Determination of the fire resistance according to EN 1366-4: 2006 of vertical linear joints sealed with Henkel PATTEX FR55

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Project name Fire resistance vertical linear joints sealed with Henkel PATTEX FR55
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A Furnace conditions
B Test results
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1 Subject

Seals for vertical joints filled with Henkel PATTEX FR55.

2 Investigation

Fire resistance according to the European EN 1366-4: 2006.

3 Sponsor

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4 Place and data regarding the investigation

The investigation took place at the laboratory of Efectis Nederland BV te Rijswijk, The Netherlands.

Installation of the sealing material : 28th of April 2009.

5 Investigated construction

5.1 General

Four linear joint seals installed in an aerated concrete wall with a thickness of 150 mm were investigated.

5.2 Build up of the joints

The joints had the following build up:
• Henkel PATTEX FR55
  Formulation: 1611, color: grey, batch No. # 1033.
• Backing material of polyethylene foam.
Joints 1, 2, 3 and 4 were installed in the following widths: 10, 15, 20 and 25 mm. The thicknesses of the joints were equal to the width. The diameters of the back fillings were 15, 20, 25 and 30 mm.

See Figure 10.1 for a joint section drawing.

5.3 Installation of the joints

The installation was done as followed:
• Installation of the backing material.
• Placing tape on the wall.
• Installing the joint.
• Smoothening the joint.
• A similar procedure is followed for the other side of the wall.

6 Production of the construction

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SPAIN : Specimen

Efectis Nederland BV Rijswijk, The Netherlands: : Supporting construction

7 Course of investigation

7.1 Verification of the specimen

Efectis Nederland BV was not involved in the selection procedure of the specimen. During mounting the used materials and parts were verified against the supplied data.

7.2 Conditioning

From the moment of installation until the fire test the construction was stored in the laboratory of Efectis Nederland BV with the following conditions:
• Ambient temperature: 20 ± 5°C.
• Relative humidity: 50 ± 10 %.

7.3 Fire test

7.3.1 Test conditions

The test was performed under the conditions as specified in EN 1366-4: 2006, using the standard fire curve as specified in the European standard EN 1363-1: 1999. The joint was sealed on both sides of the wall with Henkel PATTEX FR55.
7.3.2 Measurements

During the heating the following data were measured and registered:
- gas temperatures inside the furnace with 4 plate thermometers (TPL 1 to TPL 4), regularly spread over the directly heated wall surface.
- The pressure inside the furnace at half the height of the length of the joints.
- The surface temperatures on the non heated side of the in the standard defined surfaces with 28 thermocouples.

The test results are given in the figures B1 to B 8.
The locations of the thermocouples are given in the figure B5.

8 Observations during heating

<table>
<thead>
<tr>
<th>Time [min]</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Start heating</td>
</tr>
<tr>
<td>210</td>
<td>The pressure readings were unusual. This was caused by the condensation of water vapour in the tube of the pressure measurement. This caused a lock. This was normalised by taking the water out.</td>
</tr>
<tr>
<td>251</td>
<td>End of heating</td>
</tr>
</tbody>
</table>

9 Summary

In Table 9.1 to Table 9.4 the test results of the investigation are given.

Table 9.1 Test result joint 1 Henkel PATTEX FR55, width 25 mm

- Integrity, E sustained flaming cotton pad 251 minutes no failure, test having been discontinued at the request of the sponsor 251 minutes
- Insulation, I 251 minutes no failure, test having been discontinued at the request of the sponsor
Table 9.2  Test result joint 2 Henkel PATTEX FR55, width 20 mm

- **Integrity, E**
  - **sustained flaming**
  - **cotton pad**
  - 251 minutes no failure, test having been discontinued at the request of the sponsor

- **Insulation, I**
  - 251 minutes no failure, test having been discontinued at the request of the sponsor

Table 9.3  Test result joint 3 Henkel PATTEX FR55, width 15 mm

- **Integrity, E**
  - **sustained flaming**
  - **cotton pad**
  - 251 minutes no failure, test having been discontinued at the request of the sponsor

- **Insulation, I**
  - 251 minutes no failure, test having been discontinued at the request of the sponsor

Table 9.4  Test result joint 4 Henkel PATTEX FR55, width 10 mm

- **Integrity, E**
  - **sustained flaming**
  - **cotton pad**
  - 251 minutes no failure, test having been discontinued at the request of the sponsor

- **Insulation, I**
  - 250 minutes
11 Direct application area of the test results

11.1 General

The results of the fire test are direct applicable on similar constructions on which one or more changes mentioned hereunder are done and that the construction still complies to applicable design rules for stability and stiffness.

It is also necessary that constructions which are connected to the wall construction have a fire resistance equal or higher than this wall construction.

11.2 Vertically tested

These test results only cover vertical joints in walls.

11.3 Supporting construction

Results from a test in an aerated concrete are valid for concrete and masonry with an equal or higher thickness and density than the aerated concrete wall. In this case the supporting construction was aerated concrete with a thickness of 150 mm and a density of 600 kg/m³.
11.4 Joint orientation

These test results only cover joints that are flush with the surface of the wall. The joint has got to be present on both sides of the wall.

11.5 Joint width

The widths of the joints are restricted to joints of 10, 15, 20 and 25 mm.

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A Furnace conditions

Figure A1: Furnace temperature
Figure A2: Deviation fire curve according to EN 1363-1
Figure A3: Furnace overpressure measured at half the height of the joints
Furnace temperature

Figure A1
Deviation fire curve according to EN 1363-1

Figure A2
Furnace overpressure measured at half the height of the joints

Figure A3
B Test results

Figure B1: Joint 25 mm, temperatures
Figure B2: Joint 20 mm, temperatures
Figure B3: Joint 15 mm, temperatures
Figure B4: Joint 10 mm, temperatures
Figure B1
Figure B2

Hans Reker

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Appendix B.3/6

Efectis Nederland, Centre for Fire Safety
Date: 27-5-2009

Joint 20 mm, temperatures

Project: Henkel PATTEX FR55
Projectnbr: 2009241

TC8
TC9
TC10
TC11
TC12
TC13
TC14

Figure B2
Figure B3
Appendix B.5/6

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Joint 10 mm, temperatures

TC22
TC23
TC24
TC25
TC26
TC27
TC28

Figure B4
Figure B5: Location of the thermocouples on the specimen
Figure C1- Specimen before the fire test as seen from the non exposed side

Figure C2- Specimen before the fire test as seen from the exposed side
Figure C3- Specimen after 4 hrs and 13 minutes of heating

Figure C4- Specimen after the fire test as seen from the exposed side