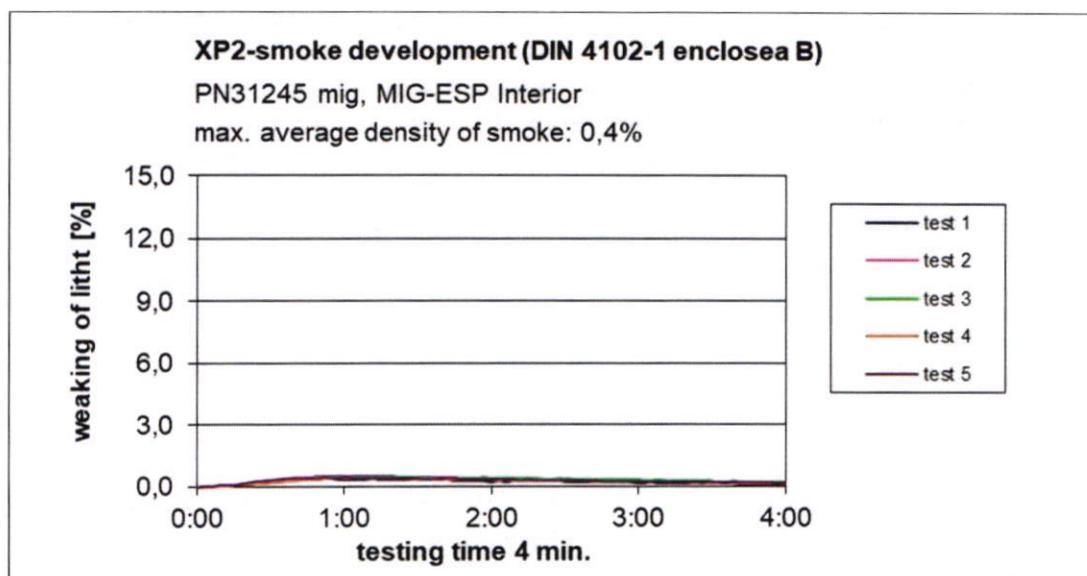
**5.4: test for determination of smoke development of building materials -  
 testing with direct flame contact (DIN 4102 appendix. B)**

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 in material thickness acc. DIN 4102-1 B.3).  
 Flaming on coated side.

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

measurement data:



6. **Remarks:** - none -

7. **Summary of results:**

| No | Measurement                                    | result  |  | Limit value               |
|----|--|---|--|---------------------------|
| 1  | calorific potential H <sub>0</sub>             | mass  | 2,391 kJ/kg  | 4,200 kJ/kg               |
|    | heat release amount                            | areic   | 12,336 kJ/m <sup>2</sup>   | 16,800 kJ/ m <sup>2</sup> |
| 2  | fire shaft-test                                | # 1   | residual length<br>max. smoke-temp smoke-int.<br>46 cm<br>110°C<br>1 % * min | >35cm<br><125°C           |
|    |  | # 2   | residual length<br>max. smoke-temp smoke-int.<br>45 cm<br>109°C<br>1 % * min | >35cm<br><125°C           |
|    |  | # 3   | residual length<br>max. smoke-temp smoke-int.<br>46 cm<br>111°C<br>1 % * min | >35cm<br><125°C           |
| 3  | smoke development under smouldering conditions | average density of smoke at comparative body temperature of | 4.3 %<br>350°C   | 30 %<br>---               |
| 4  | smoke development with direct flame contact    | max. density of smoke average residual light absorption     | 0.4 %<br>0.1 %   | 15 %<br>---               |
| 5  | toxicity                                       | has not been tested   |  |                           |

8. **Summary:**

The examined product meets with the under point 2, side 2 specified applied quantity the requirements of class A2 for non-combustible building materials according to DIN 4102, part 1 (May 1998) on massive mineral underground with a density  $\geq 1500 \text{ kg/m}^3$  and a thickness of  $\geq 6\text{mm}$ , on massive mineral underground with a density  $\geq 650 \text{ kg/m}^3$  and a thickness  $\geq 11\text{mm}$  and on non-combustible building board.

The material has not been tested for inhalation toxicity.

The examined product meets

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, 12<sup>th</sup> of May 2020

clerk in charge:



(Silke Biendara)



Head of the test laboratory



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

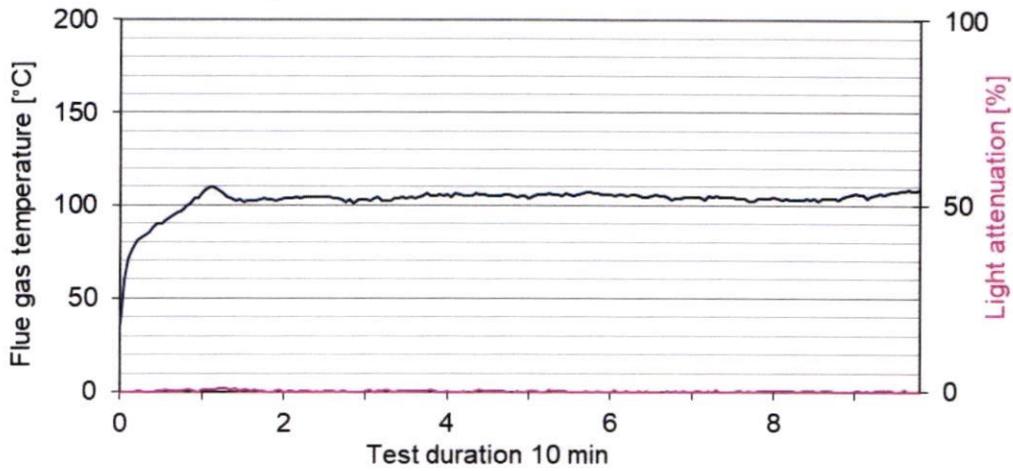


**Measurement data**

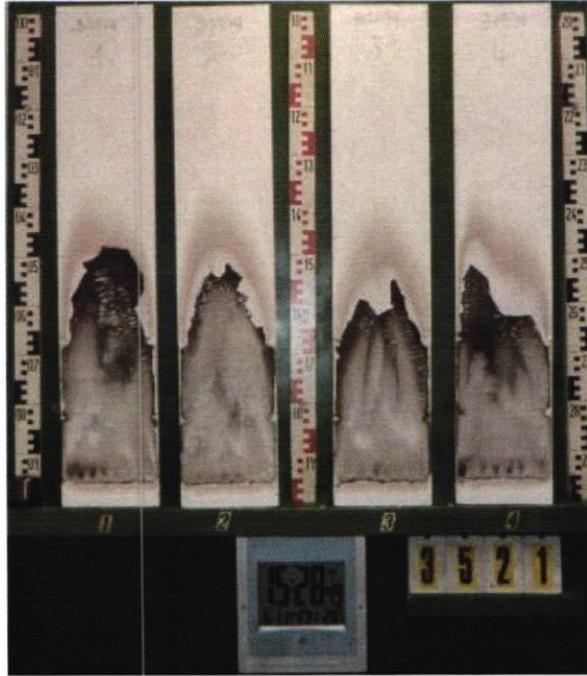
**#3520, PN31245: MIG-ESP Interior**

Max. flue temperature: 110°C, Smoke density integral: 1%/min

Residual length: 46 cm



**fire shaft-test #3521**

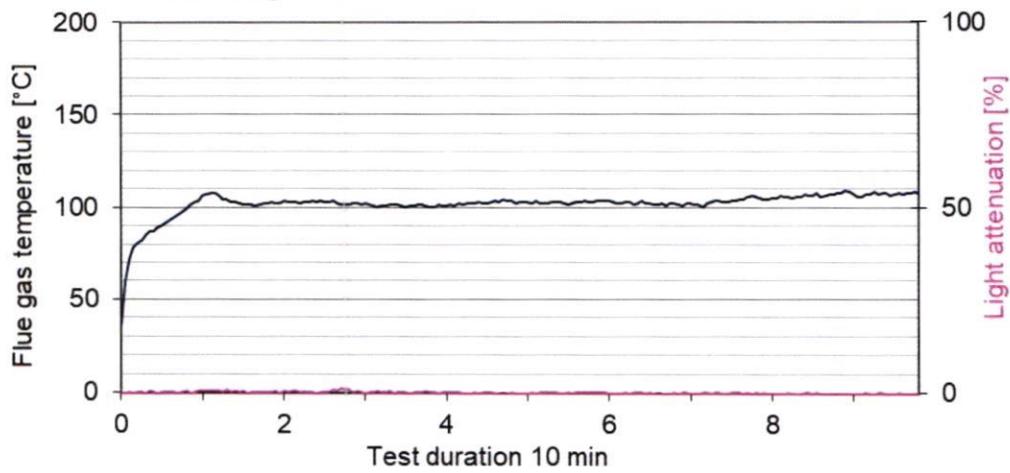


**Measurement data**

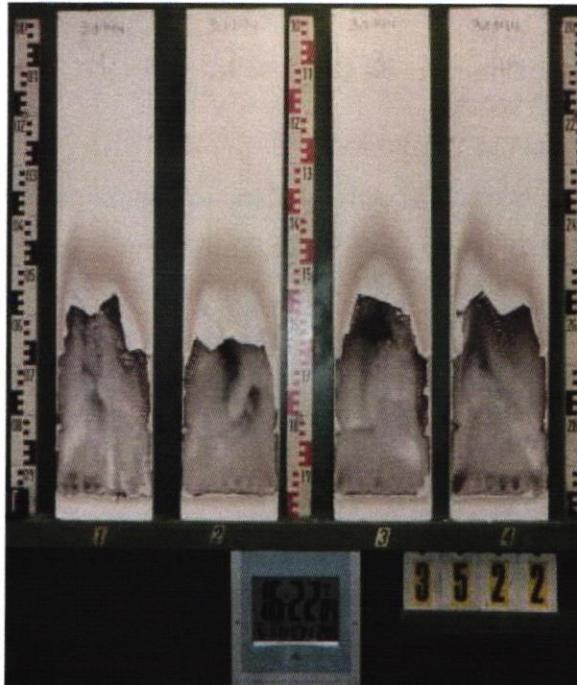
**#3521, PN31245: MIG-ESP Interior**

Max. flue temperature: 109°C, Smoke density integral: 1%/min

Residual length: 45 cm



**fire shaft-test #3522**



**Measurement data**

**#3522, PN31245: MIG-ESP Interior**

Max. flue temperature: 111°C, Smoke density integral: 1%/min

Residual length: 46 cm

