

The effectiveness of laboratory expansion tests in the identification of slowly reactive aggregates

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Abstract

Cases of alkali-silica reaction were reported for the first time in Portugal in the 1990s, mainly associated with slowly reactive aggregates of granitic composition used in large dams. A research project was developed aiming at the determination of the most effective laboratory test for the identification of the alkali reactivity of this type of aggregates. The laboratory tests followed the recommendations and standards developed under the scope of RILEM Committee on Alkali-Silica Reaction, namely the petrographic method and the concrete prism tests at 38°C (RILEM AAR-3) and 60°C (RILEM AAR-4.1). Also accelerated mortar bar tests were performed according with ASTM C1260 standard.

The results obtained in the last 4 years for about 40 granitic samples show that although the petrographic method can be very useful for the identification and quantification of potentially reactive forms of silica, it is mandatory to evaluate the variability of granularity of the rocks at the quarries' scale and the possible presence of faults or dykes with which the occurrence of microcrystalline quartz might be associated. It could be confirmed that the ASTM C1260 (80°C, immersion in 1M NaOH solution) accelerated mortar bar test, with its generally accepted limits, is ineffective for granitic aggregates. A suggestion is given for the revision of the threshold and/or the duration of the test. The concrete prism test AAR-4.1 (60°C, relative humidity>95%) proved to be more effective to identify a larger number of slowly reactive granitic aggregates than the AAR-3 (38°C, relative humidity>95%). The results are discussed in relation to two different criteria proposed by other authors.