

## Assessment Report

- Translation -

Document No.: (5261/998/14) – Pan of 31/10/2014

Client: Bekina Compounds NV  
Berchemstraat 124  
9690 KLUISBERGEN  
BELGIUM

Order date: 21/07/2014

Subject: Penetration elements/tiepoints provided with BeSealed sealing ring/sealing plug capable of swelling in water to be tested for water tightness, in structural elements made from concrete with a high water penetration resistance

Test material received: 21/07/2014

Sampling: Made by the client

Assessment period: August until September 2014

This Assessment Report consists of 3 pages, including the cover sheet, and 3 annexes.



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## 1 Commission

Bekina Compounds NV commissioned the Braunschweig Civil Engineering Materials Testing Institute (MPA) to test penetration elements/tiepoints provided with BeSealed sealing ring/sealing plug capable of swelling in water for water tightness, for use in structural elements made from concrete with a high water penetration resistance.

## 2 Testing and test results

For the tests, the client delivered the following penetration elements with the required sealing rings/plugs.

- Specimen 1: fibrous-concrete pipe ( $\varnothing_{\text{inside}} = 22 \text{ mm}$ ,  $\varnothing_{\text{outside}} = 40 \text{ mm}$ ) with "BeSealed" sealing ring ( $\varnothing_{\text{inside}} = 26 \text{ mm}$ ,  $\varnothing_{\text{outside}} = 34 \text{ mm}$ , depth = 10 mm) and 2 (both sides) "BeSealed" sealing plugs (plastic material with seal capable of swelling in water,  $\varnothing_{\text{outside}} = \text{approx. } 23 \text{ mm}$ , depth = 40 mm)
- Specimens 2&3: same as specimen 1, with "BeSealed" sealing plug (test with negative water pressure acting on the plug)

The test for water tightness of the contact faces was made with the penetration elements set in the concrete of concrete slabs (watertight concrete; approx. dimensions: 20 cm x 20 cm x 10 cm; compression strength class 30/37); testing based on DIN 1048-5 (Fig. A1). To allow the water to get to the regions with the sealing rings, and to allow it to escape in case of leaks, the penetration elements were wrapped with a plastic film before placing the concrete; the only region not wrapped was the sealed region. After a 28-day hardening period, the samples were placed in a water penetration test unit, and water pressure was applied in 0.5-bar steps with retention times of 48 hours, raising the pressure up to 5.0 bar, which was then maintained at a constant level for 7 days. Test results are listed in the table below.

Sample No.	Max. water pressure (bar)	Exposure time (d)	Test result <sup>1)</sup>
1	5	7	No leaks
2	5	7	No leaks
3	5	7	No leaks

<sup>1)</sup>The assessment was made for the contact face on the side opposite the water pressure

After the test for tightness, the samples were split in the middle, and the depth of water penetration was recorded (photos A2 to A4).

This document is the translated version of Assessment Report No. 5261/998/14 – Pan dated 31/10/2014. The legally binding text is the aforementioned German Assessment Report.

i.A.



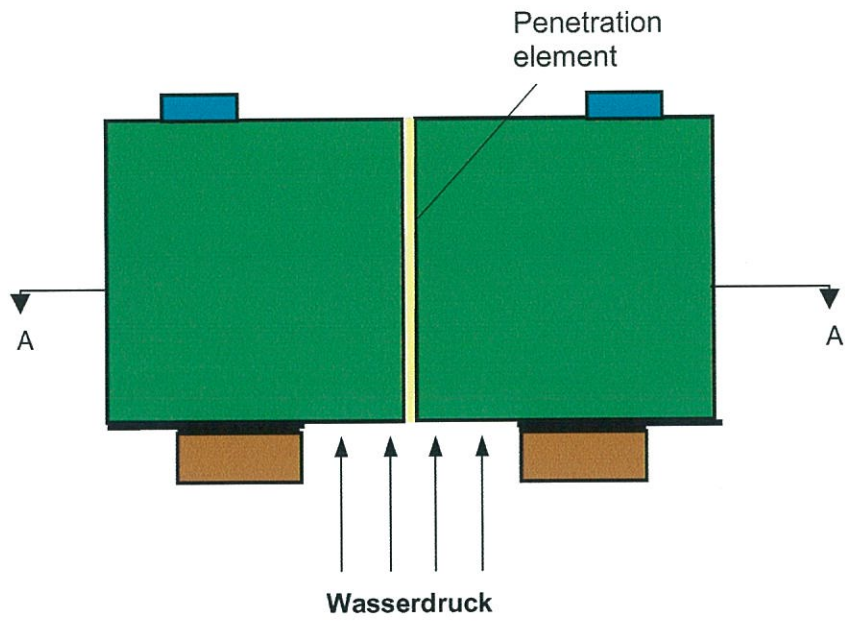
Dr.-Ing. K. Herrmann  
Head of section



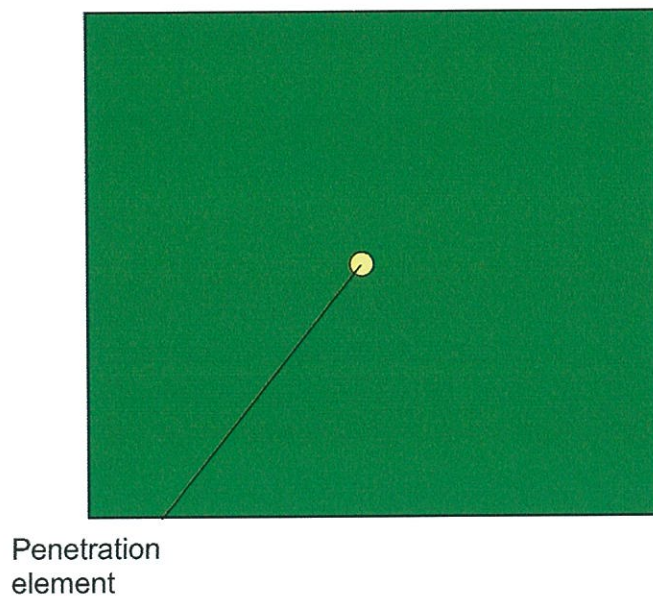
i.A.



M. Pankalla  
Engineer/official in charge



Schnitt A-A



**Fig. A1:** Sketch showing test for tightness (concrete slabs 20 x 20 x 10 cm)



**Fig. A2:** Sample 1: fibrous-concrete pipe ( $\varnothing_{\text{inside}} = 22 \text{ mm}$ ,  $\varnothing_{\text{outside}} = 40 \text{ mm}$ ) with sealing ring and 2 plugs



**Fig. A3:** Sample 2: fibrous-concrete pipe ( $\varnothing_{\text{inside}} = 22 \text{ mm}$ ,  $\varnothing_{\text{outside}} = 40 \text{ mm}$ ) with sealing ring and 1 plug (negative water pressure acting on the plug)



**Fig. A4:** Sample 3: fibrous-concrete pipe ( $\varnothing_{\text{inside}} = 22 \text{ mm}$ ,  $\varnothing_{\text{outside}} = 40 \text{ mm}$ ) with sealing ring and 1 plug (negative water pressure acting on the plug)