

ABSTRACT

**Collection of experimental data on the leaching
behavior of fresh concrete with different
compositions**

F 7058

DIBt-no. P 52-5- 20.52-1346/10

In the context of this research project six concretes, which consist of a Portland cement, a Portland limestone cement and a blast furnace cement in combination with two different fly ashes and a silica fume, were examined with different leaching tests. The aim of this research project was to provide an experimental data base for the assessment of leaching during the fresh phase of concrete in the context of technical approvals.

A Portland cement, a Portland limestone cement and a blast furnace cement, all of which come from the same plant, were selected for the investigations. The Portland cement was further combined with two different fly ashes and a silica fume respectively, so that in total six binders or binder combinations were examined. The contents of heavy metals in the starting materials were representative. For most of the heavy metals the fly ashes had higher contents than the cements and silica fume.

In the first leaching test, a simple laboratory test called fresh concrete tank test, the fresh concrete was placed in a special mold and the surface was exposed to deionized water, which was renewed at specified time intervalls. The experiment lasted for 57 days. In addition, a more practical dynamic test was performed with three selected concretes. Here fresh concrete was placed on the sand, through which running water flowed. The running water should simulate flowing groundwater. For the period between two eluate-samplings a mixed sample was taken from the overflow and analyzed. For comparison, a long term tank test was performed with the three concretes.

Comparing the various binder combinations, it was observed that despite higher contents of heavy metals the concretes, which contain the fly ashes, did not show higher releases of the most of heavy metals.

In this research project, conversion factors between the simple laboratory test (fresh concrete tank test), and the more praxisrelevant dynamic test were derived in the same way as done in /1/. The conversion factors were dependent on the environmentally relevant substances and the compositions of the concretes. The conversion factors of most of environmentally relevant substances (except vanadium), which were determined from Portland cement concrete, met the worst case.

In the fresh concrete tank test with the following long-term tank test, the release of chromium was 10 times, and the release of other heavy metals was 2 to 5 times higher than in DAfStb long-term tank test. The exception was lead, the release of which was highest in DAfStb long-term tank test. In the DAfStb long term tank test, the release of most of environmentally relevant substances was underestimated. Whether the test can still be used for the assessment must be decided by the responsible committees of DIBt.

- /1/ Brameshuber, W. ; Vollpracht, A.: Erarbeitung eines Bewertungskonzepts zur Auslaugung aus Frischbeton. Aachen : Institut für Bauforschung, 2007. – Forschungsbericht Nr. F 944