MFPA Leipzig GmbH
Testing, Inspection and Certification Authority for
Construction Products and Construction Types
Leipzig Institute for Materials Research and Testing
Business Division V - Geotechnics
Dr.-Ing. Ute Hornig
Work Group 5.1 - Structural Sealing

Test Report No. PB 5.1/19-178-2- abridged version

23 September 2019
No. Copy 1

Object: ***Injection System VME plus for concrete*** -
Tightness test under the influence of water pressure of 7 bar

Client: MKT Metall-Kunststofftechnik GmbH & Co. KG
Auf dem Immel 2
67685 Weilerbach

Sample receipt: 2019-06-19 (Receipt numbers: 2967-1, 2967-2)

Testing period: June to September 2019

Person responsible: M. Göpel, M.Sc.

This document consists of 4 sheets.

DAkkS Deutsche Akkreditierungsstelle D-PL-11021-01-00

Testing laboratory accredited by DAkkS GmbH according to DIN EN ISO/IEC 17025. The accreditation only applies to the test methods listed in the certificate (in this document marked with *) which can be seen on www.mfpa-leipzig.de

Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen Leipzig mbH (MFPA Leipzig GmbH)

Head Office: Hans-Weigel-Str. 2b – 04319 Leipzig/Germany
Managing Director: Dr.-Ing. habil. Jörg Schmidt
Comm. Register: Local Court Leipzig HRB 17719
VAT-ID: DE 813200649
Tel.: +49 (0) 341-6582-0
Fax: +49 (0) 341-6582-135

1 Scope of tasks

On behalf of *MKT Metall-Kunststofftechnik GmbH & Co. KG*, the watertightness of the *Injection System VME plus for concrete (ETA-19/0483)* installed in concrete with high water penetration resistance was to be tested subject to an external water pressure of 7 bar as part of an application-oriented test.

2 Object of the examinations

2.1 Fastener system

The *Injection System VME plus for concrete* being tested for watertightness consists of anchor rods VMU-A, V-A or commercially available threaded rods in sizes M8 to M30 which are inserted into the corresponding drill holes in a force-fitting manner using injection cartridge *VME plus*. The *VME plus* injection cartridge is a two-component epoxy resin which is supplied in side-by-side cartridges and is homogeneously mixed by the connected static mixer while being pushed out by the corresponding cartridge applicator gun.

To represent the different anchor rod diameters, the impermeability test for this mortar is carried out using M8 anchor rods, as these have the lowest settling depth of all diameters and thus represent the most critical case in relation to the sealing injection mortar.

2.2 Specimens

For the test, three cuboids with the dimensions 300 x 300 x 150 [mm] made of concrete C 30/37, maximum grain size 16 mm with high water penetration resistance in accordance with DIN 1045-2[1] were produced at MFPA Leipzig GmbH. Following a setting period for the concrete of at least 28 days, the anchor rods were placed centrally into the concrete cuboid using the injection cartridge in accordance with the client's specifications. After curing of the injection cartridge, the excess material on the concrete surface was mechanically removed the following day.

After a hardening period of 6 days, a circumferential slot of 90 mm in depth was cut centrally into the bottom of all specimens using a drill bit with a diameter of 50 mm. Starting from this slot, the concrete was carefully removed up to the end of the anchor using a hand chisel. Thus the end of the borehole with the end of the anchor rod was available for the visual observation of a potential water penetration during the impingement with pressurized water.

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[1] DIN 1045-2: Concrete, reinforced and prestressed concrete structures – Part 2: Concrete – Specification, properties, production and conformity – Application rules for DIN EN 206-1; 08/2008

3 Test execution

The test setup is shown in the following Figure 1.

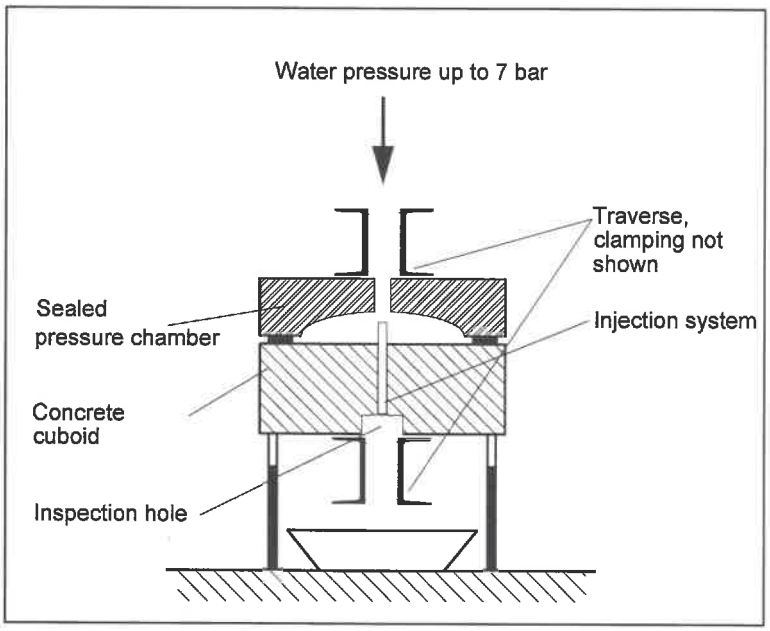

Figure 1: *schematic diagram of the test rig*

4 Results

The water pressure load on the test specimens (PK) with the *Injection System VME plus for concrete* was started 18 days after anchoring. Drinking water from the Leipzig pipeline network was used as the testing medium. The results of the examinations are summarised in Table 1.

Table 1: *Results of the impermeability test - Injection System VME plus for concrete*

Testing pressure [bar]	Test duration [d]	Water flow rate [ml/h]			Remarks
		PK 7	PK 8	PK 9	
1,0	1	0	0	0	Start of impingement with pressurised water
2,0	1	0	0	0	impermeable
3,0	1	0	0	0	impermeable
4,0	1	0	0	0	impermeable
5,0	3	0	0	0	impermeable
6,0	1	0	0	0	impermeable
7,0	14	0	0	0	impermeable

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During the entire test duration of 22 days, no outflow of water from the inspection opening underneath the anchor was detected on any of the three specimens. In terms of its impermeability, the tested *Injection System VME plus for concrete* fulfils the requirements of service class A for exposure classes 1 and 2 in accordance with the WU Guideline[2] for use in concrete and reinforced concrete structures.

The results of the tests exclusively relate to the items tested. This document does not replace a certificate of conformity or suitability according to national and European building codes.

Leipzig, 23 September 2019

Dr.-Ing. Hornig	Dipl.-Ing. Jüling	Göpel, M.Sc.
Head of Business Division	*Head of Work Group*	*Project Engineer*

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2 Directive of the German Committee for Reinforced Concrete (Deutscher Ausschuss für Stahlbeton – DAfStb) on water-impermeable concrete structures (WU Guideline), version December 2017