Materialprüfanstalt Hannover
Bauwesen und Produktionstechnik

Test report no. 174793

English version

1st copy of 5 February 2018

Ordering party:	Schomburg GmbH & Co. KG Aquafinstrasse 2 - 8 32760 Detmold
Date of commission:	04.08.2017 / Mr Beyer
Subject of commission:	Tests for determination of the process of crack healing on concrete specimens using a water resistance admixture Product: BETOCRETE CL 210-WP

The test report contains 6 pages.

The testing material is used up.

Remark: This test report is the English version of original German version of 18 December 2017.

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1. General

The ordering party has assigned MPA HANNOVER with the determination of the process of crack healing on concrete specimens using the water resistance admixture BETOCRETE CL-210-WP. The scope of the tests to be carried out has been determined by the ordering party and is set out in section 3. This test report states the results of the tests.

2. Delivery of samples

On 20.08.2017 by an employee of the ordering party:

20 kg Cement CEM I/52,5R type „Milke Classic“ in a drum

and on 25 January 2017:

1 kg BETOCRETE CL 210-WP, in a can, produced by Schomburg

The aggregate for manufacture the concrete was provided from the stock of MPA HANNOVER.

Weser sand 0/2
Weser gravel 2/8
Weser gravel 8/16

3. Scope

The scope of performed tests is listed in Table 1. The tests were performed each at the reference concrete (reference) and at the concrete produced with the water resistance admixture (CL 210-WP).

Table 1: Scope of testing

Test ID	Type of test	Standard	Age of sample	No. of samples
1	Determination of crack healing based by the decrease of water flow rate over time	Specification of the ordering party	33 d	1

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4. Results

4.1 Manufacture of samples

The samples for determination of crack healing were produced according to DIN EN 12390-2:2009-08. A forced mixer UEZ Jetmix ZM 80 was used for the mixing. The mixing time was 2 min after addition of water. The water resistance admixture was added separately after begin of mixing. The water content of the admixtures was taken into account with 70 M.-% for the calculation. The compositions of mixtures are listed in Table 2. From this mixture, the specimens were prepared for the solid concrete tests. They were de-moulded after 1 day and afterwards stored under water at 20 °C for 6 days.

Table 2: Composition of mixtures

Raw material	Quantity		Mass kg/m³
Cement	-	-	350
Water	-	-	193
w/c-ratio	-	-	0,55
Sand 0-2 mm	M.-% of aggregate	35	627
Gravel 2-8 mm		30	533
Gravel 8-16 mm		35	625
Betocrete CL 210-WP	M.-% of cement	2.00	7.00

4.2 Bulk density of fresh concrete, air content and flow table test

The properties of fresh concrete were determined according to DIN EN 12350-5 (flow table test). The results are listed in Table 3.

Table 3: Results of test on fresh concrete

Date of testing:		30.08.2017
Air temperature	°C	20
Flow table test A after water addition in mm	5 min	390

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APPENDIX

Appendix A-1: Sample before crack initiation

Appendix A-2: Sealed sample

Appendix A-3: Special test setup for testing the passage of the amount of water through the crack

Appendix A-4: Amount of flow measurement

Casting of sample:	30.08.2017
Crack initiation:	06.09.2017
Start of water admission:	02.10.2017

Date	Age of testing hh:mm	Flow amount ml/h
02.10.17	07:45	889
04.10.17	08:50	365
05.10.17	08:30	532
06.10.17	05:30	560
09.10.17	07:50	952
10.10.17	08:45	399
11.10.17	08:30	473
12.10.17	08:30	240
13.10.17	05:15	165
16.10.17	08:15	209
17.10.17	07:15	206
18.10.17	07:15	162
19.10.17	08:00	128
20.10.17	05:00	126
23.10.17	08:00	128
24.10.17	07:00	79
25.10.17	07:55	64
26.10.17	11:00	57
27.10.17	07:30	42
01.11.17	08:15	190
02.11.17	08:00	29
03.11.17	04:45	66
06.11.17	08:00	20
07.11.17	07:10	16
08.11.17	07:15	16
09.11.17	08:00	15

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4.3 Determination of the process of crack healing

The sample was stored 6 day under water and 1 day at 20 °C / 65 % r. H.. Afterwards, the sample was clamped (see Appendix A-1) and a vertical tensile splitting crack initiated using a compressive testing machine. This was then widened around the entire cube manually with a chisel to 0.35 ± 0.05 mm. On the top side of the cube, a test tube was subsequently glued over the crack to take up the test liquid with silicone (Ecosil-2000, Schomburg GmbH). The test fluid used was tap water from Stadtwerke Hannover at 12 to 14 ° dH. The crack flanks remaining outside the test tube and the underside of the cube were then sealed against penetration of water with epoxy resin (Asodur-EK98-Boden, Schomburg GmbH) (see Appendix A-2).

To determine the passage of the amount of water through the crack, a water column of 30 cm height was applied every working day for about 8 h in the test tube by means of the special test setup (see Appendix A-3) and the amount of water that had passed through the cube was documented. From these values, the change in the flow rate over time was determined. The results of the measurements are shown in Appendix A-4 and the summary is shown in Figure 1.

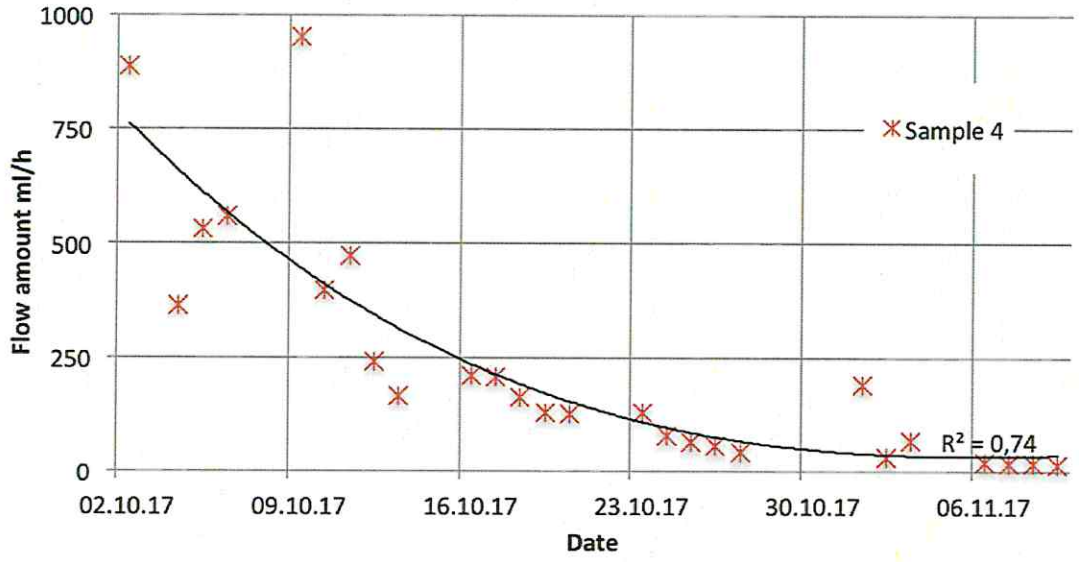

Figure 1: Crack healing

Hanover, 5 February 2018
Head of Testing Institute
By Proxy

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