

PROGNOSIS OF INTERNAL EXPANSIVE REACTIONS IN CONCRETE STRUCTURES

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ABSTRACT

In the last decade, a significant number of problems related to concrete deterioration have been detected in concrete civil infrastructures in Portugal; the leading cause being internal expansive reactions (IER), more specifically, alkali-silica reaction (ASR) and internal sulphatic reaction (ISR).

The reasoning behind the detection of an increasing number of affected structures is threefold, greater awareness of the technical and scientific community regarding IER and their consequences on large concrete structures, improvement of the methods utilized in IER diagnosis, and the fact that IER distress signs only appear several years or decades after construction. In addition to a correct diagnosis, the quantification of the current concrete condition and the evaluation of the potential for future deterioration still existing in the affected concrete structure (prognosis) are also of utmost importance, so that the risks to structural integrity and need for mitigation/remediation actions can be properly assessed.

This communication briefly presents a recent study carried out at LNEC of an IER affected concrete structure and the methodology used to make a prognosis on the condition of the deteriorated structure.

KEYWORDS: concrete civil infrastructure deterioration, IER, ASR, ISR, prognosis, mechanical properties, residual expansion, SDT.