LABBET®
ZKUŠEBNÍ LABORATOŘ
STAVEBNÍ MATERIÁLY, HMOTY, VÝROBKY, STAVEBNÍ KONSTRUKCE A OBJEKTY, DIAGNOSTIKA
BETOSAN s.r.o., Nová cesta 291/40, 140 00 Praha 4 - Krč

Pracoviště – Praha
telefon: 241 431 215
702 136 567
fax: 241 431 215
e-mail: labbet@labbet.cz

Zakázkové číslo: L-003/2019
Počet výtisků: 2
Výtisk číslo: 1 2
List číslo/Počet listů/Příloh: 1/2/1
Datum vystavení: 22. 05. 2019

Customer: XYPEX CE s.r.o.
Thakurova 7, Praha 4, Czech Republic

REPORT No. L-003/04/2019

Subject:

Analysis of waterproofing test results of hardened concrete containing Xypex® Admix C 1000 NF.

Data sources for analysis:

The analysis was completed on archived waterproofing test documents, issued by the accredited test laboratories (AZL) No. 1048-OL 123 at FSv. ČVUT in Prague and AZL No. 1687 LABBET® at Betosan s.r.o. Prague. The test reports were commissioned by NEKAP s.r.o. in the years 2013 to 05/2019.

All water tightness tests of concrete were carried out according to EN 12390-8, which involves testing one side of a 150 mm cube-shaped test specimen (alt. 150 mm-diameter cylinders-shaped specimen) with pressurized water at 0.5 MPa (i.e. 5 atm or 50 m water column) for 72 hours and measuring the depth of water penetration. Following pressurization, the specimens were split and the tensile splitting strength was recorded.

A majority of the test specimens were made on the construction site, either by the contractor or by a NEKAP technician; the rest were made at the batch plant of the concrete producer.

A total of 90 test sets were completed from 58 monitored construction projects, where Xypex® Admix C 1000 NF was added to at least a part of the reinforced concrete structure. In one case, the admixture Xypex® Admix C 500 NF was used. One set of test specimens was supplied from Poland by Nomos-BUD, with concrete produced by MOBILBET SP.zo.o./HaBe, another set was supplied by ENKA Technologies, Greece. Company INSINÖÖRITOIMISTO SULIN OY, Finland supplied specimens produced by Luja Betoni and Swerock.

The monitored concrete was produced at 20 concrete batch plants of the 6 largest Czech concrete producers (SKANSKA Transbeton, TBG Metrostav, CEMEX Czech Republic, ZAPA concrete, Kamen Zbraslav, Frischbeton) and at the 4 above noted concrete producers.

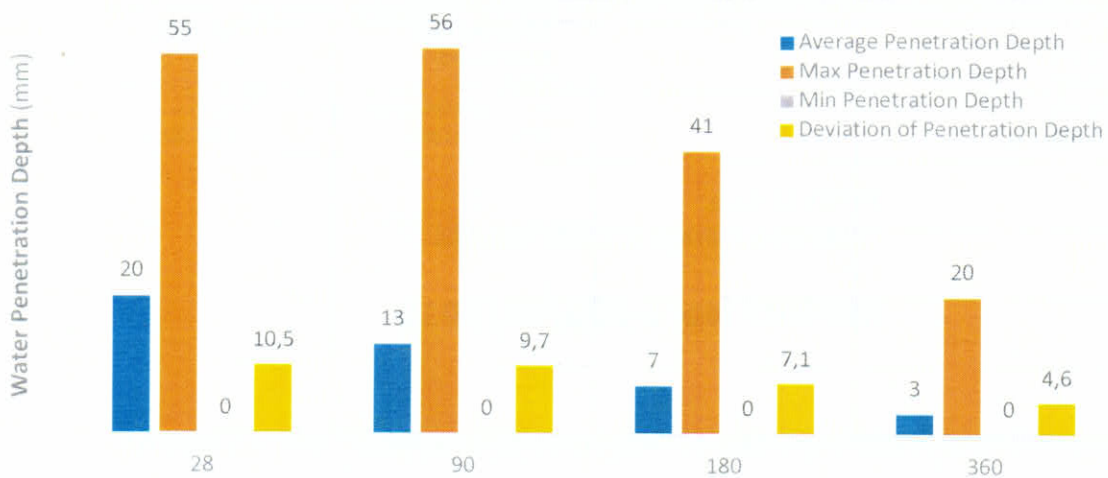
Method of evaluation:

The results of watertightness of concrete were evaluated together in one data file for statistical evaluation without taking into account their design strength class and other additional specifications such as environmental class or others characteristics.

The main criteria for assessing the watertightness of hardened concrete (depth of water penetration) was the standard strength class ages of 28 and 90 days. In cases where more test specimens (ie 3 or more cubes) were available, the water penetration tests were also performed at 180 and 360 days.

Results of analysis and evaluation:

The analysis of results was done using standard statistic variables including average, max and min depth and the standard deviation. The results of the analysis are clearly presented in the following graph.



The analysis of the results shows that the average water penetration depth into the hardened concrete at the nominal strength dates of 28 and 90 days, is at 20 mm and 13 mm respectively. This confirms the relatively good water tightness of the tested concrete.

The analysis also shows a steadily decreasing tendency in all monitored parameters during the follow-up tests at 180 and 360 days. There is a 65% drop in average water penetration between test completed at 28 and 180 days. There is also a 77% drop in average water penetration depth between 90 and 360 days.

It should be noted that in order to enhance the activity of the Xypex® Admix C 1000 NF, the test specimens were stored in the closed boxes in the laboratory, immersed approx. 30 mm in water. This curing regime partially simulates the actual conditions on the site, with concrete being exposed to water only on one side, either by ground moisture or by pressurized water from the surrounding environment of the building.

It should also be noted that the vast majority of the test specimens were made at the construction site at the time of the concrete placement, ranging from January to December. The laboratories received the specimens at different ages of the specimens, usually without detailed information regarding the demoulding time and the actual site storage conditions.

The tested portfolio of specimens included: 39 sets of specimens made from C 30 / 37-90d concrete, 22 sets of C 30/37-28d, 16 sets of C 25 / 30-90d concrete, 6 sets of C 25/30 concrete, and in 7 cases the concrete was not identified by the contracting entity. This proportional representation of concrete in the monitored projects shows that most designers of reinforced concrete structures choose 90 days concrete and this way help to eliminate the known risks of hydration processes in the hardening of concrete, the effect of which is usually the development of shrinkage cracks.

The analysis of the water tightness tests on the sets of concrete unambiguously confirms the positive effect of Xypex® Admix C 1000 NF on the water tightness of hardened concrete. This applies even in cases where the concrete designers specified concrete mix designs to ensure the concrete waterproofness e.g. max. water penetration depth of 20 to 50 mm, applicable for 50 to 100-year service life as required by the ČSN P 73 2404 norm for buildings constructed in the Czech Republic.

Appendix: Overview of projects, and individual results of water tightness tests

Written by: Ing. Milan Myška, Ph.D.
technical leader of AZL LABBET®