

Alkali–silica reaction in concrete

Simplified guidance for new construction using normal reactivity aggregates

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BRE Centre for Concrete Construction

Concrete can deteriorate as a result of an interaction between alkaline pore fluids (principally originating from the Portland cements) and reactive minerals in certain types of aggregates.

The mechanism of deterioration is known as alkali–aggregate reaction (AAR); it can occur in a number of forms, the most common being alkali–silica reaction (ASR).

This Digest is in four parts

Part 1 gives the background to the detailed and simplified guidance contained in Parts 2 and 4.

Part 2 gives detailed guidance for minimising the risk of damaging ASR in new construction.

Part 3 gives worked examples.

Part 4 gives simplified guidance for new construction using aggregates of normal reactivity.

ASR map cracking between more substantial but unrelated structural cracks



This Part of the Digest contains simplified, essential recommendations for minimising the risk of damaging ASR. It applies to concrete in which aggregates of normal reactivity are to be used with cementitious materials in mix designs commonly used in the UK. The decision to provide simplified guidance was taken in response to comments received at the public comment stage when the 1997 revision of this Digest was being prepared. This simplified guidance is not a substitute for the full recommendations: readers with doubts about any aspect of this guidance should refer to the full text in Part 2.

Because the guidance for aggregate combinations classified as having normal reactivity is more onerous than that for low reactivity aggregates, the guidance here can be used for both.

Guidance

The recommendations in this Digest are based on the principle that different limits can be set for alkali contents of concrete; these limits depend on the reactivity classification of the aggregate combination, and on the alkali content of the Portland cement or of the CEM I component of a combination with ground granulated blastfurnace slag (ggbs) or pulverised fuel ash (pfa).

The simplified guidance given in Table 1 applies in the majority of cases of concrete for new construction where aggregates have been classified as having normal reactivity (see Table 2). The qualifying conditions on page 3 which underpin the guidance must also be met. **If you are in any doubt, refer to Part 2 of this Digest.**