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Test of two horizontal and four vertical penetration seals for pipes of hardly and normally inflammable pipe materials (PVC-U and PE-HD) in a 300 mm thick aerated concrete wall as well as in a 150 mm and 300 mm thick aerated concrete floor to determine fire resistance under one-sided fire exposure according to prEN 1366-3.2: N185, 07/2007 in accordance with DIN EN 1363-1 : 1999 and following DIN 4102-11 : 1985-12

Reference: Information about test results

2 attachments

Dear Mr Wied,

For the extension of the application area of "ROKU System AWM II" by "B1" and "B2" pipes of outer diameter > 315 mm up to $\leq 400\text{ mm}$, burn tests were conducted on 23.01.2009, 26.03.2009 and 05.05.2009. Specimens were modified penetration seals attached around "B1" and "B2" pipes with pipe outside diameter of 400 mm running through various wall and floor constructions.

Due to capacity problems at MPA, the test report containing full details of the test and construction setup is still under progress and will be issued upon completion.

Therefore, we hereby submit short descriptions of the penetration seals, test setups and the results.

1.) Description of the aerated concrete wall, test #1, dated 23.01.2009

Blockwork wall, width 900 mm x height 3000 mm, consisting of 300 mm aerated concrete blocks incorporating two circular apertures with diameter 450 mm.

2.) Description of the floor assembly, test #2, dated 26.03.2009, and test #3, dated 05.05.2009

Dimensions of the floor: width 3000 mm x length 4000 mm (test #1) and width 2500 x length 4000 mm (test #2).

The floor of test #1 consisted of a 150 mm thick concrete floor finished with additional calcium-silicate boards on the top side of the floor with a total thickness of 300 mm around the aperture for the penetration seal.

The floor of test #2 consisted of two layers of 150 mm thick concrete slabs with a total thickness of 300 mm around the aperture for the penetration seal.

In both types of floors core drillings were made with a diameter of 450 mm.

3.) Description of the supporting system

The pipes in the wall construction were supported on both sides of the wall; pipes in the floor construction were supported only on the top side of the floor.

4.) Description of the pipe collars

Pipe collars as described in attachment 2 and identical with those as described in the Approval no. Z-19.17-1194 "Typ AWM II MAX" with pipe outside diameter 280 mm were attached around the pipes.

5.) Description of the construction

Wall construction: one pipe collar on each side of the wall, floor construction: one pipe collar on the underside of the floor. The remaining spaces between the pipes and the building component were filled with cement throughout the whole depth of the aperture.

6.) Other details

The minimum distance between each penetration seal was always > 100 mm.

7.) Pipes

Pipes made of PVC-U according to DIN 8062/63 and PE-HD according to 8074/75 of building material class B2.

8.) Test setup and procedure

Pipe collars in walls according to section 1 and in floors according to section 2 were installed by skilled workers chosen by the sponsor. One edge of the pipe extended 550 mm into the furnace and was open; the pipe was sealed on the unexposed face.

Burn tests were conducted in accordance with prEN 1366-3.2: N185, 07/2007 in connection with DIN EN 1363-1 : 1999.

The flame exposure within the fire chamber was according to the standard temperature curve in accordance with DIN EN 1363-1 : 1999-10, section 5.1.1. Thermocouples were located in accordance with DIN EN 1363-1 : 1999-10, section 4.5.1.1 and prEN 1366-3.2: N185, 07/2007, section 9.1.1.

Pressure in the furnace was adjusted according to prEN 1366-3.2: N185, 07/2007, section 5.1.

To measure temperatures of the unexposed faces of the specimens, thermocouples were installed in accordance with prEN 1366-3.2: N185, 07/2007, section 9.1.2, and located in accordance with prEN 1366-3.2: N185, 07/2007, section 9.1.

9.) Test results

During the burn tests conducted on 23.01.2009, 26.03.2009 and 05.05.2009 in Brunswick, the penetration seals as described in this letter proved to avoid for a period of 90 minutes:

- the penetration of fire and smoke
- the rise of a maximum allowed temperature of 180 K

The following table comprises the most important test results for the penetration seals as mentioned above.

Table 1: List of the most important test results:

Test	Criterion	Failure after [minutes]
Wall test, dd. 23.01.2009 Test duration: 122 minutes (test #1)	Integrity ¹⁾	122 minutes (penetration seal #1 and #2)
	Insulation performance ²⁾	122 minutes (penetration seal #1) 111 minutes (penetration seal #2)
Floor test, dd. 26.03.2009 Test duration: 122 minutes (test #2)	Integrity ¹⁾	122 minutes (penetration seal #1 and #2)
	Insulation performance ²⁾	122 minutes (penetration seal #1 and #2)
Floor test, dd. 05.05.2009 Test duration: 245 minutes (test #3)	Integrity ¹⁾	223 minutes (penetration seal #1) 245 minutes (penetration seal #2)
	Insulation performance ²⁾	222 minutes (penetration seal #1) 233 minutes (penetration seal #2)

¹⁾ sustaining flames, ignition of a cotton pad, test with feeler gauge

²⁾ exceeding a temperature rise of 180 K

10.) Particularities

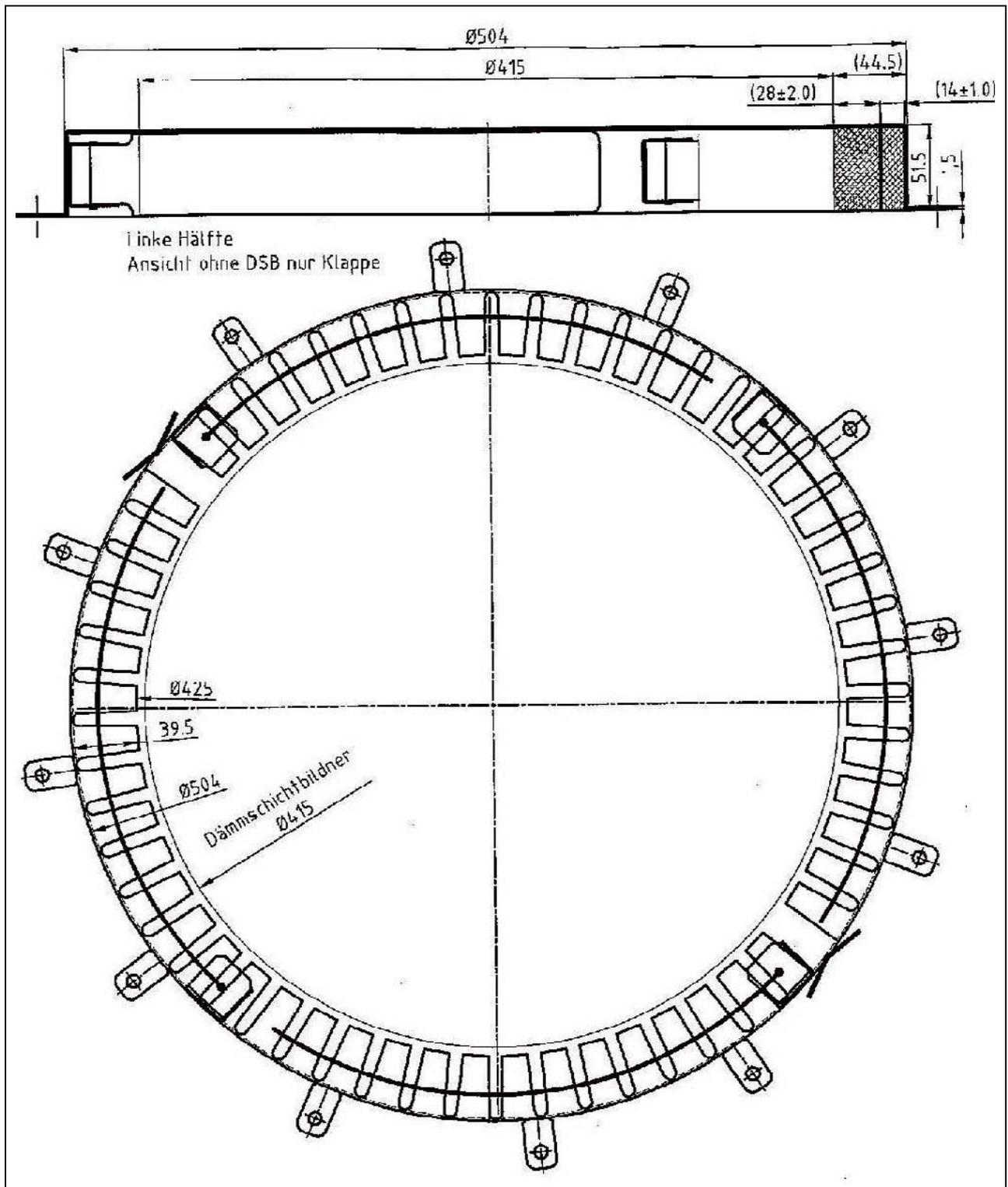
Test results, extracts as well as references to tests for commercial purposes shall not be published without permission of the testing body.

Yours sincerely,

ORR Dr.-Ing. Rohling
Department Manager

Dipl.-Ing. Rabbe
Administrator

Test of 23.01.2009: Wall							
Pipe no.	Outer diameter and material	Pipe wall thickness	Penetration seal	Dimension of ROKU Strip, 2mm thick 2 layers	Diameter of aperture	Wall thickness	Spaces filled with
1	Ø 400 mm PE	9.8 mm	Ø 400 mm AWM II MAX	42.0 x 50.0 mm	450 mm	300 mm	cement
2	Ø 400 mm PE	22.7 mm	Ø 400 mm AWM II MAX	42.0 x 50.0 mm	450 mm	300 mm	cement
Test of 26.03.2009: Floor							
Pipe no.	Outer diameter and material	Pipe wall thickness	Penetration seal	Dimension of ROKU Strip, 2mm thick 2 layers	Diameter of aperture	Floor thickness	Spaces filled with
1	Ø 400 mm PE	9.8 mm	Ø 400 mm AWM II MAX	42.0 x 50.0 mm	450 mm	300 mm	cement
2	Ø 400 mm PE	22.7 mm	Ø 400 mm AWM II MAX	42.0 x 50.0 mm	450 mm	300 mm	cement
Test of 05.05.2009: Floor							
Pipe no.	Outer diameter and material	Pipe wall thickness	Penetration seal	Dimension of ROKU Strip, 2mm thick 2 layers	Diameter of aperture	Floor thickness	Spaces filled with
1	Ø 400 mm PVC	5.0 mm	Ø 400 mm AWM II MAX	42.0 x 50.0 mm	450 mm	300 mm	cement
2	Ø 400 mm PVC	11.7 mm	Ø 400 mm AWM II MAX	42.0 x 50.0 mm	450 mm	300 mm	cement
Construction of the penetration seals Compilation of the most important data of the burn test of penetration seals				Issued by Material Prüfanstalt Braunschweig MPA Institute for building materials, construction and fire protection of the Technical University of Brunswick		Attachment 1 to Letter no. 10411/2009	



Construction of the penetration seal
 Approved pipe collar "Typ AWM II MAX" – Ø 400 mm

Issued by Material Prüfanstalt Braunschweig MPA
 Institute for building materials, construction and fire
 protection of the Technical University of Brunswick

Attachment 2 to
 Letter no. 10411/2009